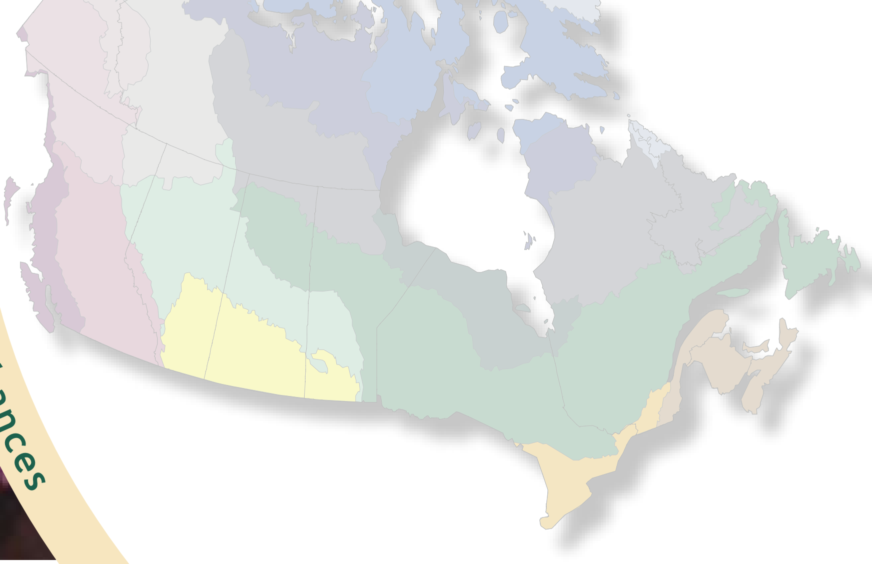
Operational-Scale Carbon Budget Model of the Canadian Forest Sector (CBM-CFS3) Version 1.0: USER'S GUIDE



S.J. Kull, W.A. Kurz, G.J. Rampley, G.E. Banfield, R.K. Schivatcheva and M.J. Apps
Northern Forestry Centre

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ABSTRACT

The Carbon Budget Model of the Canadian Forest Sector (CBM-CFS3), Version 1.0 presented in this user's guide was developed to meet the operational-scale forest carbon accounting needs of forest managers and analysts across Canada. The CBM-CFS3 is a stand- and landscape-level modeling framework that can be used to simulate the dynamics of all forest carbon stocks required under the United Nations Framework Convention on Climate Change and the Kyoto Protocol. It is compliant with the carbon estimation methods outlined in the guidelines of the Intergovernmental Panel on Climate Change (IPCC). The model uses much of the same information that is required for forest management planning activities (e.g., forest inventory, growth and yield curves, natural and human-induced disturbance information, forest management schedule and land-use change information), supplemented with information from national ecological parameter databases. With this sophisticated but user-friendly software tool, users apply their own stand- and landscape-level forest management information to calculate carbon stocks and stock changes for the past (monitoring) or into the future (projection). Users can also create, simulate and compare various forests management scenarios in order to assess impacts on carbon. Tools supplied with the model assist users with importing required data from common timber supply models such as Remsoft Spatial Woodstock™ and the Strategic Forest Management Model© (SFMM) or from user-developed data files. The model contains graph user interfaces to help prepare data, define scenarios, perform analyses, and examine results. Results of analyses can be used for various types of forest ecosystem carbon reporting requirements. Although the model currently contains a set of default ecological parameters appropriate for Canada, these parameters can be modified by the user, allowing for the application of the model in other countries.

RÉSUMÉ

Le Modèle du bilan du carbone du secteur forestier canadien (CBM-CFS3), version 1.0 présenté dans ce guide d'utilisation a été développé afin de répondre aux besoins de comptabilité du carbone forestier à l'échelle opérationnelle qu'ont les aménagistes et analystes forestiers à travers le Canada. Le CBM-CFS3 est un cadre de modélisation à l'échelle du peuplement et du paysage qui peut servir à la simulation des dynamiques des stocks de carbone forestier comme requis par la Convention-Cadre des Nations Unies sur les changements climatiques et par le Protocole de Kyoto. Il se conforme aux méthodes d'estimations citées par le document Recommandations en matière de bonnes pratiques pour le secteur de l'utilisation des terres, changements d'affectation des terres et foresterie issu du Groupe d'experts intergouvernemental sur l'évolution du climat (GIEC). Ce modèle emploie plusieurs informations qui sont déjà requises pour la planification des activités d'aménagement forestier (par ex. inventaire forestier, courbes de croissance et de rendement, données sur les perturbations naturelles et anthropiques, calendrier d'exécution de l'aménagement forestier et données sur les changements de vocation du territoire), complétées par des informations provenant de bases de données écologiques nationales. Au moyen de cet outil informatique sophistiqué mais convivial, les utilisateurs peuvent intégrer leurs propres informations relatives à l'aménagement forestier à l'échelle du peuplement et du paysage pour calculer les stocks

de carbone et les changements de ces stocks dans le passé (surveillance) ou dans l'avenir (projection). Les utilisateurs peuvent aussi créer, simuler et comparer divers scénarios d'aménagement forestier afin d'en évaluer les impacts sur le carbone. Les outils fournis avec le modèle sont conçus pour aider les utilisateurs à importer les données requises à partir de modèles courants d'approvisionnement en bois comme Remsoft Spatial Woodstock™ et Strategic Forest Management Model© (SFMM) ou encore depuis des fichiers de données faits sur mesure par les utilisateurs eux-mêmes. Le modèle contient des interfaces utilisateur graphiques pour aider à préparer les données, à définir des scénarios, à effectuer les analyses et à examiner les résultats. Les résultats des analyses peuvent servir à divers types de comptes-rendus sur le carbone des écosystèmes forestiers. Bien que le modèle contienne des paramètres écologiques par défaut qui s'appliquent au Canada, ces paramètres peuvent être modifiés par l'utilisateur, ce qui permet d'appliquer le modèle dans d'autres pays.

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PREFACE

The operational-scale Carbon Budget Model of the Canadian Forest Sector (CBM-CFS3) is the result of over a decade of dedicated research work in the areas of the forest and global carbon cycles by Senior Research Scientists Mike Apps (retired) and Werner Kurz at the Canadian Forest Service. Initially developed as a research model and named the CBM-CFS2, the model was used to simulate and track, over a given period of time, stand- and landscape-level carbon dynamics at multiple scales (nationally, provincially, at the forest management unit level, and at the stand level). The CBM-CFS2 was used to analyze past and future changes in forest biomass and dead organic matter carbon stocks. It also helped researchers to explore how natural disturbances, forest management, growth, and decomposition rates might affect forest carbon stocks. Various reports (Kurz et al. 1992) and papers (Kurz and Apps 1999; Kurz et al. 2002) were published in relation to this work. The CBM-CFS2 was developed with partial funding from the Panel on Energy Research and Development (PERD) administered by Natural Resources Canada.

The CBM-CFS3 was developed by the carbon accounting team (CFS-CAT) of Natural Resources Canada's Canadian Forest Service, led by Dr. Kurz. The CFS-CAT comprises team members from both the Pacific Forestry Centre, in Victoria, British Columbia, and the Northern Forestry Centre, in Edmonton, Alberta. The team comprises Werner Kurz, Caren Dymond, Stephen Kull, Juha Metsaranta, Michael Magnan, Eric Neilson, Greg Rampley, Cindy Shaw, Brian Simpson, Carolyn Smyth, Graham Stinson, Thomas White, and Gary Zhang. Past team members were Mike Apps, Ed Banfield, Kevin Belanger, Roozbeh Ghafary, Markus Jeon, Murugi Larsen, Ruth Parnall, Tina Schivatcheva, Zhanxue Zhu, and students Orion Carrier, Dylan Dawson, Ka-Lok Fung, Daniel Heeb, Ling Li, Scott Morken, Jocelyn Stacey, Duncan Taylor, Simon Yuen, and Weimin Zhu. Many others were involved in the design, review, and implementation of the CBM-CFS3.

The CBM-CFS3 was developed in partnership with funding assistance from the Canadian Model Forest Network (CMFN), for free availability and use. Funding was also provided by the Climate Change Action Fund and Action Plan 2000.

CHAPTER 1

INTRODUCING THE CBM-CFS3

This chapter provides an overview of how the operational-scale Carbon Budget Model of the Canadian Forest Sector (CBM-CFS3) can be used to account for carbon stocks and changes in carbon stocks on a managed forest landscape. Major concepts underlying the CBM-CFS3 and the major steps required to use the CBM-CFS3 for analysis and reporting purposes are introduced.

1.1 About the CBM-CFS3

The CBM-CFS3 is a landscape-level model of forest ecosystem carbon dynamics that can be used by forest managers and analysts to assess the carbon stocks and changes in carbon stocks in their operational forest areas. Although developed primarily to assess carbon dynamics at the operational scale, the model can also be used to explore carbon dynamics for smaller areas, down to the stand level. The model can be used to assess past changes in carbon stocks using information on management actions and natural disturbances that have occurred or to evaluate future changes that would result from scenarios of management actions and natural disturbances. The CBM-CFS3 accounts for carbon stocks and stock changes in tree biomass and dead organic matter (DOM) pools (Figure 1-1).

This user's guide introduces many of the main concepts of forest carbon modeling but does not provide detailed explanations of the methods or algorithms used by the model. This document describes how to use the model and provides suggestions for the efficient application of the model in forest management planning. Earlier versions of the CBM-CFS have been described in various publications (Kurz et al. 1992; Kurz et al. 1996; Kurz and Apps 1999; Li et al. 2003).

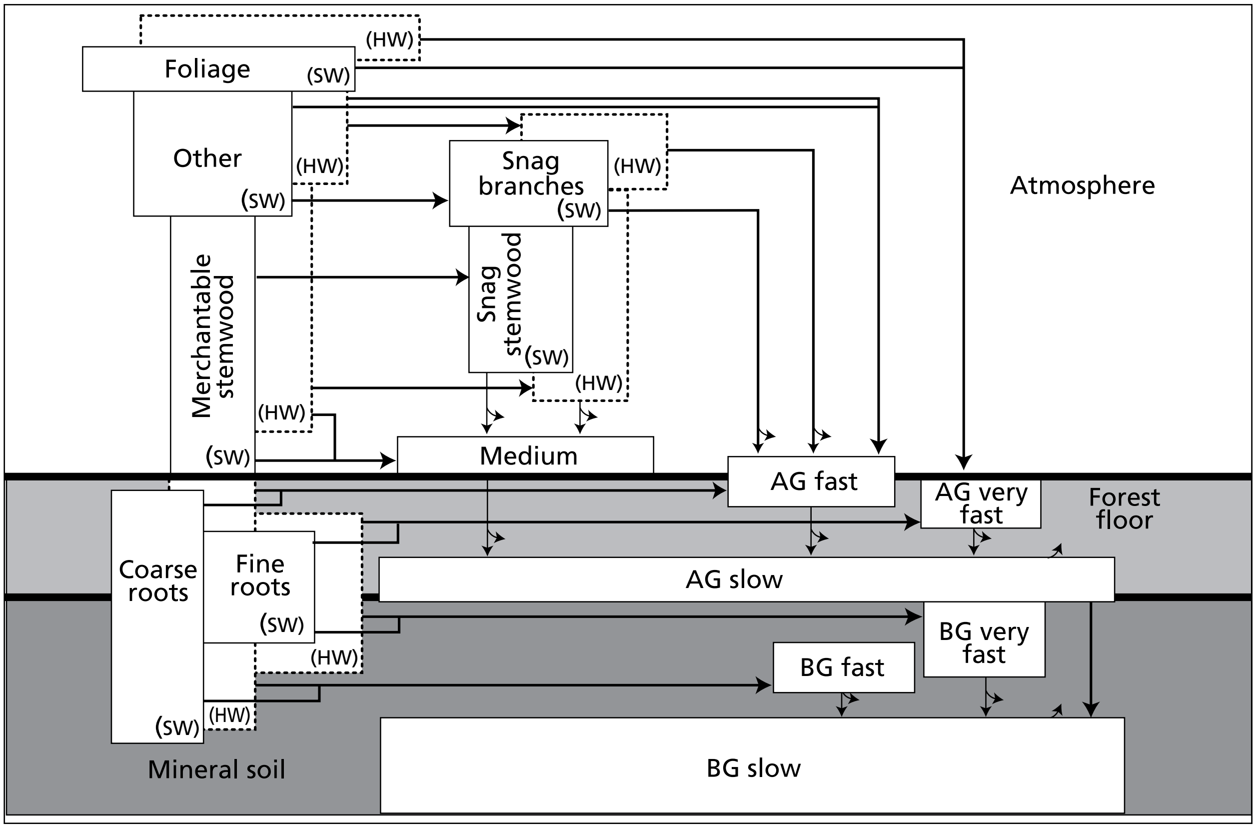


Figure 1-1. The carbon pool structure of the CBM-CFS3. "Very fast," "fast," "medium," and "slow" refer to the relative decay rates for the pools. Curved arrows represent transfers of carbon to the atmosphere, and straight arrows represent transfers from one pool to another. SW = softwood, HW = hardwood, AG = aboveground, BG = belowground.

1.2 Forest Management Planning

Consultations with forest managers and analysts during the design phase for the operational-scale version of the CBM-CFS3 highlighted the fact that, when used as an indicator, forest carbon would have to be viewed in the context of other forest planning indicators. Moreover, the model would have to be designed for ease of use by forest planners and analysts and would have to consider existing forest inventory and growth and yield information. In response to these requests, the CBM-CFS3 builds, to the greatest extent possible, on forest inventory and growth and yield information that is commonly used in forest management planning (Kurz et al. 2002). The CBM-CFS3 can help forest managers to meet carbon-related criteria and indicator reporting requirements of provincial and territorial governments, sustainable forest certification organizations, and the Kyoto Protocol (The Kyoto Protocol to the Convention on Climate Change 1992).

The CBM-CFS3 allows users to explore a range of situations, including the effects of different levels of natural disturbances and management actions, and changes to growth and yield. The model can be used as a landscape-planning tool to evaluate the likely consequences for carbon of alternative management scenarios and thus to assist in the development of management plans for forest management areas. The primary intention, however, is that the model be used in combination with existing planning tools. It can also be used to assess the impacts of past management activities on carbon stocks within a forest management area.

1.3 Relation to International Reporting Requirements

The Canadian Forest Service (CFS), in cooperation with other federal departments, provincial and territorial agencies, universities, and the forest industry, is currently developing Canada's National Forest Carbon Monitoring, Accounting and Reporting System (NFCMARS) (Kurz and Apps 2006). This system will be used to prepare the annual estimates of carbon stock changes and greenhouse gas emissions other than carbon dioxide (CO_2) on Canada's managed forest. These estimates are submitted annually under the United Nations Framework Convention on Climate Change (UNFCCC) and will in future also be used to prepare the submissions required under the Kyoto Protocol. The NFCMARS uses the CBM-CFS3 as its core model (albeit in a version that is somewhat more complex than the operational-scale version). The operational-scale version of the CBM-CFS3 will aid forest managers in assessing and understanding the contributions of their forest estates to the provincial and national totals.

1.4 Representation of Space

The CBM-CFS3 is an aspatial model. Each record represents a stand or a group of stands with similar attributes. The members of a group of stands need not be contiguous.

The total area included in an analysis is divided into one or more spatial units (SPU). Within each SPU, the locations of the stands represented by the records are not known, but the total forest area and its attributes are described by the information in the records.

The model does not recognize adjacencies or other spatial relationships of stands within an SPU. It performs both stand-level and landscape-level simulations. At the stand level the model simulates ecosystem carbon dynamics such as growth, litterfall, decomposition, and the impacts of management and disturbances. At the landscape level the model selects and schedules stands for management actions and natural disturbances. The model loads all stands that are members of an SPU into memory and conducts all operations on those records.

The user has the option of defining multiple SPUs as members of a disturbance group to which specific rule sets are applied (explained in more detail in Chapter 6, section 6.2). If this is done, then all records of all SPUs in the disturbance group are loaded for a simulation.

A large analysis area with a very large number of records can be broken into SPUs and disturbance groups. Each SPU can be simulated independent of all others that are not members of its disturbance group.

1.5 Capabilities and Limitations

As stated earlier, the CBM-CFS3 is an aspatial model. The size of the area represented in the model is constrained only by the number of records that are loaded when the model simulates an area. This includes all records for the SPUs contained in a disturbance group.

The model can be used to simulate a single stand. The upper limit of the number of stands that can be simulated depends on the user's computer configuration, specifically the amount of memory available to the model. Simulation runs with several thousand records have been executed. In one of the most computationally intensive applications to date, the model simulated approximately 1.4 million records distributed across some 100 disturbance groups (in that case, administrative management units), each of which comprised several ecological SPUs (for a total of nearly 800 SPUs).

The model works in annual time steps. It is not possible to simulate time steps of less than 1 year. Research applications of the model have simulated periods extending over several centuries, but for most applications shorter simulation periods are more appropriate.

The CBM-CFS3 incorporates the best available science, and efforts will be made to continually review the performance of the model against new scientific findings.

At this time, the model does not address the following situations:

Peatland carbon dynamics: Although forested peatlands are recognized as an important contributor to carbon stocks in Canada, little is known about the impacts of management, disturbances, and climate change on fluctuations in water tables. Without the ability to predict changes in the water table for records in the peatland component of the forest inventory, it is not possible to predict the associated changes in carbon stocks in the peat component of the system. This issue is the subject of ongoing research. For example, for some boreal black spruce stands on peatlands, the model simulates the forest component of the ecosystem but does not address the dynamics of the peat layer or the contribution of mosses to peat formation.

Climate change impacts on forest growth: The CBM-CFS3 can simulate the effects of temperature changes on decomposition rates (Kurz and Apps 1999), but it does not address the impacts of changes in precipitation on decomposition. It also does not address the impacts of climate change on forest growth. Most applications of the CBM-CFS3 focus on the recent past or the next few decades. Refining the representation of climate change impacts is the subject of ongoing research.

The impacts of climate change on disturbance regimes: These impacts are not predicted through process simulation, but users can implement them by providing scenarios with changes in disturbance regimes without explicit attribution to possible causes such as fire suppression or climate change.

Insect disturbances that cause reductions in growth rates: Model components that address this issue have been implemented in a research version of the model and may become available in future versions of the CBM-CFS3.

The CBM-CFS3 accounts for forest ecosystem carbon dynamics: Although transfers of carbon are made to a "Forest Products" pool and users can track how much carbon was harvested from their land base, only inputs to this pool are tracked (i.e., the carbon dynamics of the forest products sector are not explicitly modeled).

1.6 CBM-CFS3 Structure

CBM-CFS3 has three or four stages that the user will need to work through, depending on what the model is being used for (Figure 1-2).

In the first and most complex step, the user must create templates that tell the CBM-CFS3 how to map and import the user's land base information into the software's input database. Once loaded, these data and information can be used for model simulations. The optional second step is to set up new model assumptions and scenarios by defining the assumptions that will be used in each model simulation run. In the third step, the user instructs the model to run one or more simulations. In the fourth step, the simulation results for one or more scenarios can be reviewed and compared for multiple output variables.

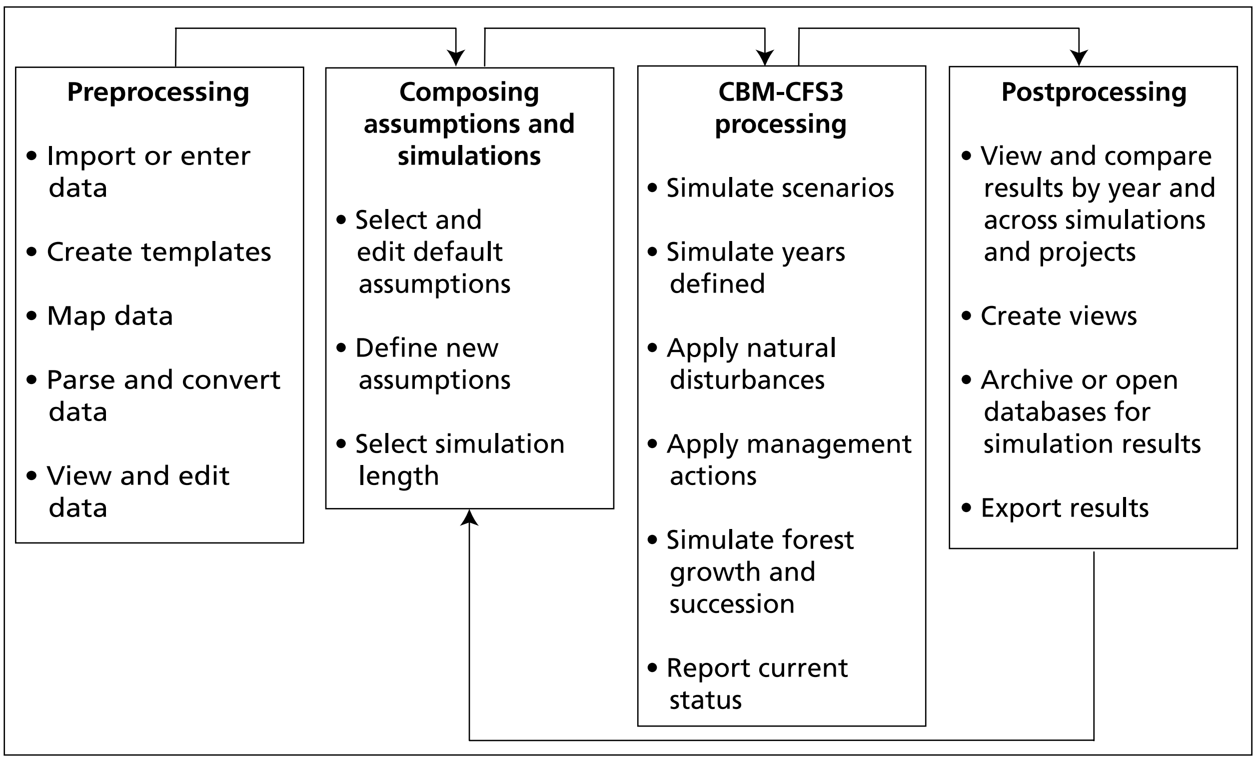
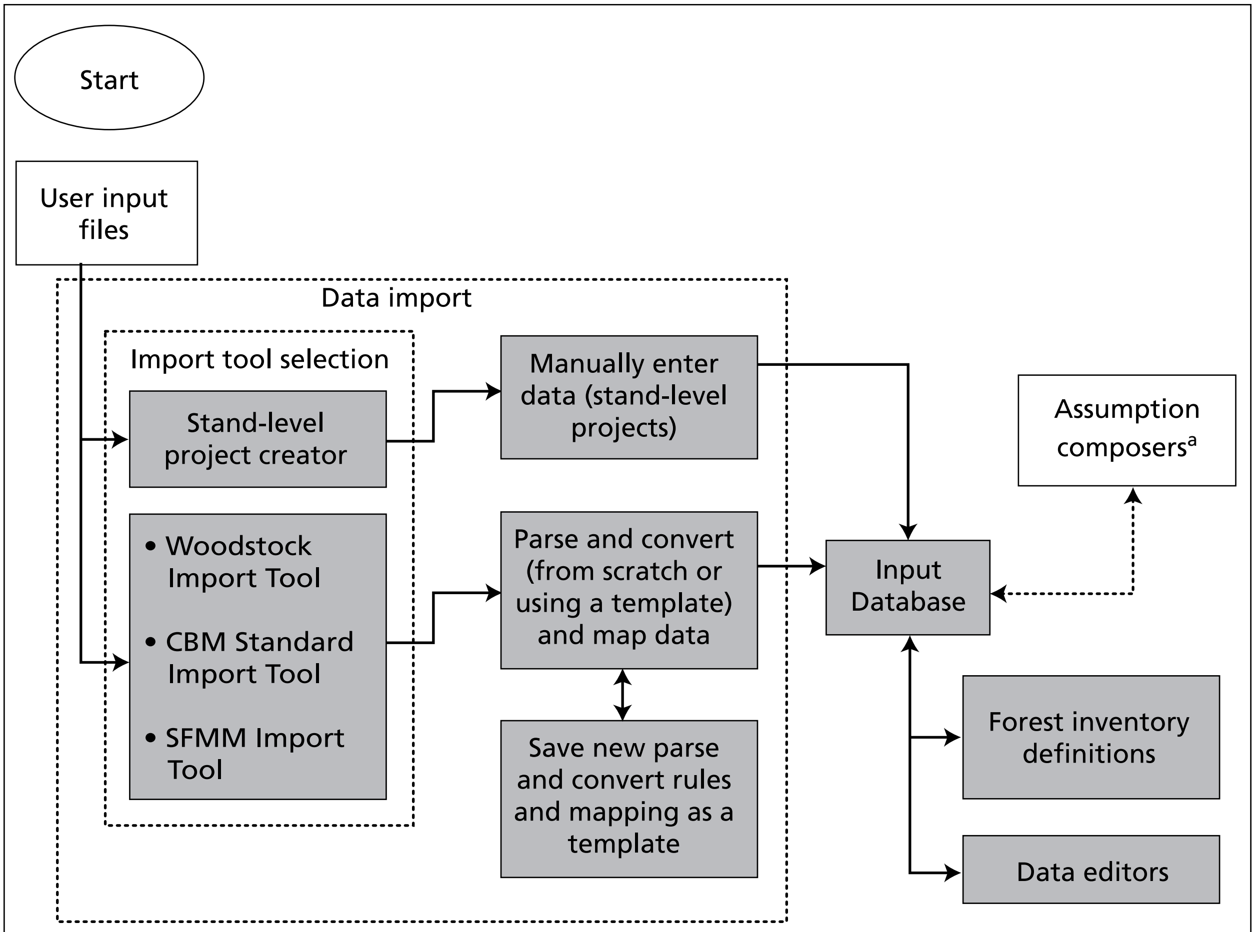


Figure 1-2. The main stages of the analysis using the CBM-CFS3.

1.6.1 Preprocessing

The preprocessing tools used by the CBM-CFS3 allow the user to import, parse and convert, and prepare input data (Figure 1-3).



[a]Refer to section 1.6.2.

Figure. 1-3. Preprocessing tools (gray boxes) of the CBM-CFS3.

Import Tools

Import tools in the model permit the user to import data for one stand or for entire forest management units. The Stand-Level Project Creator can be used to manually enter information for one or a small number of stands. With the Woodstock Import Tool, the SFMM (Strategic Forest Management Model) Import Tool, and the CBM Standard Import Tool, the user can load forest management data and specify the rules for parsing and converting these data into the appropriate format for the CBM-CFS3. The users save the parsing steps as a template. Users of the Woodstock and Standard import tools have the option of performing partial data imports. Templates created during the initial import process for a project can be reused for parsing any future data imports (of a similar format) for the project.

To facilitate use of the Woodstock and SFMM import tools, the Spatial Woodstock (Remsoft Inc 2006) timber supply model and SFMM (Davis 1999) timber supply model can generate output files specifically designed for input into the CBM-CFS3. The SFMM Import Tool also uses output from the Case Analysis Tool for users of the SFMM (CACTuS) (Watkins 2005).

The CBM Standard Import Tool can be used by those who do not use Spatial Woodstock or SFMM timber supply models; it requires the creation of import files specifically formatted for the CBM-CFS3.

Each of these tools is described in detail in Chapter 3.

Input Database

The Input Database stores the imported (and modified) information and data (e.g., inventory, growth and yield curves, disturbance history, disturbance forecasts) to be used by the CBM-CFS3.

Forest Inventory Definitions

The forest inventory definitions allow users to view the data that they have imported into the model and to modify them, if necessary. Each of these definitions is described in more detail in Chapter 4.

Data Editors

The data editors allow the user to view, edit, or add data and information to imported data. The seven editors — the Climate Data Editor, the Disturbance Events Editor, the Disturbance Matrix Editor, the Growth Curve Editor, the Inventory Editor, the Transition Rules Editor, and the Default Input Data Editor — are described in detail in Chapter 6.

1.6.2 Composing Assumptions and Simulations

The CBM-CFS3 includes tools that allow the user to view and define the assumptions and simulations that will be run through the model. These tools are the assumption composers (Figure 1-4).

When the user imports data into the CBM-CFS3 Input Database (Figure 1-4), the import tools create a set of default assumptions based on the assumptions in the data. Where assumptions are missing, the CBM-CFS3 creates default assumptions using information provided by the user during the import process, such as the project's geographic and ecological location in Canada, disturbance types, and tree species. With these default assumptions (and the data to which they are linked in the data editors) in place, the user can proceed to the Simulation Scheduler to start the simulation process and then examine the results in the Results Explorer. A user who would like to create alternative assumptions in the model for the purposes of sensitivity analysis can do so by manipulating data in the data editors, linking these data to new assumptions in the assumption composer tools and running new simulations in the Simulation Scheduler (section 1.6.3).

Assumption Composer Tools

The assumption composer tools (Figure 1-4) can be used to define the assumption, data, and parameter components for a model simulation. Assumptions can be created for simulations, stand initialization, model runs, growth and yield, disturbance matrices, biomass turnover, DOM turnover, volume-to-biomass, climate, and disturbance and management activities.

Assumptions for a project in the CBM-CFS3 are hierarchical, with simulation assumptions at the top (Figure 1-4). Simulation assumptions can be selected and run in the Simulation Scheduler (section 1.6.3). Each simulation assumption is composed of a CBM Run Assumption and a Stand Initialization Assumption. These assumptions are in turn composed of underlying assumptions from the same assumption composer tools, the exception being that CBM Run Assumptions are linked to Disturbance and Management Assumptions. Each of the assumption composer tools is described in detail in Chapter 7.

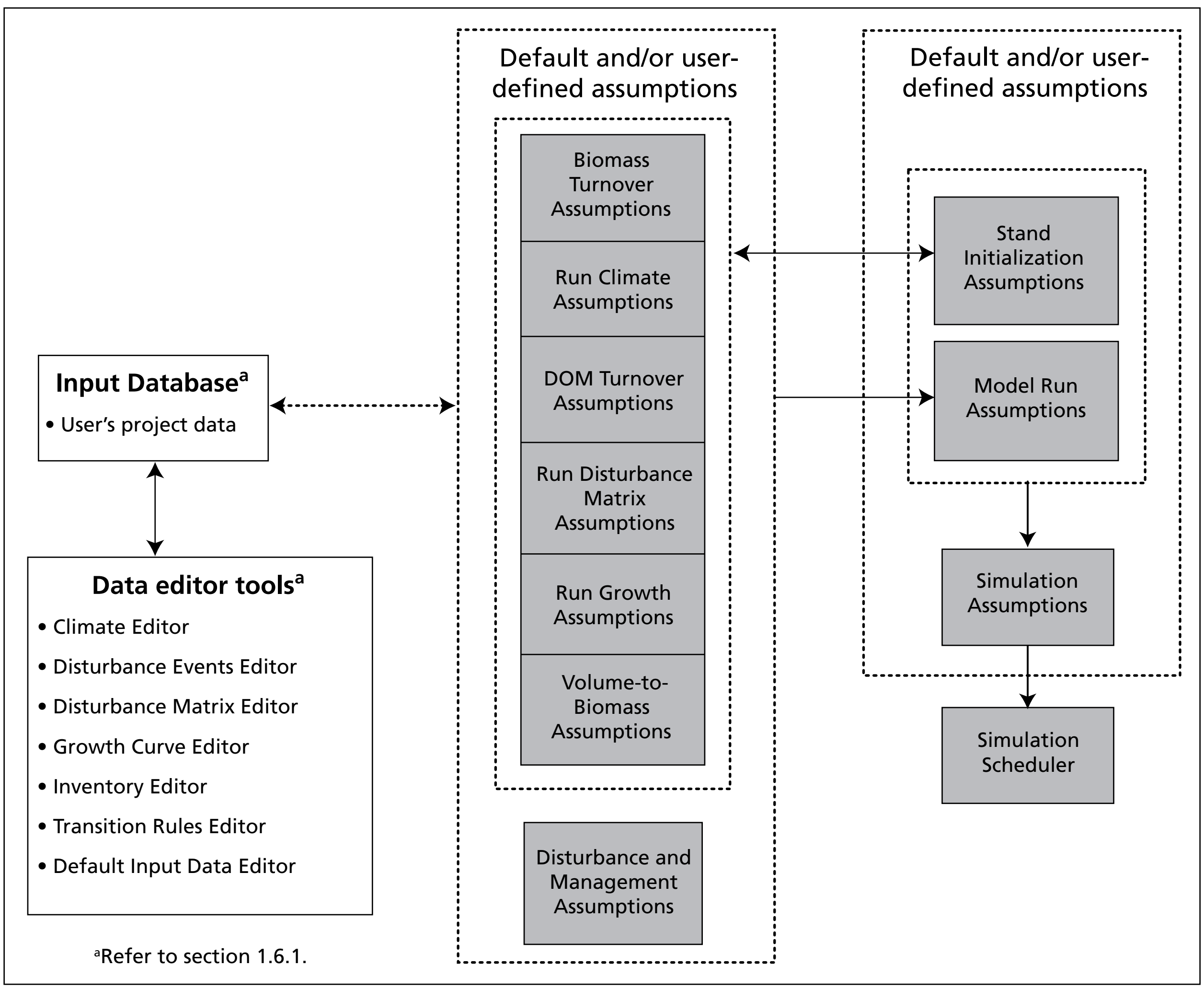


Figure 1-4. Diagram of the CBM-CFS3 assumption composer tools and Simulation Scheduler (gray boxes).

1.6.3 CBM-CFS3 Processing

The Simulation Scheduler is used to simulate projects in the CBM-CFS3. The simulation process includes application of the MAKELIST preprocessing program, modeling and calculation of carbon stocks and stock changes, and creation of a simulation results database that is stored in the Archive Index Database.

Simulation Scheduler

The Simulation Scheduler is used to instruct the model as to which simulation assumptions to run and allows the user to view the simulation, stand initialization, and CBM-CFS3 run details for each simulation. Each simulation performed by the CBM-CFS3 is uniquely identified by a run number stored in both the Input Database and the Archive Index Database (see Figure 1-3 and section 1.7.1). The Simulation Scheduler is described in more detail in Chapter 7.

MAKELIST

MAKELIST is a preprocessing program that is used to format the inventory information for input into the CBM-CFS3 and to initialize the DOM carbon pools. These pools include carbon from aboveground and belowground dead tree biomass (e.g., coarse woody debris; litter, fibric, and humic layers; and mineral soil). The CBM-CFS3 uses a larger number of DOM carbon pools than did the CBM-CFS2 (Kurz and Apps 1999).

Behind the scenes: Initialization of DOM carbon pool

Forest inventory information typically does not include information about the amount of carbon stored in DOM pools. The CBM-CFS3 uses a well-established simulation approach to initialize the DOM pools of each record in the inventory. To minimize changes in DOM pools at the beginning of a simulation that are artifacts from the initialization of these pools, the CBM-CFS3 uses a simulation approach to assign values to the DOM carbon pools that reflect the disturbance history and dynamics of the stand (Kurz and Apps 1999). After all the inventory information has been loaded, but before CBM-CFS3 simulation runs have started, MAKELIST is used to generate initial values for the DOM pools. MAKELIST uses the same algorithms and parameters as the CBM-CFS3 and simulates each stand record through a number of natural disturbance cycles (grow, burn, grow, burn, etc.) until the slow DOM carbon pool at the end of two successive rotations meets a user-defined criterion (default tolerance is 0.1%). MAKELIST assumes that the historical natural disturbance regime is stand-replacing fire and grows stands for *X* years between fires, where *X* is the mean fire return interval for the region, determined from the literature and provided in the input databases. MAKELIST allows specification of whether the last stand-replacing disturbance was fire or harvest (i.e., whether the stand is first- or second-growth at the start of the CBM-CFS3 runs).

The model then simulates one more rotation to the current age of the stand record. The DOM pool values at that time are then assigned to that record in the database. When the CBM-CFS3 starts the actual simulations, the simulated DOM dynamics are a continuation of the dynamics that led to the pools at the initial age. For example, a stand that is at age 55 in the inventory will, in the next time step, reach age 56, and the DOM dynamics are merely a continuation of those that occurred in the previous time step from age 54 to 55. No "jumps" or discontinuities occur in the first time step of the

CBM-CFS3 simulation. MAKELIST and the CBM-CFS3 are always run together. Future versions of the model will allow a user to conduct a single MAKELIST simulation and to simulate multiple scenarios from this common starting point.

Archive Index Database

The Archive Index Database tracks the relations between model input and the results databases (i.e., projects and their results) that the user has created. Most users will have only one Archive Index Database on their respective computer systems. The Archive Index Database also tracks the status of the user's simulations (i.e., whether or not the simulation[s] have been executed).

1.6.4 Postprocessing Tools

After performing a simulation run with the CBM-CFS3, the user may view and obtain results for the run with the postprocessing tools, the Results Explorer and the View Editor (Figure 1-5).

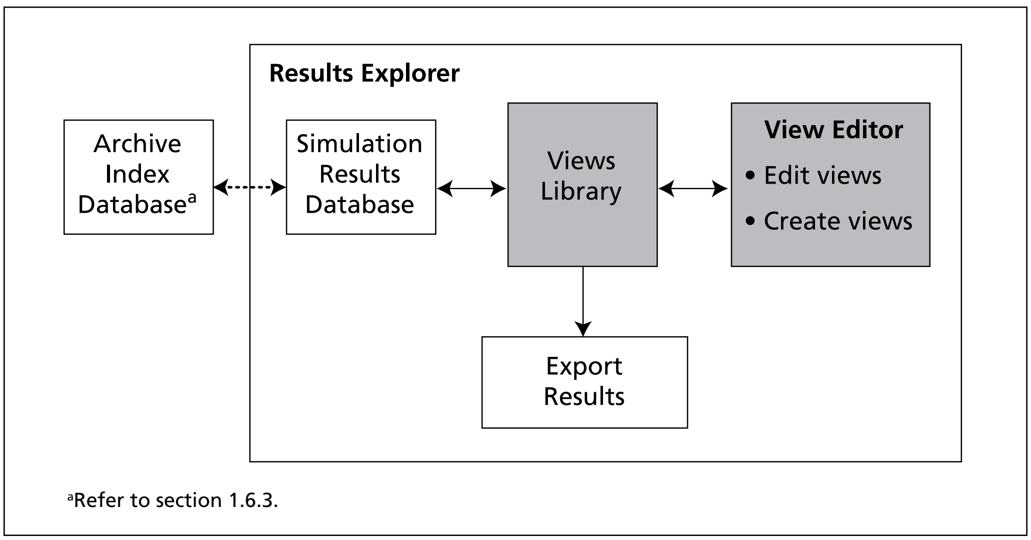


Figure 1-5. Postprocessing tools (gray boxes) of the CBM-CFS3.

Simulation Results Database

The results for each model simulation are stored in a separate Simulation Results Database. The Archive Index Database maintains the relations between input files, scenario assumptions, and Simulation Results Databases. Users can archive Simulation Results Databases or open them for application to views.

Results Explorer

The user can open and archive, browse and apply views to, and view, compare and export results for selected Simulation Results Databases with the Results Explorer. Results can be viewed as graphs, tables, or reports. The Results Explorer is described in detail in Chapter 8.

View Editor

The View Editor allows the user to create results views or edit existing results views. These views can be saved and applied to any Simulation Results Databases. The View Editor is described in detail in Chapter 8.

Exporting

Data displayed in the Results Explorer can be exported as text or as an Excel (Microsoft 2003) file to allow further data manipulation or generation of publication-quality graphics. The export tool is described in detail in Chapter 8.

1.7 Information and Data Requirements

The CBM-CFS3 is a generic framework for forest carbon accounting that is implemented as a toolbox comprising databases, data preprocessing and postprocessing tools, user interfaces to the databases, and the core scientific model. The model, associated documentation, and tutorials guide the user through the data compilation and analysis steps. The user must provide data that are unique to a specific study area. Data and model parameters that are required to describe ecological processes are derived from the scientific literature and are provided in the model databases. All input data and parameters are open and transparent, and the user can modify input data provided with the CBM-CFS3 at any time.

Running the CBM-CFS3 requires a number of data inputs (Figure 1-6). Many of these data are readily available as output files from some of the timber supply models used in Canada, such as the Spatial Woodstock timber supply model and SFMM timber supply model.

Other required parameters such as volume-to-biomass conversion factors and carbon cycling parameters are provided in the model. Details of the requirements for data import files are explained in more detail in Chapter 3.

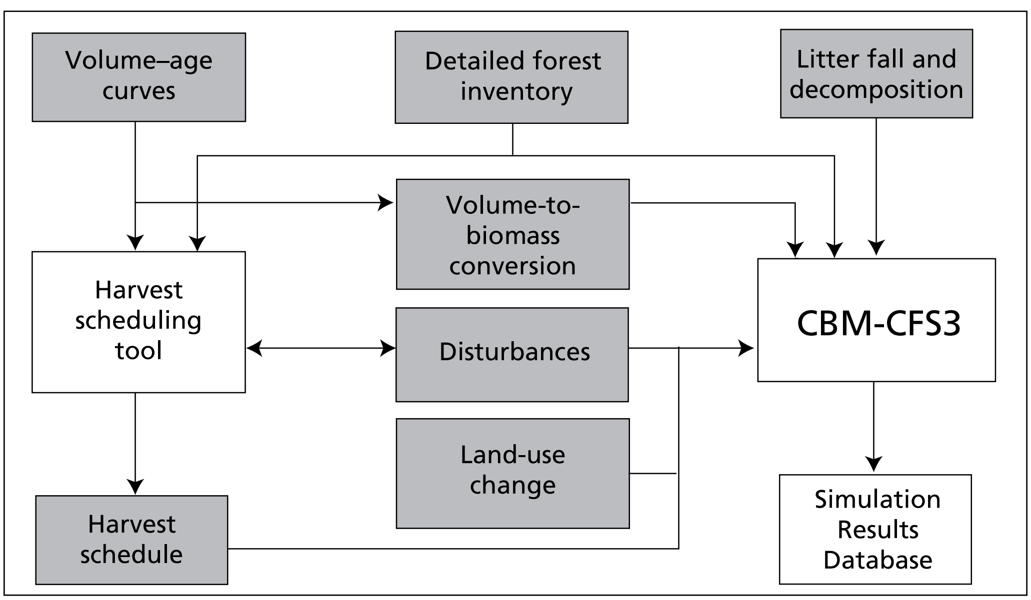


Figure 1-6. Data input (gray boxes) required by the CBM-CFS3.

1.7.1 Detailed Forest Inventory

To use the CBM-CFS3, **the user must provide a detailed forest inventory** as described in the next paragraph (or some variation thereof).

The information in the inventory must be provided as a series of records, each of which represents a single stand or a group of stands with similar attributes. Each record must contain a series of classifiers (such as stand identifier, administrative unit, ecological region, ownership) and a series of stand attributes (such as area, age, species, forest type, volume, last disturbance type). The information in each record allows the model to select the appropriate growth and yield curve that applies to the record. The user provides the relations between stand classifiers and growth and yield curves in a database table.

1.7.2 Volume–Age Curves

The user must provide volume–age curves for use in the model, hereafter referred to as growth and yield curves. The model uses these curves to define stand dynamics. Curves are defined as data pairs of stand age and stand volume (to some predefined merchantability standards). Libraries with hundreds of growth and yield curves can be entered by the user.

Various degrees of sophistication can be used for the implementation of these curves. The model can accommodate natural and "managed" growth and yield curves, as well as various transitions between curves after certain events. "Managed" curves should not incorporate transitions resulting from disturbance events. Instead, these transitions should be represented as a switch to a new growth and yield curve that describes how the stand type grows after the disturbance event.

1.7.3 Volume-to-Biomass Conversions

Volume curves provide information about the merchantable stem volume. The CBM-CFS3 requires information about all aboveground and belowground tree biomass components. The model uses a sophisticated system of equations and supporting parameter sets to convert merchantable volume to all aboveground biomass components such as stemwood, other (branches, tops, and submerchantable-size tree biomass), and foliage.

The conversion factors and methods used by the CBM-CFS3 are based on the results of an ongoing CFS project at the Pacific and Laurentian forestry centres that is developing such conversion factors for application to the Canadian Forest Inventory (CanFI2001).

The conversion factors and algorithms are based on more than 1000 tree-level biomass regression equations compiled from the literature. These have been applied to more than 11 million tree measurements from over 133 000 permanent sample plot data from across Canada (Power and Gillis n.d.). Details of the methods used will be published elsewhere upon completion of the CFS biomass inventory project (Paul Boudewyn, Natural Resources Canada, Canadian Forest Service, Pacific Forestry Centre, personal communication by e-mail on August 9, 2006. Boudewyn P., and Song, A. Methods to produce a biomass inventory of Canada. Nat. Resour. Can., Can. For. Serv., Pac. For. Cent. Manuscript in preparation).

Belowground biomass of fine and coarse roots is estimated from published regression equations and methods developed specifically for the CBM-CFS3 (Kurz et al. 1996; Li et al. 2003).

1.7.4 Litterfall and Decomposition

The reporting guidelines of the Intergovernmental Panel on Climate Change (Penman et al. 2003) specify that carbon be accounted for in aboveground and belowground biomass and DOM pools such as litter, woody debris, and soil carbon. Forest inventories have traditionally not addressed these nontimber components, although such information is becoming more readily available. The size and dynamics of DOM pools are related to the stage of stand development and the disturbance and management history of the stand. The approach of the CBM-CFS3 is to simulate the dynamics of DOM pools on the basis of available information for the stand, its history, and its ecological characteristics.

The scientific analysis of the approaches and calibration of the DOM parameters of the model are continuing. The parameters currently used are similar to those described by Kurz and Apps (1999). The number of individual DOM pools in the model has been increased, however, to account for aboveground and belowground DOM components separately and to account for snag stem and snag branch DOM.

Parameters describing litterfall and decomposition rates are provided in the databases of the CBM-CFS3. The user has the option of either using these default values or modifying them, should more accurate values be available for the region of interest. The carbon accounting team (CFS-CAT) of the CFS will continue to test and improve the DOM model parameters and provide periodic updates to the parameter sets recommended for use with the model. The CFS-CAT will use data from a compilation of forest ecosystem carbon estimates (Shaw et al. 2005) and from the National Forest Inventory ground plots (as these become available) to further refine regional parameter sets on DOM dynamics.

1.7.5 Disturbances

The user must provide disturbance information to the model. The CBM-CFS3 modeling framework allows considerable flexibility in the definition of disturbances. Disturbances are events that occur periodically, affect certain eligible stands, have a specified impact on carbon pools at the time of disturbance, and affect the postdisturbance carbon dynamics of the stand.

Where the CBM-CFS3 is applied to estimate past changes in carbon stocks, information on the actual area disturbed must be provided in the input database(s). Where future projections are to be analyzed, the disturbance regime assumptions for each scenario must be provided.

The user can specify the **amount to disturb** annually for each SPU or for groups of SPUs (e.g., where an administrative area is further stratified into ecological classes). Values should be specified for the disturbed area or the proportion of the eligible area that is disturbed and the volume to be removed through disturbance.

The stands **eligible for disturbance** are defined on the basis of classifiers, stand attributes, or past disturbance events. The user specifies the conditions a stand must meet to be eligible for a disturbance. All eligible stands are then compiled in a list and sorted according to user-specified rules. Examples of such rules might be that a proportion of all eligible stands is disturbed (as would occur with fires) or that the oldest softwood stands are affected (as would occur with specific insects).

The **impact** of disturbances is defined in "disturbance matrices" (Kurz et al. 1992). These define the proportion of each biomass and DOM carbon pool that is transferred to another carbon pool, the atmosphere, or the forest product sector (in the case of harvesting). Disturbance matrices for several disturbance types calibrated to specific regions are provided in the CBM-CFS3 databases.

The **postdisturbance dynamics** of the stand are defined primarily by the new growth and yield curve applied to the stand. The model allows the user to define one or more new growth and yield curves to which proportions of the disturbed area will be allocated.

With this framework, the user can simulate a wide range of natural disturbances (and management actions represented using the approaches outlined in the next section).

At present, the CBM-CFS3 can represent both stand-replacing and partial stand mortality (generic stand mortality from 5% to 95%) for natural disturbances such as wildfire and insect disturbances. It is also possible to simulate model scenarios without natural disturbances.

1.7.6 Harvest Schedule

The user must supply a schedule of management actions to the CBM-CFS3 to simulate any harvest or other management activities. The same principles as explained for natural disturbances apply, i.e., the user has a suite of parameter choices that can be made to determine the type and rates of management actions.

Forest management activities preprogrammed for use in the CBM-CFS3 include clear-cut logging with or without slash burning, partial cutting, commercial thinning (25–75% removal), salvage logging following fire or insect disturbances, deforestation, afforestation, natural nonforest rehabilitation, natural succession with and without immediate stand mortality, and generically applicable mortality (5–95%). The model represents planting through reductions in the regeneration delay in growth and yield curves or through switching to a different growth and yield curve.

Information on harvest rates can be provided as the amount of volume (or carbon) removed, the area harvested, or a proportion of the eligible area or volume to harvest.

Note: Representation of tree planting

The methods used to represent planting in timber supply models differ among provinces and further review of the implementation may be required.

In all cases, certain rules for eligibility of harvest must be provided, along with sequencing rules for the eligibility of stands (e.g., oldest first, highest volume first, number of years since eligibility for harvest as specified in the growth and yield curves). If areas are protected from harvesting, this information must be contained as a classifier in the forest inventory information.

The information on harvest rates can be derived from timber supply models. Model developments are in progress to permit the CBM-CFS3 to use harvest schedules developed by regional timber supply models as input specifications. Customized import tools have been developed for the Spatial Woodstock and SFMM timber supply models. Other models can be included in the system through the use of the CBM Standard Import Tool (Chapter 3, section 3.1.1.).

When harvest schedules developed by other models are implemented in the CBM-CFS3, they are translated into a set of instructions provided at the beginning of the simulation. The simulation results of the CBM-CFS3 may not be exactly the same as those from a spatial timber supply model because the CBM-CFS3 is an aspatial model.

1.7.7 Land-Use Change

For the implementation of Kyoto Protocol accounting, information on the changes in land-use from forest to nonforest (deforestation) and from nonforest to forest (afforestation or reforestation) since 1990 is also required from the user. This information should be provided as the area annually deforested or afforested. When land is afforested or reforested (as defined in the Kyoto Protocol), the growth and yield curve for the afforested stand should also be provided by the user.

The current model does not track carbon stocks in deforested areas that have been converted to agricultural use. Simple postdeforestation dynamics can be assumed, but agricultural land-use details are not simulated. The CFS-CAT is currently in discussions with the team at Agriculture and Agri-Food Canada that is developing the National Greenhouse Gas Accounting and Verification System for Agriculture. A protocol for interaction between the two systems to account for the impacts of land-use changes is under development for use in Canada's national reporting systems. At this time, forest planners need not be concerned about the accounting of carbon stock changes on deforested land converted to nonforest uses because the international reporting convention is that all stock changes associated with land-use change are reported in the new land-use category.

1.8 Using this Guide

All users should read Chapter 2 of this guide, which describes system requirements, installation procedures, how to manage projects, how to access tutorials, and how to obtain help. Chapter 3 should also be read by all users to learn how to create import files, import data, create a project, and run a simulation for a project. Chapter 3 also describes the procedures for using each of the three CBM-CFS3 operational-scale data import tools and the stand-level project creation tool. If a user simply wants to import their data, create a project, execute a simulation and analyze the results, another chapter of importance is Chapter 8, which describes how to use the Results Explorer tool.

Users interested in editing data and parameters and creating new assumptions within the model for any project they have created should also read Chapters 4, 6, and 7.

Chapter 5 describes some additional tools in the model for exploring and managing projects and databases; and Chapter 9 describes how to manage and manipulate graphs created within the CBM-CFS3.

Procedural steps in this guide appear in bold and are either numbered (required steps) or unnumbered. Unnumbered steps within a sequence of numbered steps represent an optional task. Unnumbered steps are otherwise used where a task only involves one or two steps, or where an alternate action within a step can be taken.

CHAPTER 2

GETTING STARTED

This chapter presents system requirements, installation, software start-up, project management, software shutdown, tutorials access, help access, and known software issues access instructions.

2.1 System Requirements

The CBM-CFS3 is designed to run on high-end personal computers with the following minimum hardware requirements:

- a 1.2-Ghz processor or better;
- a monitor capable of 1024 X 768 resolution (small fonts highly recommended);
- a minimum of 512 megabytes of RAM (RAM requirements scale with the size and complexity of the input data)
- Windows 2000 (Microsoft 2000c) or Windows XP (Microsoft 2000d);
- a hard drive with 1 gigabyte or more of available space.
- Microsoft Data Access Components (MDAC) version 2.6 or better (Microsoft 2000b), which can be downloaded for free from the Microsoft website at http://www.microsoft.com/downloads/;
- Microsoft .NET Framework version 1.1 redistributable package (Microsoft 2004) to allow use of the pre- and post-processing tools, which be downloaded for free from the Microsoft website at http://www.microsoft.com/downloads/ (if it is already installed on your computer, DO NOT try to install a simultaneous second version);
- Windows operating system language set to "English (Canada)" for the English version of the CBM-CFS3 and "French (Canada)" for the French version of the CBM-CFS3.

The amount of free disk space needed will vary according to the type of analysis and the number of simulations to be conducted. More powerful systems will allow better performance of the software; regardless, a large amount of hard drive space is highly recommended. A French language version of the CBM-CFS3 is under development.

2.2 Installation Instructions

Installation instructions are provided in the subsections below for both the downloaded and compact disk (CD) versions of the CBM-CFS3. The CBM-CFS3 file (CBMToolsSetup.msi) is available for download through the National Forest Information System (NFIS) website (www.nfis.org). When a user creates an NFIS account in order to download the model, the e-mail address they enter for their account will be used to provide the user with notifications of software updates and training opportunities. Before proceeding with installation instructions, the user must uninstall any previous versions of the CBM-CFS3 on the computer.

2.2.1 Installing from a Download File

Users who download a copy of the CBM-CFS3 installation file (CBMToolsSetup.msi) can install it through the following steps:

1. **Double-click on the CBMToolsSetup.msi file**

A "Welcome to the Operational-Scale CBM-CFS3 Setup Wizard" window (Figure 2-1) will pop up.

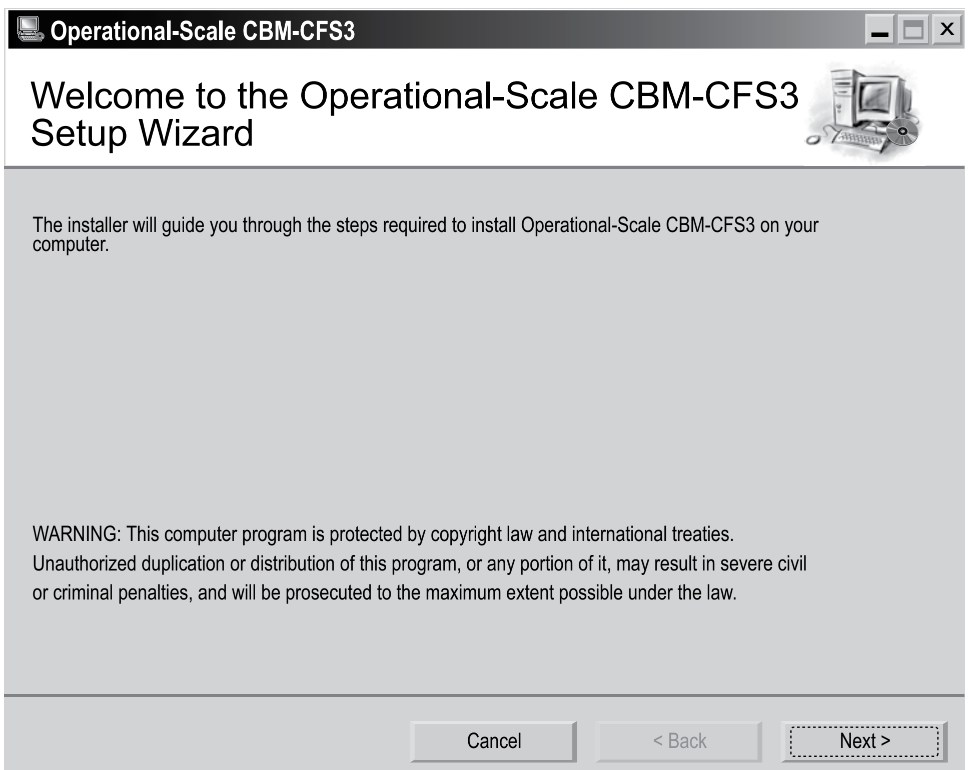


Figure 2-1. The "Welcome to the Operational-Scale CBM-CFS3 Setup Wizard" window.

2. **Click on the "Next" button to proceed**

   or

   Click on the "Cancel" button to terminate the process

If the user clicks on the "Next" button, the "Select Installation Folder" window (Figure 2-2) will pop up. In this window, the user must select a computer folder where the CBM-CFS3 will be installed. The default folder displayed in the "Folder" box is "C:\Program Files\Operational Scale CBM-CFS3\." The user may type in a different folder location in the "Folder" box if desired or may use the "Browse" button to browse to the appropriate folder.

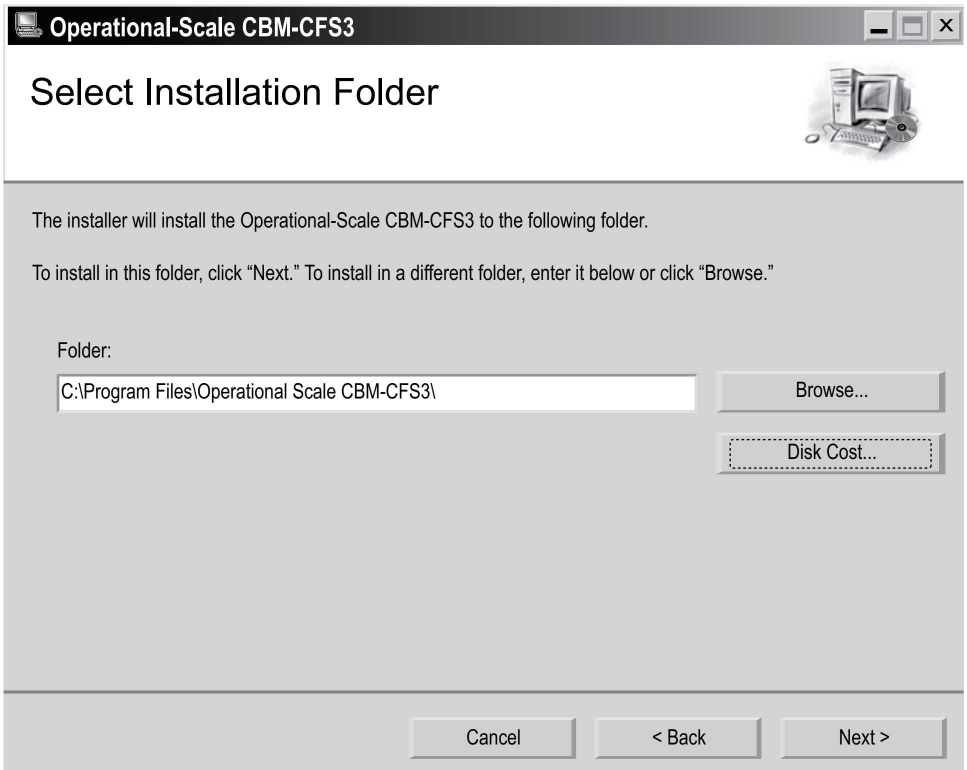


Figure 2-2. The "Select Installation Folder" window.

☞ *Tip: Verifying available disk space*

To check the available space on your computer drives, click on the "Disk Cost…" button in the "Select Installation Folder" window. The "Operational-Scale CBM-CFS3 Disk Space" window (Figure 2-3) will pop up. This window presents a scrollable (via the vertical and horizontal scroll bars) display of the computer drives in the "Volume" column, the disk sizes in the "Disk Size" column, the available disk space in the "Available" column, the required disk space in the "Required" column, and the remaining disk space in the "Remaining" column. To exit this window, click on the "OK" button or the "X" button.

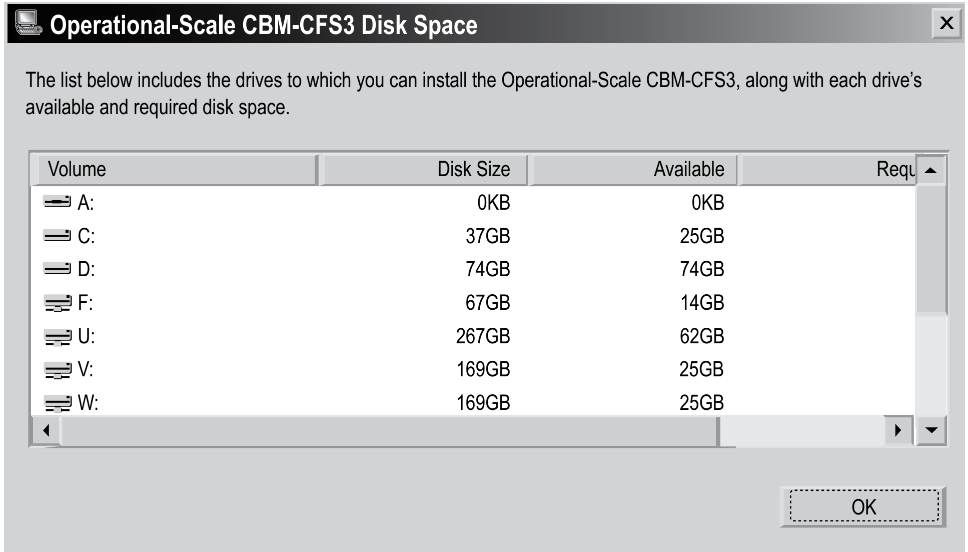


Figure 2-3. The "Operational-Scale CBM-CFS3 Disk Space" window.

To select a folder using the "Browse" button, perform steps 3 to 5; otherwise, skip to text following step 5,

3. **Click on the "Browse" button**

The "Browse for Folder" window (Figure 2-4) will pop up.

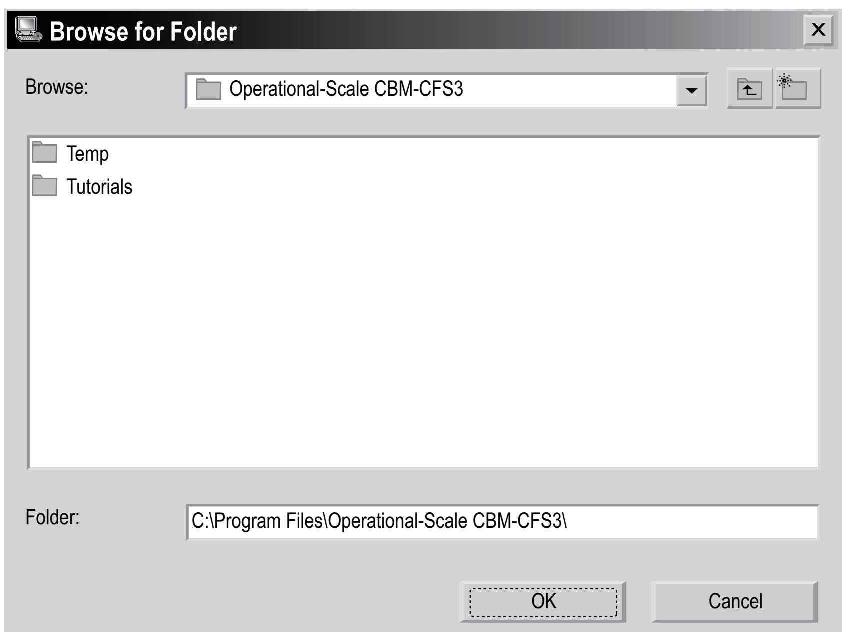


Figure 2-4. The "Browse for Folder" window used for identifying the folder in which to install the CBM-CFS3.

4. **Select or create an appropriate folder**
5. **Click on the "OK" button to proceed**

   or

   Click on the "Cancel" button to terminate the process

Once the user has selected the appropriate folder in which to install the CBM-CFS3 and it is displayed in the "Folder" box of the "Select Installation Folder" window,

6. **Click on the "Next" button to proceed**

   or

   Click on the "Back" button to return to the previous window

   or

   Click on the "Cancel" button to terminate the process

If the user clicks on the "Next" button, the "Confirm Installation" window (Figure 2-5) will pop up.

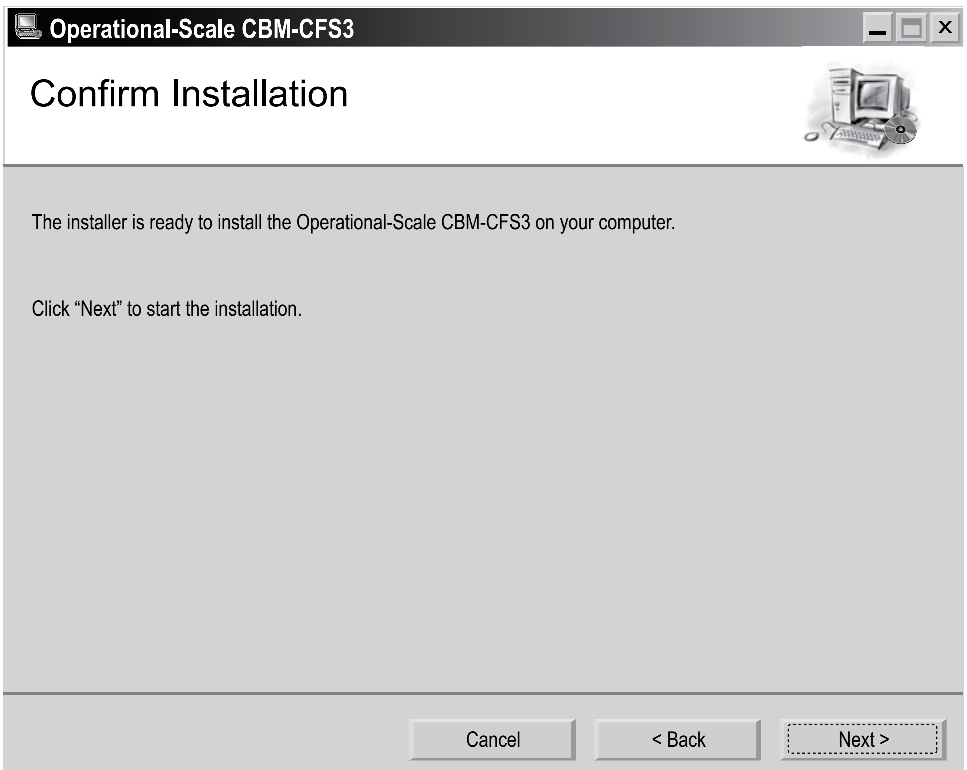


Figure 2-5. The "Confirm Installation" window.

7. **Click on the "Next" button to proceed**

   or

   Click on the "Back" button to return to the previous window

   or

   Click on the "Cancel" button to terminate the process

If the user clicks on the "Next" button, the installation will begin. Once the installation is complete, the "Installation Complete" window (Figure 2-6) will pop up.

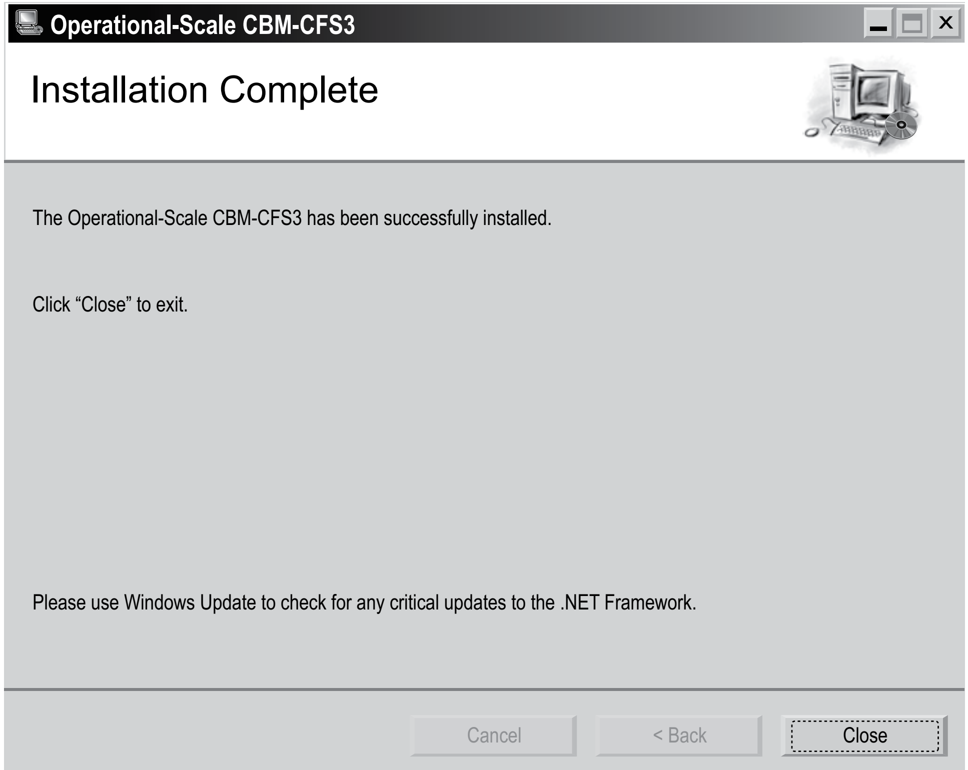


Figure 2-6. The "Installation Complete" window.

8. **Click on the "Close" button**

To learn how to start the CBM-CFS3 once the installation is complete, proceed to section 2.3.

2.2.2 Installing from a Compact Disk (CD)

To install the CBM-CFS3 from a CD

1. **Insert the CD into your CD-ROM drive**
2. **Go to the "Start" menu and select "Run"**
3. **Enter the drive letter of the CD-ROM drive and type "CBMToolsSetup.msi"**
4. **Follow the instructions in section 2.2.1 starting with the text following step 1**

To learn how to start the CBM-CFS3 once the installation is complete, proceed to section 2.3.

2.3 Opening the CBM-CFS3

To start the CBM-CFS3 from the Windows "Start" menu

1. **Click on "Start," then "Programs," "CBM," and "CBM Toolbox"**
   or
   Click on the "CBM Toolbox" icon  **on the Windows desktop display**

The "CBM-CFS3" window (Figure 2-7) will pop up and will then be replaced by the "General Disclaimer for the CBM-CFS3 Version 1.0" window (Figure 2-8). In this window,

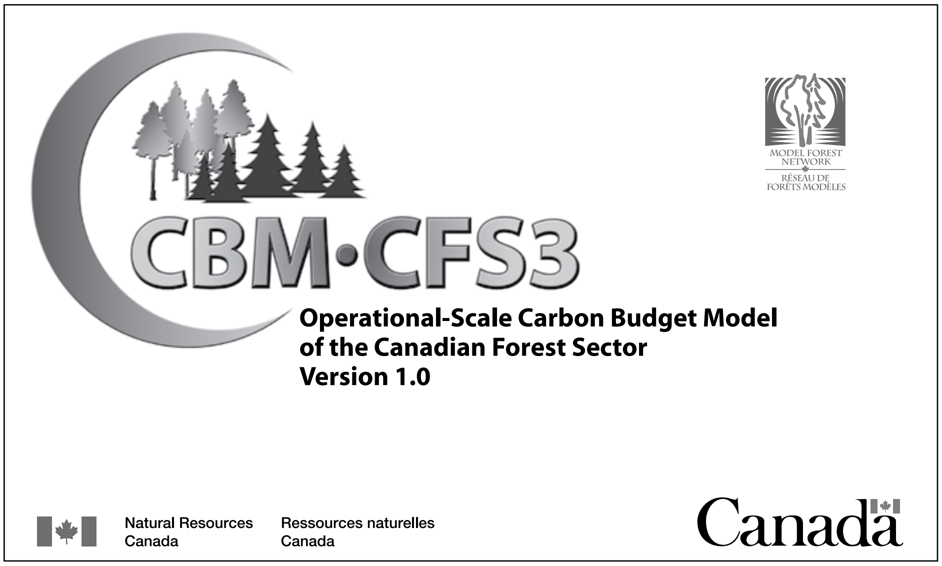


Figure 2-7. The "CBM-CFS3" window.

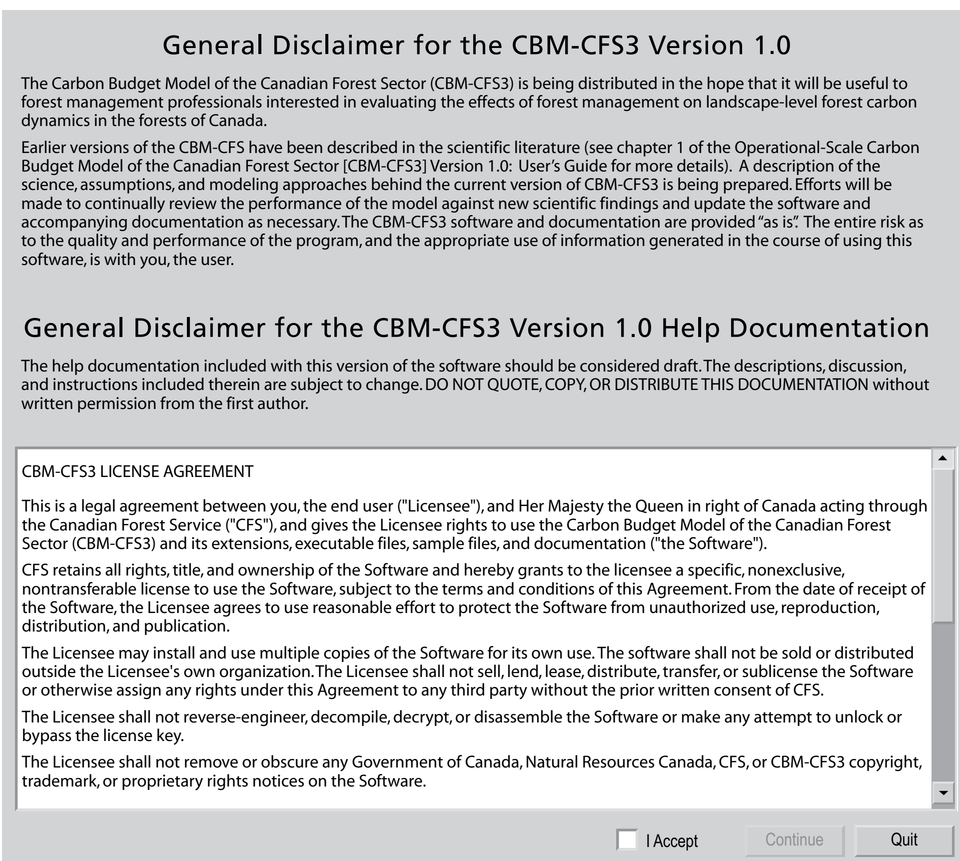


Figure 2-8. The "General Disclaimer for the CBM-CFS3 Version 1.0" window.

2. **Read the License Agreement and Warranty and Indemnity information**
3. **Agree to the statements in this disclaimer window by clicking on the "I Accept" check box, and then click on the "Continue" button**

   or

   Click on the "Quit" button to exit the program

If the user accepts the disclaimer, the main CBM-CFS3 window (Figure 2-9) and then the "Project Manager" window (Figure 2-10) will pop up.

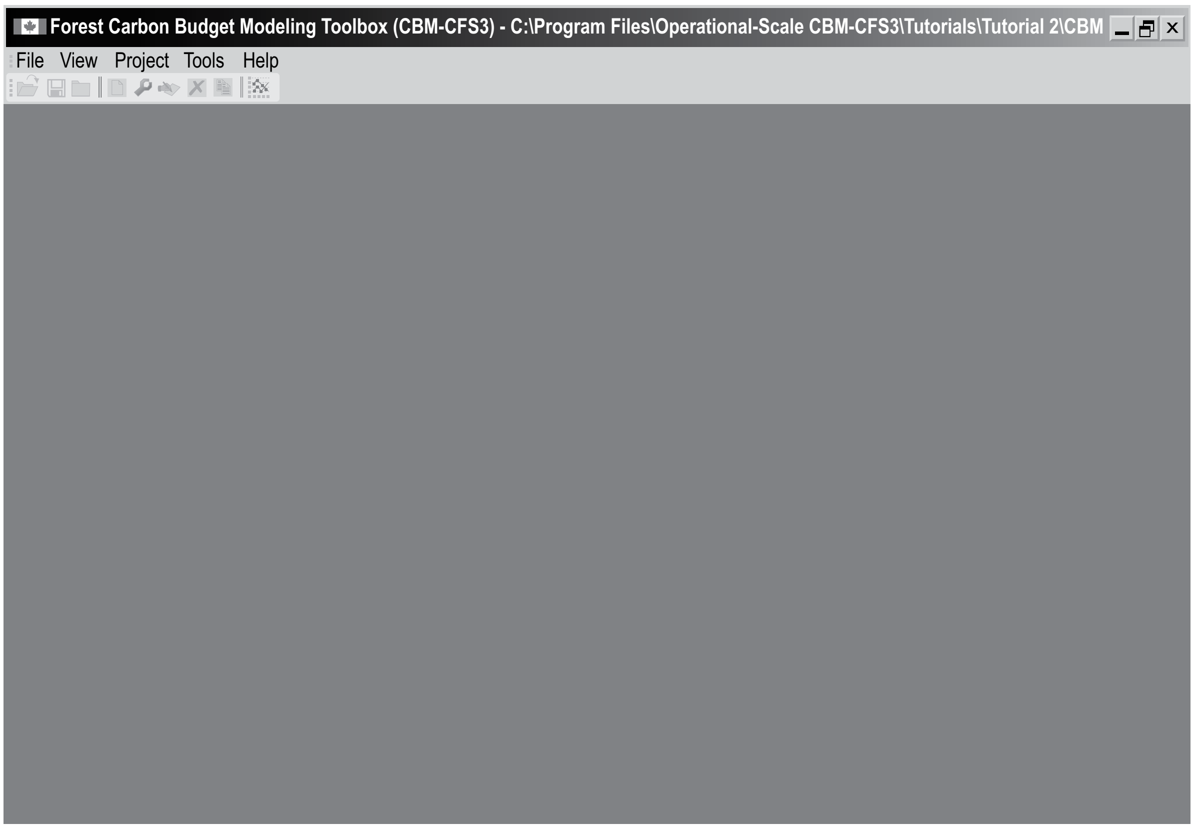


Figure 2-9. The main CBM-CFS3 window.

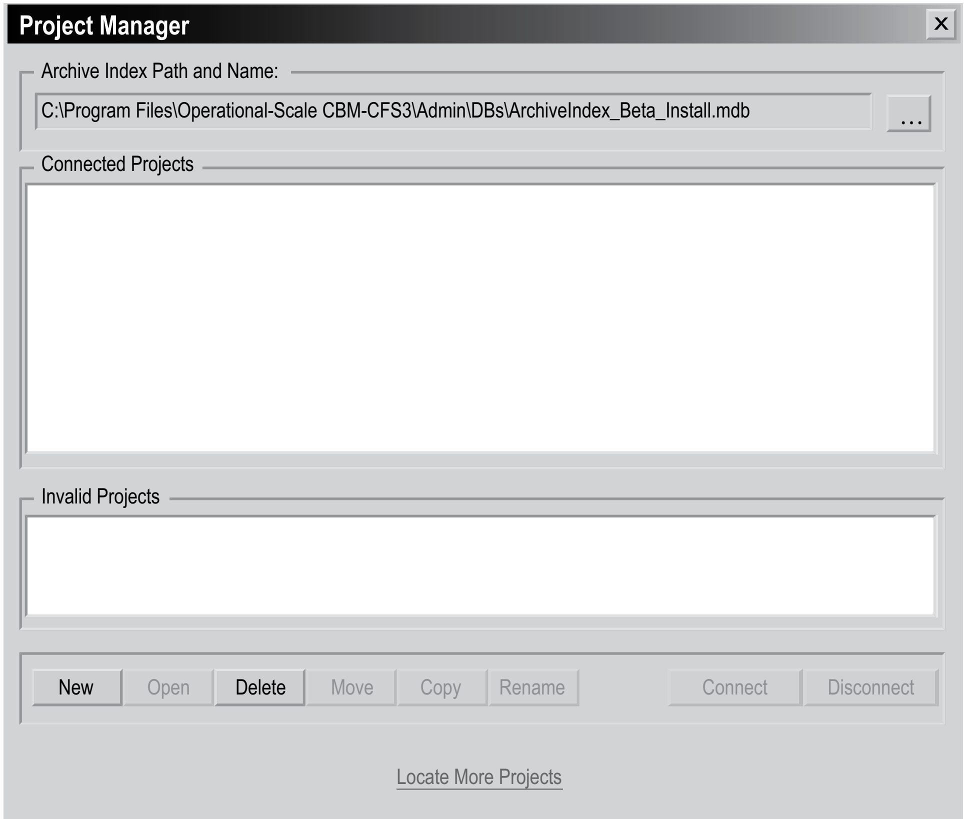


Figure 2-10. The "Project Manager" window.

2.4 The Project Manager

When the CBM-CFS3 is started up, the "Project Manager" window (Figure 2-10) will pop up in the main CBM-CFS3 window.

☞ *Tip: Reopening the "Project Manager"*

Should you accidentally close the "Project Manager" window and want to reopen it, or if you want to open it at a later time,

1. **Click on "View" on the main CBM-CFS3 window menu bar**
2. **Select "Project Manager" from the drop list that appears**

In the "Project Manager" window, the "Archive Index Path and Name" box will automatically point to the Archive Index Database (discussed in Chapter 1).

Note: Selecting an Archive Index Database

If the "Archive Index Path and Name" box does not point to the Archive Index Database in the "Project Manager" window or if you need to point to a different Archive Index Database,

1. **Click on the "…" button beside the "Archive Index Path and Name" box**

The "Please select the archive index under which your projects are saved" window (Figure 2-11) will pop up.

2. **Point to and click on the name of the appropriate database in the window that appears**
3. **Click on the "Open" button to proceed**

   or

   Click on the "Cancel" button to terminate the process

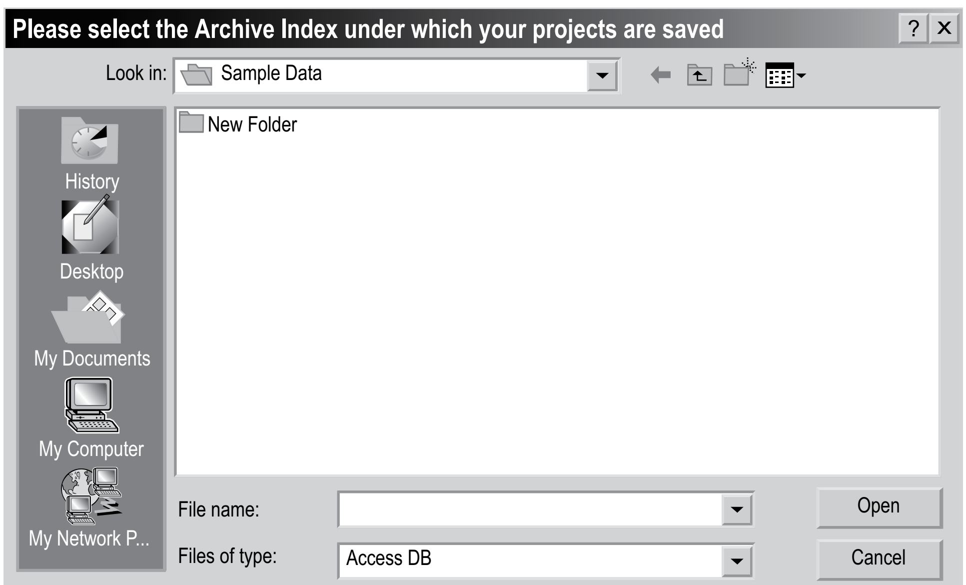


Figure 2-11. The "Please select the Archive Index under which your projects are saved" window.

The "Connected Projects" box (Figure 2-10) will display the names of projects previously created by the user (if any) with that particular version of the CBM-CFS3. The "Invalid Projects" box will display projects that appear to have an invalid format (if any), for example, missing the cbmproj file (see section 2.4.2). The user can also create a new project in this window (see Chapter 3).

2.4.1 Connected Projects

Existing projects previously created by the user, which will appear in the "Connected Projects" box of the "Project Explorer" window (Figure 2-10), can be opened, renamed, moved, copied, deleted, or disconnected. To obtain information about any project,

1. **Click on the name of the project in the "Connected Projects" box**
2. **Right-click over the name and click on "Project Info" on the menu that appears**

The "Project Information" window (Figure 2-12) will pop up. Displayed in this window are the "Input DB" box, showing the input database path, the "Simulation" box, showing the Simulation Assumption name of the project, the "Stand Init" box, showing the Stand Initialization Assumption associated with the project, and the "CBM Run" box, displaying the name of the model run assumption associated with the project.

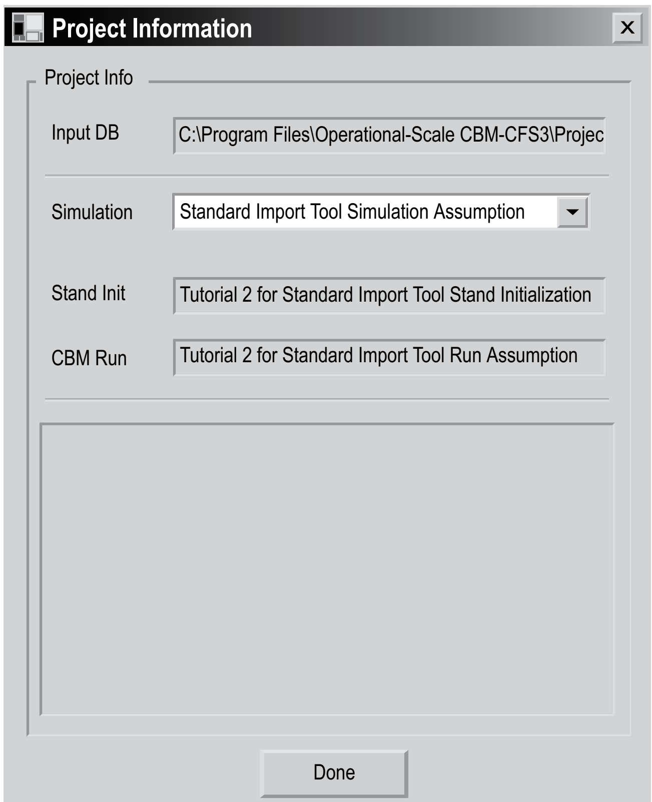


Figure 2-12. The "Project Information" window.

3. **Click on the "Done" button to close the window**

Opening an Existing Project

To open an existing project displayed in the "Connected Projects" box

Double-click on the name of the project in the "Connected Projects" box

or

Click on the name of a project, right-click over it, and click on "Open Project" on the menu that appears

or

Click on the name of the project in the "Connected Projects" box and click on the "Open" button.

The project selected will be opened in the CBM-CFS3 main window. The "Project Explorer" window, "Simulation Explorer" window, and "Results Explorer" window will pop up. Details about the Project Explorer and Simulation Explorer are available in Chapter 5, Exploring and Managing a Project. Detailed information about the Results Explorer is available in Chapter 8, Using the Results Explorer. A "Message" window and "Task List" window will also pop up. For details about these windows, read Chapter 5, section 5.4.

Alternatively, if the "Project Manager" window is closed, projects can be opened from the main CBM-CFS3 window menu bar options. To open a project this way

1. **Click on "File" on the main CBM-CFS3 window menu**
2. **Click on "Open" on the drop list that appears**

A "Browse for CBM Project File" window (Figure 2-13) will pop up.

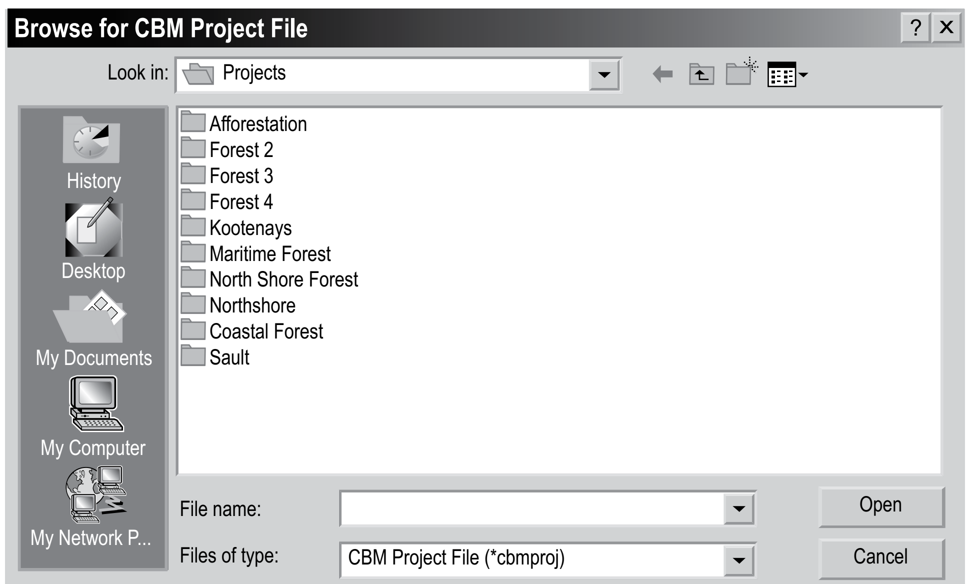


Figure 2-13. The "Browse for CBM Project File" window.

3. **Browse to the "Projects" folder (default location is C:\Program Files\Operational Scale CBM-CFS3\Projects) and double-click on the name of the folder containing the project to open**
4. **Click on the project name.cbmproj file that is displayed (where "project name" represents the user-defined project name of the existing project)**
5. **Click on the "Open" button to open the project**

   or

   Click on the "Cancel" button to terminate the process

If the user clicks on the "Open" button, the project selected will be opened in the main CBM-CFS3 window. In addition to this way of opening projects, projects that have been opened recently and then closed in the CBM-CFS3 can be easily and quickly reopened. To do this

1. **Click on "File" on the main CBM-CFS3 window menu bar**
2. **Click on "Recent Projects" on the drop list that appears**
3. **Select the name of the appropriate project from the side drop list that appears**

Renaming an Existing Project

To rename an existing project displayed in the "Connected Projects" box

1. **Click on the name of the project in the "Connected Projects" box**
2. **Right-click over the name and click on "Rename" on the menu that appears**
   or
   Click on the "Rename" button

The "Rename" window (Figure 2-14) will pop up with the name of the project displayed in the "Current Name" box.

Figure 2-14. The "Rename" window.

1. **Enter a name in the "New Name" box**
2. **Click on the "Rename" button to proceed**
   or
   Click on the "Cancel" button to terminate the process

Moving an Existing Project

To move an existing project displayed in the "Connected Projects" box

1. **Click on the name of the project in the "Connected Projects" box**
2. **Right-click over the name, and click on "Relocate" on the menu that appears**
   or
   Click on the "Move" button

The "Relocate Project" window (Figure 2-15) will pop up. The current project location will appear in the "From" box. To proceed

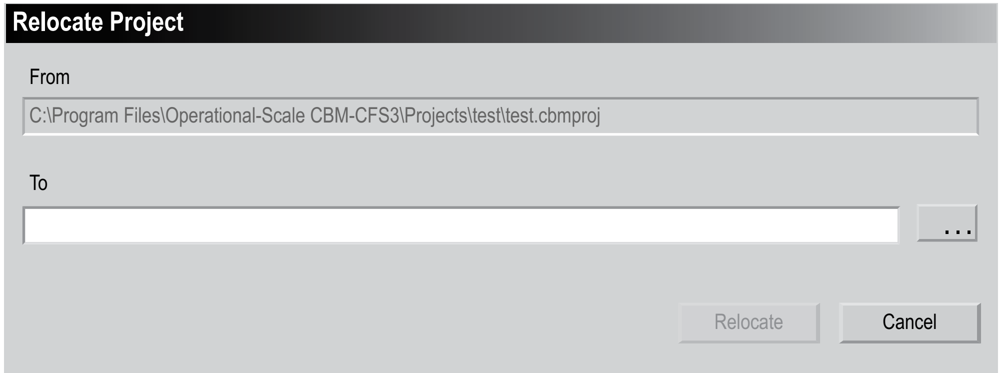


Figure 2-15. The "Relocate Project" window

3. **Enter the new location for the project in the "To" box and skip to step 6**
   or
   Click on the "…" button

The "Browse for Folder" window (Figure 2-16) will pop up.

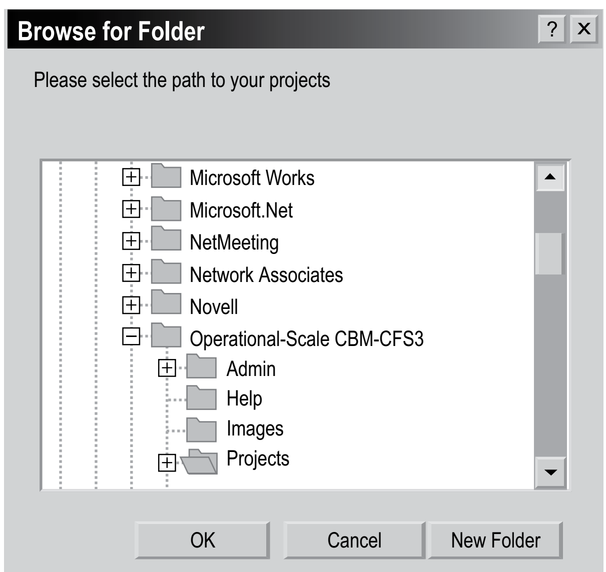


Figure 2-16. The "Browse for Folder" window prompting the user to select the path to their projects.

4. **Browse to the appropriate new location**
5. **Click on the "OK" button to proceed,**
   or
   Click on the "Cancel" button to terminate the process
   or
   Click on the "New Folder" button to create a new folder

If the user clicks on the "OK" button, the "Browse for Folder" window will close.

6. **Click on the "Relocate" button to relocate the project**

   or

   Click on the "Cancel" button to terminate the process

Copying an Existing Project

To copy an existing project displayed in the "Connected Projects" box

1. **Click on the name of the project in the "Connected Projects" box**
2. **Right-click over the name, and click on "Copy" on the menu that appears**

   or

   Click on the "Copy" button

The "Copy Project" window (Figure 2-17) will pop up. The name and location of the project to copy will appear in the "Source" box.

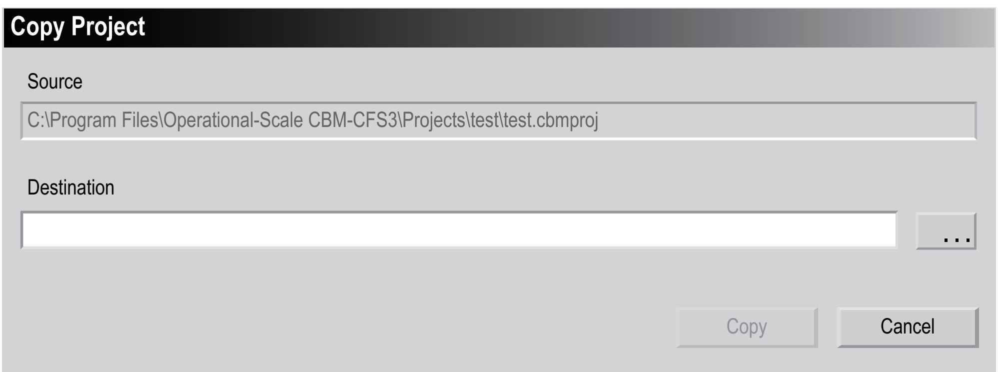


Figure 2-17. The "Copy Project" window.

3. **Type in the location for the copy of the project in the "Destination" box and skip to step 6**

   or

   Click on the "…" button

A "Browse for Folder" window (Figure 2-18) will pop up.

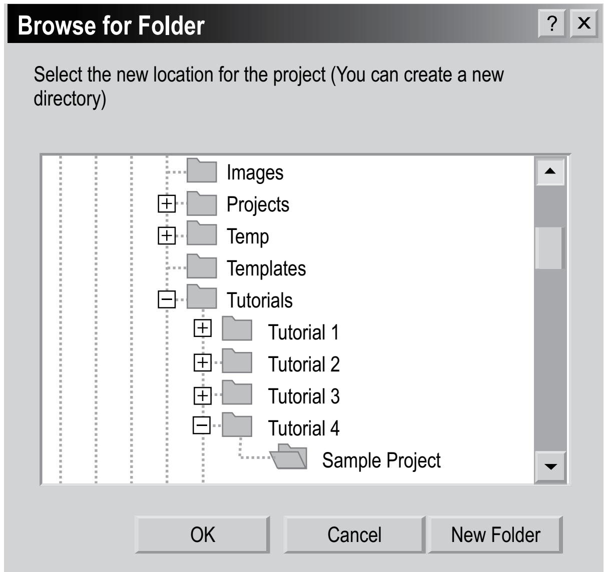


Figure 2-18. The "Browse for Folder" window prompting the user to select the new location for the project.

4. **Browse to the appropriate location where the copy can be placed**
5. **Click on the "OK" button to proceed**

   or

   Click on the "Cancel" button to terminate the process

   or

   Click on the "New Folder" button to create a new folder

If the user clicks on the "OK" button, the "Browse for Folder" window will close.

6. **Click on the "Copy" button to proceed**

   or

   Click on the "Cancel" button to terminate the process

Deleting an Existing Project

To delete an existing project displayed in the "Connected Projects" box

1. **Click on the name of the project in the "Connected Projects" box**
2. **Right-click over the name, and click on "Delete" on the menu that appears**

   or

   Click on the "Delete" button

The "Delete Project?" window will pop up asking the user to confirm deletion of the selected project(s).

Click on the "Yes" button to proceed,

or

Click on the "No" button to cancel the deletion process

Disconnecting an Existing Project

By disconnecting a project, the user is not deleting it, but rather is just disconnecting it from the Archive Index Database. To disconnect an existing project displayed in the "Connected Projects" box

Click on the name of the project in the "Connected Projects" box

Right-click over the name, and click on "Disconnect" on the menu that appears

or

Click on the "Disconnect" button

The project name will disappear from the "Connected Projects" box. To learn how to reconnect a disconnected project, proceed to section 2.4.3.

2.4.2 Invalid Projects

Projects appearing in the "Invalid Projects" box (Figure 2-10) must be validated before they can be connected to the Archive Index Database and made available to be opened. A project will be listed in the "Invalid Projects" box if the CBM-CFS3 cannot locate the Input Database for the project. This may occur for two reasons: either the database (.mdb) file for the project has been deleted or it has been relocated. To validate an invalid project

1. **Click on the name of the project in the "Invalid Projects" box**
2. **Right-click over the name and click on "Validate" on the menu that appears**

The CBM-CFS3 will attempt to find the input database file for the project. If it is found and validated, the project name will move to the "Connected Projects" box, and if not, the user will not be able to open the project.

2.4.3 Disconnected Projects

The "Projects" folder may include projects supplied by other users or projects that have been disconnected from the Archive Index Database either purposely or because of an update to the CBM-CFS3. These disconnected projects can be found and reconnected or deleted in a hidden section of the "Project Manager" window (Figure 2-10). To access this hidden section

1. **Click on the "Locate More Projects" link**

The hidden section of the "Project Manager" window (Figure 2-19) will pop up. In this section, the user should make the "Projects Root Directory" box point to C:\Program Files\Operational Scale CBM-CFS3\Projects, where projects are normally stored, unless the projects are stored in a different folder. In either case, to have the names of disconnected projects appear in the "Disconnected Projects" box

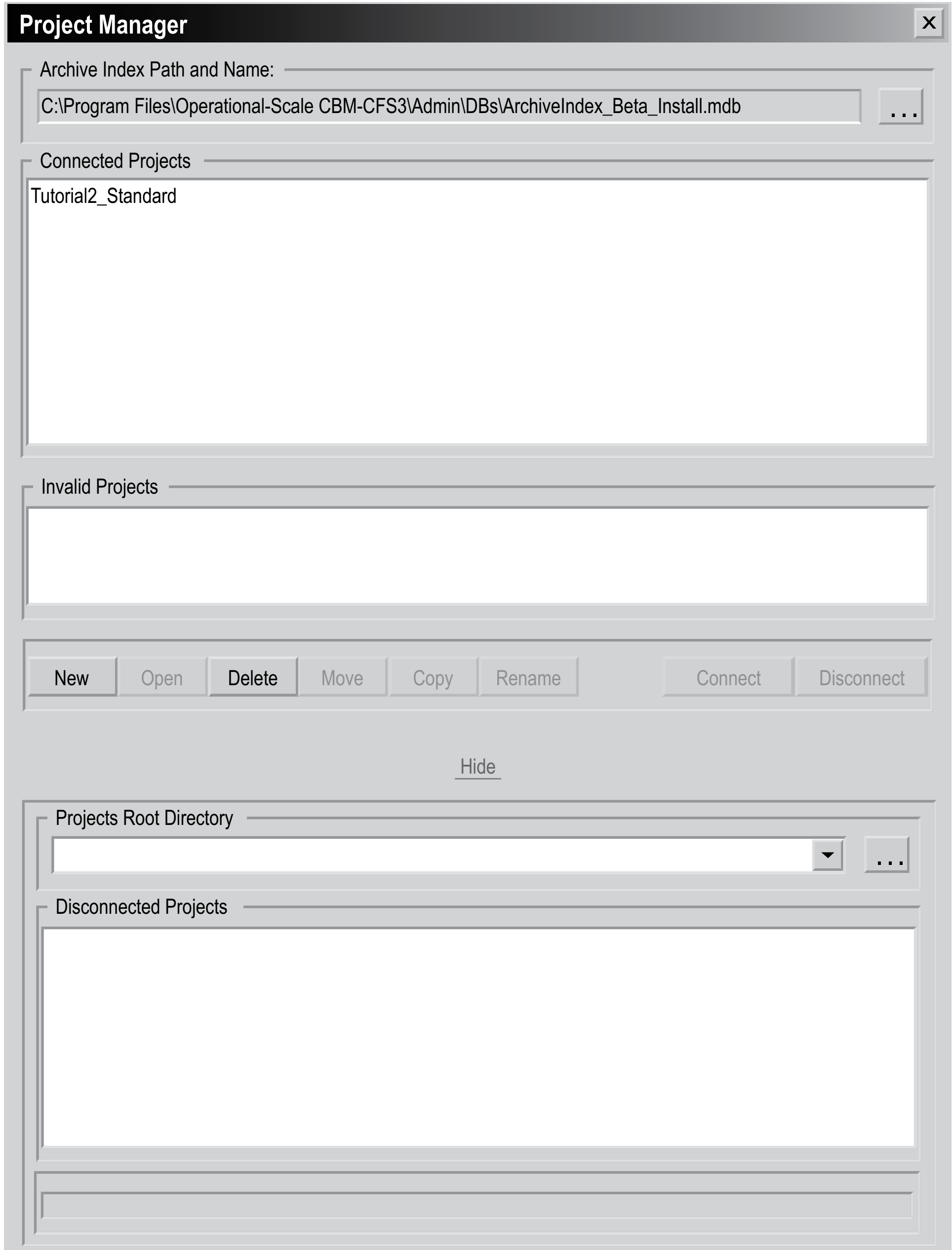


Figure 2-19. The "Project Manager" window displaying the hidden section for disconnected projects.

2. **Click on the "…" button beside the "Projects Root Directory" box**

A "Browse for Folder" window (Figure 2-16) will pop up.

3. **Browse to and select the folder where the projects are stored**
4. **Click on the "OK" button to proceed**

   or

   Click on the "Cancel" button to terminate the process

   or

   Click on the "New Folder" button to create a "Projects" folder

Reconnecting a Project

To reconnect a disconnected project

Click on the name of the project in the "Disconnected Projects" box

Right-click over the name, and select "Connect" from the menu that appears

or

Click on the "Connect" button

The project name will be reconnected to the Archive Index Database and appear in the "Connected Projects" box. To hide the disconnected projects section

Click on the "Hide" link

2.5 Closing the CBM-CFS3

If the user wants to close the CBM-CFS3

1. **Click on "File" on the main CBM-CFS3 window (Figure 2-9) menu bar**
2. **Click on "Exit" on the drop list that appears**

The "Operational-Scale CBM-CFS3" window will pop up asking the user to confirm the request to close the application.

3. **Click on the "Yes" button to proceed or the "No" button to keep the model open**

Alternately, to close the CBM-CFS3

Click on the "X" in the top right corner of the main CBM-CFS3 window (Figure 2-9)

The "Operational-Scale CBM-CFS3" window will pop up asking the user to confirm the request to close the application.

Click on the "Yes" button to proceed

or

Click on the "No" button to keep the model open

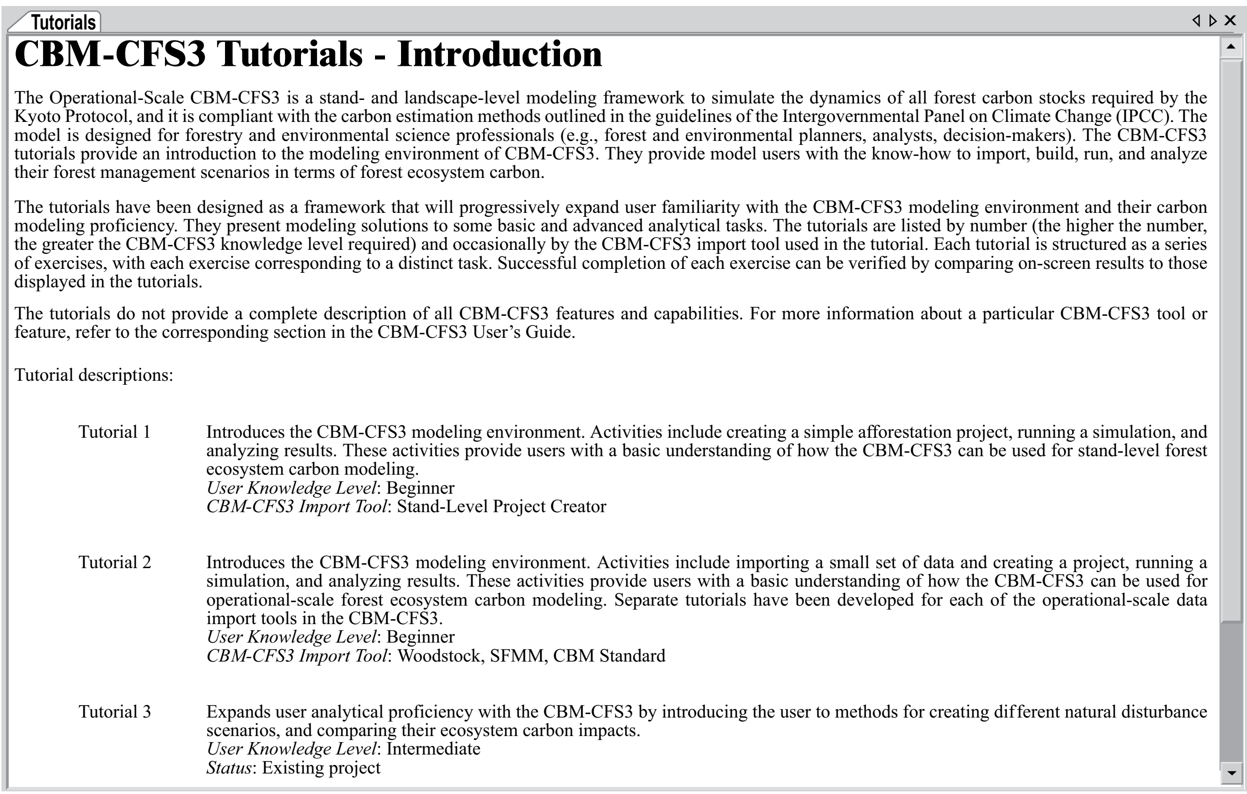
2.6 Tutorials

Several tutorials have been included in the model to help users learn how to import data, run the model, review results, create and edit various assumptions and data, and how to use the Stand-Level Project Creator. To access the tutorials

Click on "Help" on the menu bar in the main CBM-CFS3 window (Figure 2-9)

Click on "Tutorials" on the menu that appears

The "Tutorials" window (Figure 2-20) will pop up. In this window, the user can access (by clicking on the links) step-by-step tutorials on how to perform a simple simulation (with each CBM-CFS3 import tool), explore the effects of disturbances and improved growth rates on forest ecosystem carbon dynamics, assess the impacts of multiple natural disturbances on the same land base, and evaluate the impacts of different forest management regimes on the same land base.


Tutorials

CBM-CFS3 Tutorials - Introduction

The Operational-Scale CBM-CFS3 is a stand- and landscape-level modeling framework to simulate the dynamics of all forest carbon stocks required by the Kyoto Protocol, and it is compliant with the carbon estimation methods outlined in the guidelines of the Intergovernmental Panel on Climate Change (IPCC). The model is designed for forestry and environmental science professionals (e.g., forest and environmental planners, analysts, decision-makers). The CBM-CFS3 tutorials provide an introduction to the modeling environment of CBM-CFS3. They provide model users with the know-how to import, build, run, and analyze their forest management scenarios in terms of forest ecosystem carbon.

The tutorials have been designed as a framework that will progressively expand user familiarity with the CBM-CFS3 modeling environment and their carbon modeling proficiency. They present modeling solutions to some basic and advanced analytical tasks. The tutorials are listed by number (the higher the number, the greater the CBM-CFS3 knowledge level required) and occasionally by the CBM-CFS3 import tool used in the tutorial. Each tutorial is structured as a series of exercises, with each exercise corresponding to a distinct task. Successful completion of each exercise can be verified by comparing on-screen results to those displayed in the tutorials.

The tutorials do not provide a complete description of all CBM-CFS3 features and capabilities. For more information about a particular CBM-CFS3 tool or feature, refer to the corresponding section in the CBM-CFS3 User's Guide.

Tutorial descriptions:

Tutorial 1 — Introduces the CBM-CFS3 modeling environment. Activities include creating a simple afforestation project, running a simulation, and analyzing results. These activities provide users with a basic understanding of how the CBM-CFS3 can be used for stand-level forest ecosystem carbon modeling.
User Knowledge Level: Beginner
CBM-CFS3 Import Tool: Stand-Level Project Creator

Tutorial 2 — Introduces the CBM-CFS3 modeling environment. Activities include importing a small set of data and creating a project, running a simulation, and analyzing results. These activities provide users with a basic understanding of how the CBM-CFS3 can be used for operational-scale forest ecosystem carbon modeling. Separate tutorials have been developed for each of the operational-scale data import tools in the CBM-CFS3.
User Knowledge Level: Beginner
CBM-CFS3 Import Tool: Woodstock, SFMM, CBM Standard

Tutorial 3 — Expands user analytical proficiency with the CBM-CFS3 by introducing the user to methods for creating different natural disturbance scenarios, and comparing their ecosystem carbon impacts.
User Knowledge Level: Intermediate
Status: Existing project

Figure 2-20. The "Tutorials" window.

2.7 Getting Help

There are several ways for users to obtain help in using the CBM-CFS3. Many questions about the CBM-CFS3 are answered in this user's guide and the user can use the index within this guide to search for specific keywords. Within the CBM-CFS3, users have access to a directory of integrated help files via the "Help" option under "Help" on the main CBM-CFS3 window menu bar. Answers to technical support questions can also be obtained by consulting the "Frequently Asked Questions" section of the Forest Carbon Accounting website (http://carbon.cfs.nrcan.gc.ca) or by contacting Stephen Kull at the Canadian Forest Service, Northern Forestry Centre in Edmonton, Alberta:

Telephone:	(780) 435-7304
Fax:	(780) 435-7359
E-mail:	cbm-help@nrcan.gc.ca

The CFS-CAT is very interested in your comments and feedback. Your suggestions will enable us to fine-tune this model.

Documentation of results from the application of the CBM-CFS3 to case studies will be forthcoming. Some relevant publications can be found in the "Literature Cited" section of this user's guide.

2.8 About the CBM-CFS3

To find the CBM-CFS3 version and build number and to view the acknowledgments for the software

1. **Click on "Help" on main CBM-CFS3 window menu bar (Figure 2-9)**
2. **Click on "About" on the drop list that appears**

The "About the Operational-Scale Carbon Budget Model" window (Figure 2-21) will pop up, displaying the previously described information.

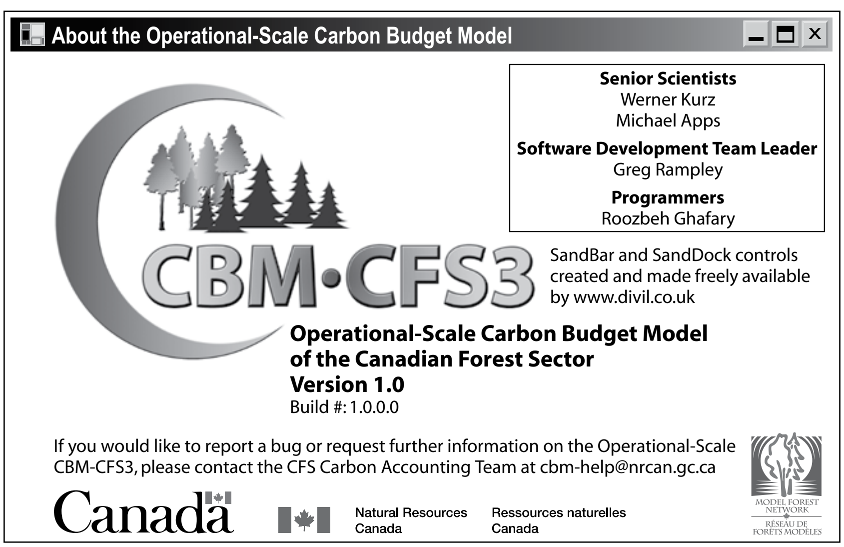


Figure 2-21. The "About the Operational-Scale Carbon Budget Model" window.

2.9 Known CBM-CFS3 Issues

To read about any known issues in the CBM-CFS3 software (e.g., relating to functionality, scientific deficiencies or programming)

1. **Click on "Help" on main CBM-CFS3 window menu bar (Figure 2-9)**
2. **Click on "Known Issues" on the drop list that appears**

A portable document format (PDF) file will pop up describing any issues related to that version of the CBM-CFS3.

CHAPTER 3

PREPARING IMPORT FILES, IMPORTING DATA, AND RUNNING A SIMULATION

This chapter guides the CBM-CFS3 user through the basic steps in creating a project, importing or entering data and information into the model, and running a simulation.

3.1 Preparing Data for Import

The following subsections describe the types of import data and files required for three of the four CBM-CFS3 import tools, the CBM Standard Import Tool, the Woodstock Import Tool, and the SFMM (Strategic Forest Management Model) Import Tool. The Stand-Level Project Creator, which requires manual data entry, is discussed in section 3.3. Regardless of the import tool that will be used, the user is advised to read section 3.1.1 to gain an understanding of the types of data and information used by the CBM-CFS3.

Note: The Windows Regional Options and the use of commas versus decimals in import data

The CBM-CFS3 will function on the English or French version of a Windows operating system (see section 2.1 for eligible Windows operating systems). The model will also accommodate import data with decimals delimited by periods or commas; however, the user may be required to adjust their Windows Regional Options to accommodate either of these (the user should verify their settings regardless). A user with period-delimited decimal import data (for example, 0.5) should have their Windows Regional Options set to "English (Canada)" before starting the CBM-CFS3. A user with comma-delimited decimal import data (for example, 0,5) should have their Windows Regional Options set to "French (Canada)" before starting the CBM-CFS3. The user should note that the CBM-CFS3 will display delimited data and results based on the Windows Regional Options selected on the user's computer; however, text-based results files will always use period-delimited decimals.

3.1.1 CBM Standard Import Tool

Any CBM-CFS3 user who does not use the Woodstock or SFMM timber supply models and who is not using the CBM-CFS3 for stand-level projects, must prepare import data to meet the format requirements of the CBM Standard Import Tool. This import tool allows import of data in a variety of formats including text files, Excel (Microsoft 2003) spreadsheets and Access (Microsoft 2000a) database tables. The CBM Standard Import Tool also allows users to create default assumptions for some other parameters such as those applied to dead organic matter (DOM) pools and volume-to-biomass conversion factors. Future development of the CBM Standard Import Tool will be guided by feedback from users, so that the CBM Standard Import Tool will capture more of the functionality and capability desired by users as it evolves.

The CBM Standard Import Tool accepts only data that is provided in a specific format. It is crucial that the user understand the requirements of the CBM Standard Import Tool outlined in this manual to meet these requirements. The instructions are divided into the following seven sections, which correspond to the data groupings required by the CBM Standard Import Tool:

1. Age Classes
2. Disturbance Types
3. Classifiers and Values
4. Inventory
5. Growth and Yields
6. Transition Rules
7. Disturbance Events

Basic Requirements for Creating Text Files for Import

For data that is to be imported in text files (files with extension .txt), the user must adhere to the following format requirements:

- The items must be in plain text format.
- The items must be delimited by one or more spaces or tabs.
- Empty lines are ignored and are therefore allowed.
- Lines beginning with an exclamation mark (!) are ignored and can be used for comments.
- Lines other than empty lines and those beginning with an exclamation mark (!) must contain data in the specified format.
- Identification (ID) fields may be alphanumeric but may not contain any spaces and may not be enclosed within single quotes.
- Non-ID fields may be alphanumeric and may contain spaces and must be enclosed within single quotes (e.g., 'Clear cut harvesting').
- Single quote characters are reserved and cannot be used within any field (e.g., 'First seasons cuts' not 'First season's cut').

Basic Requirements for Creating Microsoft Access Database Files or Microsoft Excel Spreadsheet Files for Import

For data that is to be imported in the form of Microsoft Access database files (with extension .mdb) or Microsoft Excel spreadsheet files (with extension .xls), the user must adhere to the following format requirements:

- The name of the table (or worksheet) is not important, since the user explicitly selects the table (or worksheet) from a list once the source file has been selected.

- If the column positions are identical with their default positions, the column-mapping step can be skipped. However, if the column positions are different from their default positions, column mapping is required. The default column positions are given in the discussion of each import file.
- Where indicated, row ordering is important for groupings of data for import.
- In the first row of a Microsoft Excel worksheet, each column used must have a unique column name. These names must not contain spaces.
- For each table or worksheet in which the user wishes to override the default column positions, all of the columns for the table or worksheet must be mapped.

1. Age Classes

The "Age Classes" import file contains information identifying the age classes and age class size of the user's data, in the required column format. The first column is the ID field for the age class, which is followed by the size of the age class in years. The first age class must be an age class starting at year 0 with a size of 0. The table can include an optional "Description" column for describing age classes. Examples of the format required for the "Age Classes" import files in text or Microsoft Access table format are shown in Figure 3-1. A Microsoft Excel file (not shown) would have a format similar to that of a Microsoft Access table (Figure 3-1b). The following are the default column positions:

1. Age class ID
2. Size of age class

2. Disturbance Types

The "Disturbance Types" import file identifies the user's disturbance and management activity types in the required column format. An example of the contents of a "Disturbance Types" text file for the CBM Standard Import Tool is shown in Figure 3-2a. The file includes a column for the ID field associated with the disturbance type and a column for the name of the disturbance type. Note that the DISTID numbers in the first column are not contained within the single quotes, whereas the disturbance type names in the second column are. The user may choose to use the disturbance type name as the ID rather than a DISTID number. In that case, the IDs used must not have any spaces (Figure 3-2b); hence, the name 'Clear cut harvesting' in the Names column might become simply "Harvesting" in the ID column.

A Microsoft Excel file (not shown) would have a format similar to that of a Microsoft Access table (Figure 3-2c). The order in which the rows appear is not important. The following are the default column positions:

1. Disturbance type ID
2. Disturbance type name

a)

```
!
! Sample Standard Import Tool Version 1.0 Age Classes Import File
!
!Age Class ID            Size (Years)

AGEID0                    0
AGEID1                   10
AGEID2                   10
AGEID3                   10
AGEID4                   10
AGEID5                   10
AGEID6                   10
AGEID7                   10
AGEID8                   10
AGEID9                   10
AGEID10                  10
AGEID11                  10
```

b)

AgeClassID	Size
AGEID0	0
AGEID1	10
AGEID2	10
AGEID3	10
AGEID4	10
AGEID5	10
AGEID6	10
AGEID7	10
AGEID8	10
AGEID9	10

Figure 3-1. Examples of a) text and b) Microsoft Access "Age Classes" import files. A Microsoft Excel import file would have an appearance similar to that of the Microsoft Access import file.

a)

```
!
! Sample Standard Import Tool Version 1.0 Disturbance Type Import File
!

DISTID1        'Planting'
DISTID2        'Reforestation'
DISTID3        'Seeding'
DISTID4        'Fire'
DISTID5        'Clear cut harvesting'
DISTID6        'Miscellaneous'
```

b)

```
!
! Sample Standard Import Tool Version 1.0 Disturbance Type Import File2
!

Planting       'Planting'
Reforestation  'Reforestation'
Seeding        'Seeding'
Fire           'Fire'
Harvesting     'Clear cut harvesting'
Misc           'Miscellaneous'
```

c)

DisturbanceTypeID	Name
DISTID1	Planting
DISTID10	Eastern spruce budworm infestation
DISTID11	Brown spruce longhorn infestation
DISTID2	Reforestation
DISTID3	Seeding
DISTID4	Natural forest fire
DISTID5	Controlled burn
DISTID6	Thinning
DISTID7	Mountain pine beetle infestation
DISTID8	Asian gypsy moth infestation

Figure 3-2. Examples of a) text (with DISTID numbers in the Disturbance Type ID column), b) text (with names in the Disturbance Type ID column), and c) Microsoft Access "Disturbance Types" import files. A Microsoft Excel import file would have an appearance similar to that of the Microsoft Access import file.

3. Classifiers and Values

The "Classifiers and Values" import file contains the classifiers and values describing the user's forest types in the required column format. User's importing data that includes more than one administrative boundary (province) or ecological boundary (terrestrial ecozone of Canada; see the Importing subsection of section 3.2.1 for more details and map) should include classifiers for each. The CBM-CFS3 allows a maximum of 10 classifiers to describe the user's forest types, and one of these classifiers must identify tree species.

An example of the content of a "Classifiers and Values" text file for use with the CBM Standard Import Tool is shown in Figure 3-3. The example import text file (Figure 3-3) displays 3 classifiers. Each group of classifier values must be preceded by a line containing a slash and an asterisk (/*) and followed by a line containing an asterisk and a slash (*/). These characters are required to identify the group and cannot appear anywhere within the group. The first line of a given group must be a string contained within single quotes and should name the classifier in question. The lines that follow in the grouping are the values of the classifier. Each additional line in the group contains the ID of the classifier value followed by the name of the value. The name must be enclosed within single quotes.

```
!
!Sample Standard Import Tool Version 1.0 Classifiers and Values Import File
!
/*
'Species Types'
RM          'Red maple'
RP          'Red pine'
WP          'White pine'
JP          'Jack pine'
WS          'White spruce'
*/

/*
'Site Quality'
EX          'Excellent'
SQ1         'Very good'
SQ2         'Medium'
SQ3         'Poor'
*/

/*
'Ownership'
CR          'Crown land'
PV          'Private land'
FN          'First Nations'
*/
```

Figure 3-3. Example of a text "Classifiers and Values" import file.

An example of a "Classifiers and Values" import file in a Microsoft Access database table is shown in Figure 3-4. The order in which the rows appear is not important. The special keyword "_CLASSIFIER" is reserved and is used in the "ClassifierValueID" column to indicate that the next column holds a classifier name and not a classifier value name. The "ClassifierNumber" column presents the classifier number if the row is a classifier name and the classifier number to which the value belongs if the row is a classifier value name. The following are the default column positions:

1. Classifier number
2. Classifier value ID (or "_CLASSIFIER" keyword)
3. Classifier name or classifier value name

ClassifierNumber	ClassifierValueID	Name
1	_CLASSIFIER	Working Species or Leading Species
2	_CLASSIFIER	Site Quality
3	_CLASSIFIER	Density or Silviculture Class
4	_CLASSIFIER	Working Status
5	_CLASSIFIER	Curve Set Used in Each
5	A	Curve set 1
5	B	Curve set 2
2	POOR	Poor
1	BF	Balsam fir
1	BRS	Black and red spruce
5	C	Curve set 3
5	D	Curve set 4
3	D0	75%+ Crown closure
3	D1	51%-74% Crown closure
3	D2	26%-50% Crown closure
3	D3	0%-25% Crown closure
5	E	Curve set 5
2	EXCEL	Excellent
5	F	Curve set 6
2	GOOD	Good
1	JP	Jack pine
1	KCT	Kentucky coffee tree
3	NN	Nonforested polygon
2	OK	Satisfactory
3	PL	Currently planting
1	SM	Silver maple
2	VGOOD	Very good
1	W	Walnut
1	WB	White birch
4	WS1	Working forest
4	WS2	Reserve forest
1	WWP	Western white pine

Figure 3-4. Example of a Microsoft Access "Classifiers and Values" import file. A Microsoft Excel import file would have an appearance similar to that of the Microsoft Access import file.

4. Inventory

The "Inventory" import file contains the user's forest inventory information in the required column format. An example of the contents of a CBM Standard Import Tool "Inventory" text file using age classes rather than actual ages is shown in Figure 3-5a. Each line in the import file represents an area defined by its age class and classifier values. The first *n* columns are classifiers and their respective values, where *n* is the total number of classifiers. As a result, the number of starting columns will differ between import files depending on the number of classifiers used for that inventory. The columns contain the classifier value ID described for the "Classifier and Values" import file (Figure 3-3).

a)

```
!
!Sample Standard Import Tool Version 1.0 Inventory Import File
!
! Classifiers
!1    2    3    4    UsingID   Age       Area   DISTID
RM    EX   CR   HL   TRUE      AGEID0     23    DISTID1
PJ    SQ1  CR   PL   TRUE      AGEID1     88    DISTID3
RM    SQ3  CR   PL   TRUE      AGEID2     67    DISTID4
WP    EX   FN   PL   TRUE      AGEID3    100    DISTID3
WS    SQ2  PV   LL   TRUE      AGEID4    500    DISTID2
WS    SQ1  CR   PL   TRUE      AGEID5     40    DISTID1
RM    SQ3  PV   LL   TRUE      AGEID6      4    DISTID4
```

b)

```
!
!Sample Standard Import Tool Version 1.0 Inventory Import File
!
! Classifiers
!1    2    3    4    UsingID   Age   Area   DISTID
RM    EX   CR   HL   FALSE      43     23    DISTID1
PJ    SQ1  CR   PL   FALSE      21     88    DISTID3
RM    SQ3  CR   PL   FALSE      82     67    DISTID4
WP    EX   FN   PL   FALSE      17    100    DISTID3
WS    SQ2  PV   LL   FALSE       0    500    DISTID2
WS    SQ1  CR   PL   FALSE       5     40    DISTID1
RM    SQ3  PV   LL   FALSE     106      4    DISTID4
```

c)

1	2	3	4	T/F	AgeClassID/Age	Area	DISTID
WP	SQ3	CR	PL	TRUE	AGEID1	200005	DISTID4
RP	EX	CR	PL	TRUE	AGEID2	23.89	DISTID1
RM	SQ2	CR	LL	TRUE	AGEID3	7	DISTID4
WS	SQ1	FN	HL	TRUE	AGEID3	1.22	DISTID2
PJ	EX	PV	PL	TRUE	AGEID3	1000	DISTID3

Figure 3-5. Examples of a) text (with four classifiers and "UsingID" set to "TRUE"), b) text (with four classifiers and "UsingID" set to "FALSE"), and c) Microsoft Access "Inventory" import files. A Microsoft Excel import file would have an appearance similar to that of the Microsoft Access import file.

The first column that follows the classifier values is the "UsingID" column, where a "TRUE" entry identifies the age value in the next column ("Age") as an age class for the stand (Figure 3-5a). The user would enter "FALSE" in the "UsingID" column if actual ages were being entered in the "Age" column (Figure 3-5b). In the latter case, the user would simply enter the stand age in the "Age" column and drop the "AGEID" preface. Records in the "UsingID" column must be either all "TRUE" or all "FALSE."

The "Area" column contains the area for the described classifier values and must be in hectares.

The "DISTID" column contains the disturbance identifier from the "Disturbance Type" import file that represents the last disturbance type to affect the stand.

An example of an "Inventory" import file in a Microsoft Access table is shown in Figure 3-5c.

The following are the default column positions:

1. Classifier value ID(s)
2. UsingID entry
3. Age class ID or age
4. Area
5. Disturbance ID

5. Growth and Yield

Each line in the "Growth and Yield" import file represents the projected merchantable volumes for a species component within a stand type, in the required column format. An example of the contents of a "Growth and Yield" text file for the CBM Standard Import Tool is shown in Figure 3-6a.

a)

```
!
!Sample Standard Import Tool Version 1.0 Growth and Yield Import File
!
! Classifiers                 Species   Merchantable Volume at Age Classes
!1      2     3    4
RM      EX    CR   HL    RM      0   0   5   10   12   15   20
PJ      SQ2   CR   PL    PJ      0   0   3    5    8   11   15
RM      SQ3   PV   PL    RM      0   0   6   12   18   26   32
WP      EX    FN   LL    WP      0   0   2    6   10   13   16
WS      SQ1   CR   PL    WS      0   0   4    7   11   19   28
WS      SQ1   CR   PL    RM      0   0   5   12   17   23   27
```

b)

1	2	3	4	SPECIES	Vol0	Vol1	Vol2	Voln
WP	SQ3	CR	PL	WP	0	0	2	4
RP	EX	CR	PL	RP	0	0	3	6
WS	SQ1	FN	HL	WS	0	0	2	4
PJ	EX	PV	PL	PJ	0	0	1	3

Figure 3-6. Examples of a) text and b) Microsoft Access "Growth and Yield" import files. A Microsoft Excel import file would have an appearance similar to that of the Microsoft Access import file.

A complete growth and yield curve is represented by the sum of its species component volumes. The curve can be identified by the set of classifier values shared by each species component. A growth and yield curve may have between 1 and 10 species components; however, these components will be aggregated into leading softwood species and leading hardwood species when the biomass expansion is performed by the CBM-CFS3. Merchantable volume is defined as the sum of merchantable volumes of all species in a stand type. Merchantability limits for softwood and hardwood are defined by province and territory in Appendix 2.

The first *n* columns in the "Growth and Yield" import file are the classifier values that define the stand type associated with the growth and yield curve, where *n* is the total number of classifiers used. Four classifiers are used in the examples in Figure 3-6a and Figure 3-6b.

The first column that follows the classifier values is the "Species" column. This column must contain classifier value IDs representing the leading species of the stand type. In addition, the user can specify a stand type that identifies more than one leading species, each with its own volume curve. For example, in Figure 3-6a, the last two rows show the same four classifiers defining the stand type (WS, SQ1, CR, PL), one for each of the two leading species within the stand type, WS and RM. Each of these species has a different growth and yield curve.

Merchantable volume columns (the number of columns required depending on the number of age classes created by the user in the "Age Classes" import file) follow the species type column. For each species row, the volume values listed in the merchantable volume columns should be from youngest to oldest, where each column containing a volume value corresponds to an age class defined in the "Age Classes" import file. The number entered for a volume can be either an integer (e.g., 1) or a float value (e.g., 0.111), and must be in units of cubic meters per hectare (m^3/ha).

An example of a "Growth and Yield" import file in a Microsoft Access table is shown in Figure 3-6b. The following are the default column positions:

1. Classifier value ID(s)
2. Species type
3. Merchantable volume(s)

6. Transition Rules

Each line in the "Transition Rules" import file represents a transition rule for a stand type, in the required column format. These transition rules allow for a change in stand type after a disturbance or management event.

An example of the contents of a "Transition Rules" text file for the CBM Standard Import Tool is shown in Figure 3-7a. The first *n* columns are the classifier values (up to 10 permitted) that define the original stand type ("Source Classifiers"), where *n* is the total number of classifiers used to define the stand type (4 in Figure 3-7a).

a)

```
!Sample Standard Import Tool Version 1.0 Transition Rules Import File
!
!Source Classifiers          Age Classes                                  Disturbance Target Classifiers Regen Reset Percent
1   2   3   4   UsingID SWStart  SWEnd    HWStart HWEnd    Type        1  2   3  4    Delay Age
!Transition Rules for WP
WP  EX  CR  HL  TRUE    AGEID8   AGEID10  AGEID8  AGEID10  DISTID4     WP EX  CR HL   0     0     100
WP  EX  CR  HL  TRUE    AGEID4   AGEID6   AGEID4  AGEID6   DISTID2     WP SQ1 CR HL   0     0     100
WP  SQ1 CR  PL  TRUE    AGEID5   AGEID6   AGEID5  AGEID6   DISTID3     WP SQ2 CR PL   3     0      50
WP  SQ1 CR  PL  TRUE    AGEID5   AGEID6   AGEID5  AGEID6   DISTID3     WS SQ2 CR PL   0     0      50
WP  SQ3 CR  LL  TRUE    AGEID1   AGEID20  AGEID1  AGEID20  DISTID1     WP SQ3 CR LL   0     0     100
WP  SQ2 CR  PL  TRUE    AGEID4   AGEID6   AGEID5  AGEID7   DISTID2     WP SQ2 CR PL   5     0     100
```

b)

1	2	3	4	UsingID	SWStart	SWEnd	HWStart	HWEnd	Disturbance	1	2	3	4	Regen Delay	Reset Age	Percent
WP	EX	CR	HL	TRUE	AGEID8	AGEID10	AGEID8	AGEID10	DISTID4	WP	EX	CR	HL	0	0	100
WP	EX	CR	HL	TRUE	AGEID4	AGEID6	AGEID4	AGEID6	DISTID2	WP	SQ1	CR	HL	0	0	100
WP	SQ1	CR	PL	TRUE	AGEID5	AGEID6	AGEID5	AGEID6	DISTID3	WP	SQ2	CR	PL	3	0	50
WP	SQ1	CR	PL	TRUE	AGEID5	AGEID6	AGEID5	AGEID6	DISTID3	WS	SQ2	CR	PL	0	0	50
WP	SQ3	CR	LL	TRUE	AGEID1	AGEID20	AGEID1	AGEID20	DISTID1	WP	SQ3	CR	LL	0	0	100
WP	SQ2	CR	PL	TRUE	AGEID4	AGEID6	AGEID5	AGEID7	DISTID2	WP	SQ2	CR	PL	5	0	100

Figure 3-7. Examples of a) text and b) Microsoft Access "Transition Rules" import files. A Microsoft Excel import file would have an appearance similar to that of the Microsoft Access import file.

The first column that follows the classifier values is the "UsingID" column, where a "TRUE" entry indicates that values in the next four columns (SWStart, SWEnd, HWStart, HWEnd) are age class IDs and a "FALSE" entry indicates that the values are ages rather than age classes (the same protocol as described for the "Inventory" import file). In a "Transition Rules" import file, all records in the "UsingID" column must be either "TRUE" or "FALSE."

The "SWStart" and "SWEnd" columns define the starting age class (or age) and ending age class (or age), respectively, for the softwood components of a forest type that are eligible for the transition rule. The same applies for the "HWStart" and "HWEnd" columns, which refer to the hardwood components (Figure 3-7a). The age class range between SWStart (or HWStart) and SWEnd (or HWEnd) cannot overlap for any two records (rows) with the same stand-type classifier values and disturbance type.

The "Disturbance Type" column contains the disturbance type ID (defined in the "Disturbance Types" import file) that causes the stand-type transition. The next group of columns ("Target Classifiers"), which vary in number depending on the number of classifier values used, are the classifier values that define the stand type resulting from the disturbance.

The "Regen Delay" column contains a regeneration delay value, the numbers of years for the regeneration delay of the target stand type. The "Reset Age" column contains the age from which the target stand type will begin growing. The reset age is not affected by a "TRUE" or "FALSE" entry in the "UsingID" column. The user should enter a number representing the actual age. If the "UsingID" column contains "TRUE," the actual age entered will be associated with the appropriate age class.

The "Percent" column contains the percentage of the original area of the stand type that transitions to the target stand type. A group of transition rules can be used whereby a specific combination of forest type and age class will transition to several different target forest types when disturbed. In this case, a transition rule must be entered for each target forest type, and the transition percentages for this group of transition rules must sum to 100%. For example, in Figure 3-7a, the source WP, SQ1, CR, PL stand type transitions to the target WP, SQ2, CR, PL stand type (50%) and the WS, SQ2, CR, PL stand type (50%) following disturbance.

The CBM-CFS3 is limited to recognizing four target transitions options per source forest type following disturbance. Any remaining proportion of disturbed area not handled by these transitions will retain the original forest type. Additional transitions will be ignored. If the user does not enter any transition rules in this "Transition Rules" import file, forest types will be assumed to transition back to the original forest type following disturbance or management events.

An example of a "Transition Rules" import file in a Microsoft Access table is shown in Figure 3-7b. The following are the default column positions:

1. Source classifier value ID(s)
2. UsingID entry
3. Softwood starting age class ID
4. Softwood ending age class ID
5. Hardwood starting age class ID

6. Hardwood ending age class ID
7. Disturbance ID
8. Target classifier value ID(s)
9. Regeneration delay
10. Reset age
11. Percentage

7. Disturbance Events

Each line in the "Disturbance Events" import file is used to represent a disturbance and/or management activity that has occurred or will occur on the user's spatial unit(s) (SPUs), in the required column format. An example of the contents of a "Disturbance Events" text file for the CBM Standard Import Tool is shown in Figure 3-8a.

a)

!Sample Standard Import Tool Version 1.0 Disturbance Events Import File
!

!Classifier Value UsingID AgeClass

1	2	3	4		SWStart	SWEnd	HWStart	HWEnd	Measurement Type	Amount	DistTypeID	Year
WP	EX	CR	HL	TRUE	AGEID8	AGEID10	AGEID8	AGEID10	A	10	DISTID4	1
WP	EX	CR	HL	TRUE	AGEID4	AGEID6	AGEID4	AGEID6	A	55	DISTID2	2
WP	SQ1	CR	PL	TRUE	AGEID5	AGEID6	AGEID5	AGEID6	A	87	DISTID3	3
WP	SQ1	CR	PL	TRUE	AGEID5	AGEID6	AGEID5	AGEID6	A	555	DISTID3	4
WP	SQ3	CR	LL	TRUE	AGEID1	AGEID20	AGEID1	AGEID20	A	235	DISTID1	5
WP	SQ2	CR	PL	TRUE	AGEID4	AGEID6	AGEID5	AGEID7	A	5	DISTID2	6

b)

1	2	3	4	UsingID	SWStart	SWEnd	HWStart	HWEnd	Measurement Type	Amount	DistTypeID	Year
WP	EX	CR	HL	TRUE	AGEID8	AGEID10	AGEID8	AGEID10	A	10	DISTID4	1
WP	EX	CR	HL	TRUE	AGEID4	AGEID6	AGEID4	AGEID6	A	55	DISTID2	2
WP	SQ1	CR	PL	TRUE	AGEID5	AGEID6	AGEID5	AGEID6	A	87	DISTID3	3
WP	SQ1	CR	PL	TRUE	AGEID5	AGEID6	AGEID5	AGEID6	A	555	DISTID3	4
WP	SQ3	CR	LL	TRUE	AGEID1	AGEID20	AGEID1	AGEID20	A	235	DISTID1	5
WP	SQ2	CR	PL	TRUE	AGEID4	AGEID6	AGEID5	AGEID7	A	5	DISTID2	6

Figure 3-8. Examples of a) text and b) Microsoft Access "Disturbance Events" import files. A Microsoft Excel import file would have an appearance similar to that of the Microsoft Access import file.

The first *n* columns are classifier values, where *n* is the total number of classifiers (four in Figure 3-8a). Together, these classifier values describe which stand types the model should select when executing the disturbance and management activities.

The first column that follows the classifier values is the "UsingID" column, where a "TRUE" entry indicates that values in the next four columns (SWStart, SWEnd, HWStart, HWEnd) are age class IDs and a "FALSE" entry indicates that the values are ages rather than age classes (the same protocol as described for the "Inventory" import file). In a "Disturbance Events" import file, all records in the "UsingID" column must be either "TRUE" or "FALSE."

The "SWStart" and "SWEnd" columns define the starting age class (or age) and ending age class (or age), respectively, for the softwood components of a forest type that are eligible for the disturbance event. The same applies for the "HWStart" and "HWEnd" columns, which refer to the hardwood components (Figure 3-8a). The age class range between SWStart (or HWStart) and SWEnd (or HWEnd) cannot overlap for any two records (rows) with the same stand-type classifier values and disturbance type.

The "Measurement Type" column contains the measurement type for the disturbance ("A" for area, "P" for proportion, or "M" for merchantable carbon, in tonnes per hectare). The "Amount" column contains the amount to be disturbed according to the measurement type previously indicated in the "Measurement Type" column.

The "DistTypeID" column contains the disturbance type ID (defined in the "Disturbance Types" import file) and the "Year" column contains the year (annual time step) in which the disturbance will occur.

At a minimum, the user must enter one event in the "Disturbance Events" import file; if the user does not want this event to have any impact, a value of zero can be entered in the "Amount" column for the event.

An example of a "Disturbance Events" import file for a Microsoft Access table is shown in Figure 3-8b. The following are the default column positions:

1. Classifier value ID(s)
2. UsingID entry
3. Softwood starting age class ID
4. Softwood ending age class ID
5. Hardwood starting age class ID
6. Hardwood starting age class ID
7. Measurement type
8. Amount
9. Disturbance type ID
10. Year

To begin the CBM-CFS3 data import process, proceed to section 3.2.

3.1.2 Woodstock Import Tool

Once users of Spatial Woodstock, version 3.2x (Remsoft Inc. 2006) have created a forest management scenario, they can export files for use in the CBM-CFS3, using the CBM-CFS3 Export Tool. For more information about this tool, consult the Remsoft website (www.remsoft.com).

Once the appropriate Spatial Woodstock files (i.e., themes, yields, transitions, schedule, actions, and areas) have been exported, the user must import these files as tables into a single Microsoft Access database file. In Microsoft Access

1. **Create a new database**
2. **Import the exported Spatial Woodstock files as tables**

The CBM-CFS3 cannot import a Microsoft Access database file with tables containing more than 10 classifiers used to describe each forest type, so the user must delete any excess classifiers. A user with data including more than one administrative boundary (province or territory) or ecological boundary (terrestrial ecozone of Canada; see the Importing subsection of section 3.2.2 for more detail) should keep classifiers for each. The file must contain at least one scheduled disturbance or management event, even if that event has an impact target of zero. The Microsoft Access database file can then be imported into the CBM-CFS3 using the Woodstock Import Tool (see section 3.2.2). To begin the CBM-CFS3 data import process, proceed to section 3.2.

3.1.3 SFMM Import Tool

Once SFMM users have created and successfully run a management scenario, they can create the files required for the CBM-CFS3. The CBM-CFS3 requires the Input Data Text Input File (file with extension .inp) from an SFMM run. The user can create this file on the "Data Handling Menu" screen in SFMM. The user must also export a file for the management scenario from SFMM to CACTuS and create a summary database file. The information in this summary database file must also be imported into the CBM-CFS3. The process for creating the CACTuS database file for the CBM-CFS3 is under development, and SFMM users should contact Michael Ter-Mikaelian (michael.termikaelian@ontario.ca, tel: 705-946-7432) at the Ontario Forest Research Institute in Sault Ste. Marie, Ontario, to obtain CACTuS-processed forest management unit data. To begin the CBM-CFS3 data import process, proceed to section 3.2.

3.1.4 Stand-Level Projects

A user who is planning to examine single stands using the CBM-CFS3 will need to describe the stand or stands using the Stand-Level Project Creator, rather than importing data. The user should have the following information on hand: tree species, location (province of Canada), nonforest site types, classifiers (descriptors used to define forest stand types), a total merchantable volume growth and yield curve for each stand type, historic and/or future natural and forest management disturbance types, and a schedule of these events. The CBM-CFS3 provides default biomass and DOM turnover parameters, DOM parameters, and nonforest initial condition parameters; however, should the user have more accurate parameters for the specific land base, the default values can be replaced with those values. To begin the Stand-Level Project Creator, proceed to section 3.3.

3.2 Importing Data

To begin importing data into the CBM-CFS3 using the CBM Standard Import Tool, the Woodstock Import Tool, or the SFMM Import Tool, the user must create a new project. To proceed

In the "Project Manager" window (Figure 2-10), right-click on the "Connected Projects" box and click on "New Project" on the menu that appears

or

In the "Project Manager" window (Figure 2-10), click on the "New" button

or

On the menu bar of the main CBM-CFS3 window, click on "File," click on "New" on the menu that appears, and then click on Project on the side menu that appears

Any of these methods will open up the "New Project" window (Figure 3-9). In this window, the user selects the appropriate import tool to be used to import data, which depends on the source of the data and/or the kind of project to be created. The options for import tools are the CBM Standard Import Tool, the Woodstock Import Tool, and the SFMM Import Tool. To proceed

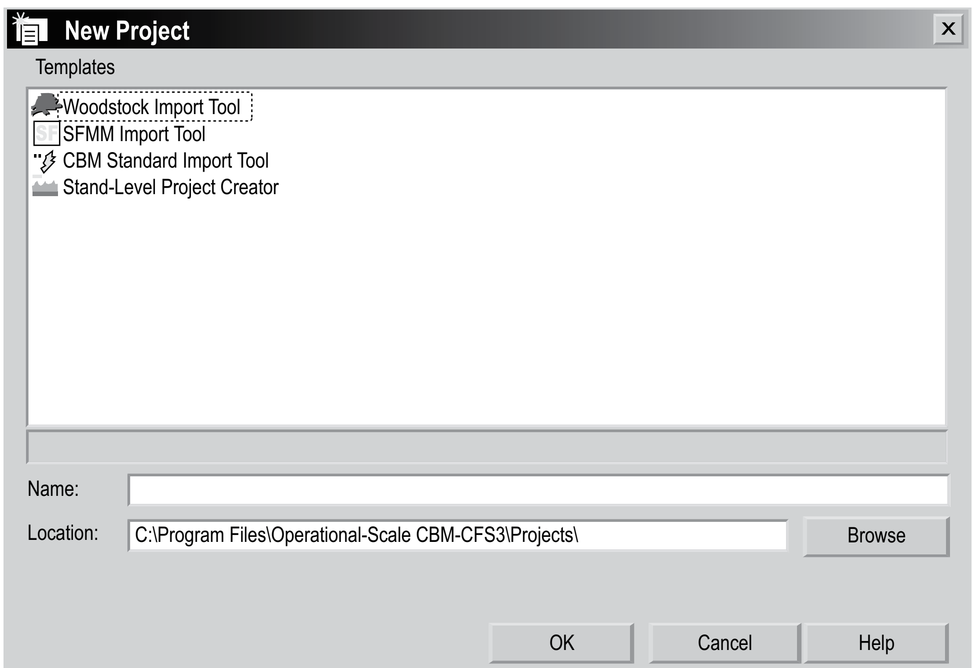


Figure 3-9. The "New Project" window.

1. **Enter a project name in the "Name" box**
2. **Enter a folder location for the project in the "Location" box or accept the default location (C:\Program Files\Operational-Scale CBM-CFS3\Projects), and skip to the text following step 4**

   or

Click on the "Browse" button to browse to a location (if the C:\Program Files\Operational Scale CBM-CFS3\Projects is not the appropriate location)

If the user clicks on the "Browse" button, the "Browse for Folder" window (Figure 3-10) will pop up.

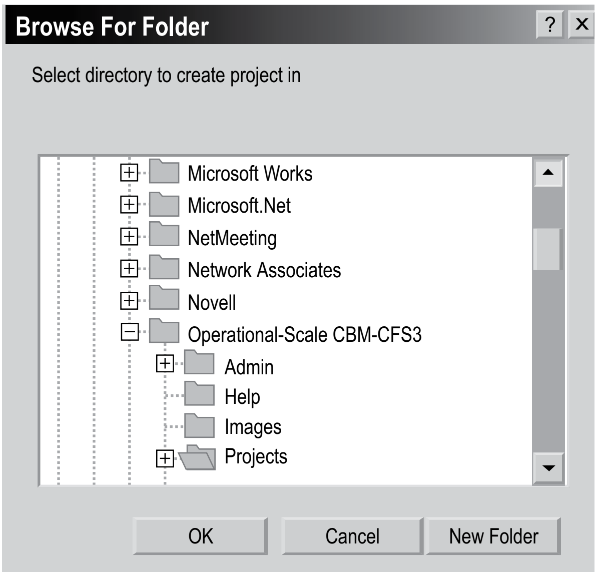


Figure 3-10. The "Browse for Folder" window prompting the user to select the directory in which to create the project.

3. **Browse to the C:\Program Files\Operational-Scale CBM-CFS3\Projects folder or any other designated folder for the project**
4. **Click on the "OK" button to proceed**

   or

   Click on the "Cancel" button to terminate the process

   or

   Click on the "New Folder" button to create a new folder

Note: Automated process for locating "Projects" folder

The CBM-CFS3 will remember the folder location when future projects are created, so this series of steps need be completed only once. However, the user must go through these steps again if a different folder is chosen for projects at a later date.

Once an appropriate location is displayed in the "Location" box, the project path and project name will be displayed below the "Location" box.

Next, the user must select the import tool. The Woodstock Import Tool should be used by those exporting their data from the Spatial Woodstock software (using the CBM export feature). The SFMM Import Tool should be selected by those extracting data from SFMM and CACTuS software. The CBM Standard Import Tool should be selected by those extracting data from other timber supply models or sources and importing standard import files formatted for CBM-CFS3. The Stand-Level Project Creator should be used by those who wish to create one or only a few stands. To proceed

5. **In the "Templates" box of the "New Projects" window (Figure 3-9), click on the appropriate icon for the import tool to be used**
6. **Click on the "OK" button to proceed**

   or

   Click on the "Cancel" button to terminate this process

   or

   Click on the "Help" button to access the program's help features

After clicking on the "OK" button, the user can proceed to section 3.2.1 for importing files with the CBM Standard Import Tool, section 3.2.2 for importing files with the Woodstock Import Tool, section 3.2.3 for importing files with the SFMM Import Tool, or section 3.3 for creating stands in the Stand-Level Project Creator.

3.2.1 CBM Standard Import Tool

If the user chooses to import files using the CBM Standard Import Tool (according to the steps in the previous section), the "CBM Standard Import Tool" window (Figure 3-11) will pop up. Importing files with the CBM Standard Import Tool involves three steps, which correspond to three of the tabs appearing in this window: Initial Setup, Template Selection, and Import. The "Report Log" tab contains a list of import tasks performed by the import tool; in the event of a problem, its contents can be copied and sent to the CFS-CAT for help with debugging problems.

Initial Setup

To proceed with the import process, the user must begin on the "Initial Setup" tab (Figure 3-11).

1. **Click on the "…" button next to the "Age classes" box and point to the appropriate age class text or database file to be imported in the "Open" window that pops up**
2. **Click on the "Open" button to proceed**

   or

   Click on the "Cancel" button to terminate the file selection

After clicking the "Open" button, users importing data from Microsoft Access or Microsoft Excel files must also click on the drop list box next to the "…" button and click on the appropriate table or worksheet name from the database file on the drop list that appears. Users importing text files do not need to perform this additional step, and the drop list will simply display "N/A" (for "not available").

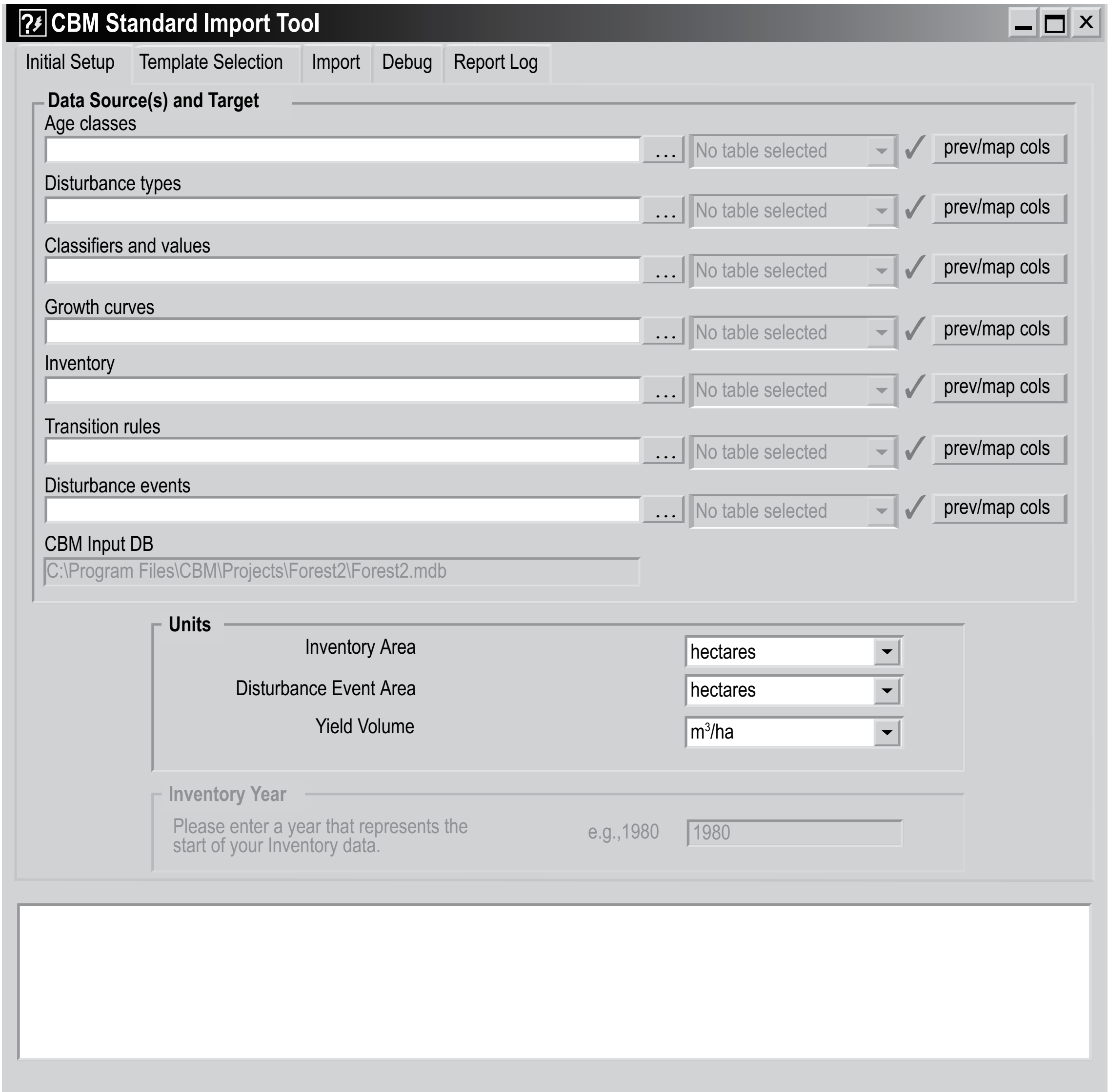


Figure 3-11. The "CBM Standard Import Tool" window with the "Initial Setup" tab selected.

By clicking on any of the "prev/map cols" (preview/map columns) buttons associated with a "Data Source(s) And Target" option file, the user can view the text file or database column mapping associated with the file or database that has been selected, in a pop-up "Text File Preview" window (Figure 3-12) or "Table Preview and Column Mapping" window (Figure 3-13).

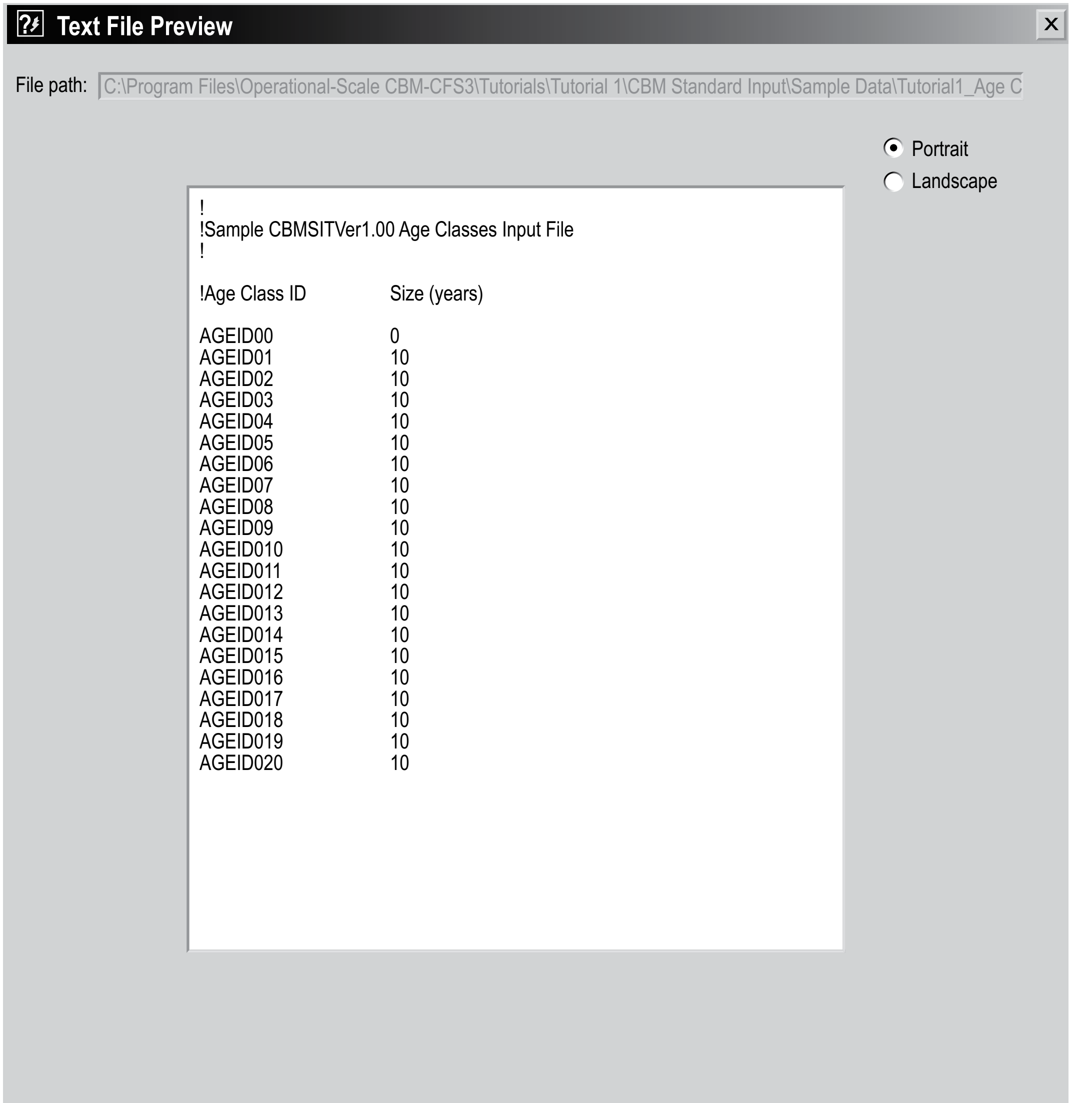


Figure 3-12. The "Text File Preview" window displaying the "Portrait" layout.

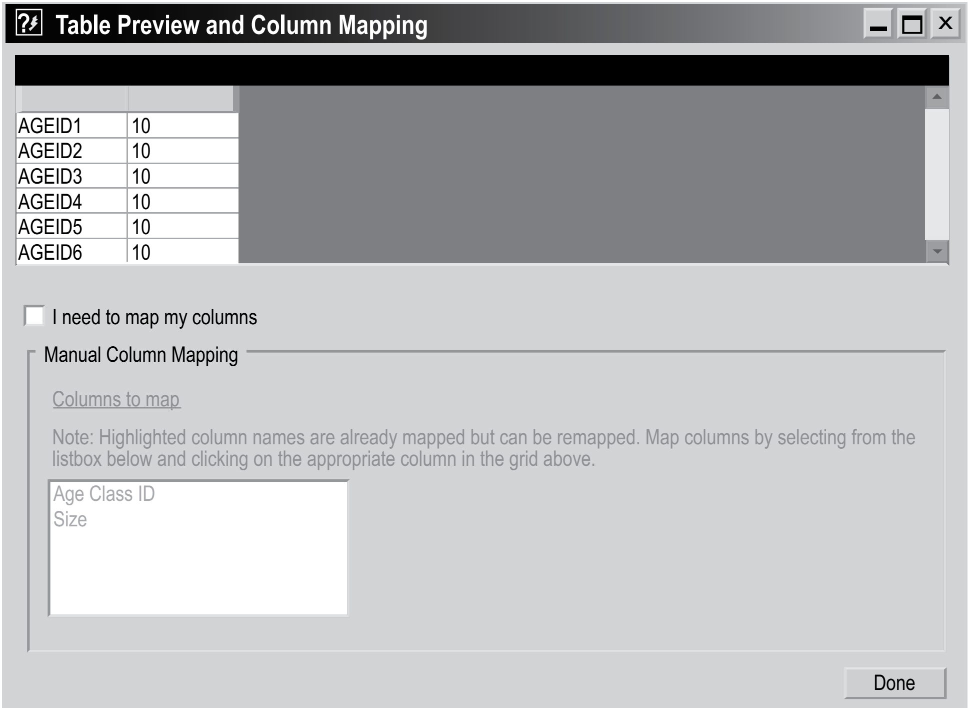


Figure 3-13. The "Table Preview and Column Mapping" window.

A text file in the "Text File Preview" window can be viewed in one of two layouts, "Portrait" (vertical layout) or "Landscape" (horizontal layout), by clicking on the appropriate radio button.

In the "Table Preview and Column Mapping" window, the user can map columns if necessary. If it has been decided to override the default column positions, the user must map all columns in a table. To map columns

Click on the "I need to map my columns" check box

Click on a name in the "Columns to map" box

Click anywhere on the column that should be assigned the name selected in the preceding step

Repeat the preceding two steps for any remaining names in the "Columns to map" box

Click on the "Done" button when this mapping is complete

Note: Reuse of templates

Users can use a template (see next section, "Template Selection") containing column mapping to avoid the need to manually map columns in this way during future data imports.

3. **Click on the "…" button next to the "Disturbance types," "Classifiers and values," "Growth curves," "Inventory," "Transition rules," and "Disturbance events" boxes, and point to the appropriate file to import for each**

Note: Selecting units and inventory year (currently disabled)

4. **To make changes from the default units displayed, select the appropriate Inventory Area, Disturbance Event Area, and Yield Volume units used in the data that is being imported by clicking on the drop list for each in the "Units" box**
5. **In the "Inventory Year" box, type in the inventory year corresponding to the data that is being imported**

Template Selection

Next, the user must create and select a template. The template stores information about how the user maps import data classifiers to CBM-CFS3 classifiers during the data import process. If the user does only a partial import of data for a project, the template can be reused later to import the remaining datasets for the same project (see section 3.4). To proceed

6. **Click on the "Template Selection" tab (Figure 3-14)**

The "Template Directory" box points to the "Templates" folder (C:\Program Files\Operational Scale CBM-CFS3\Templates\).

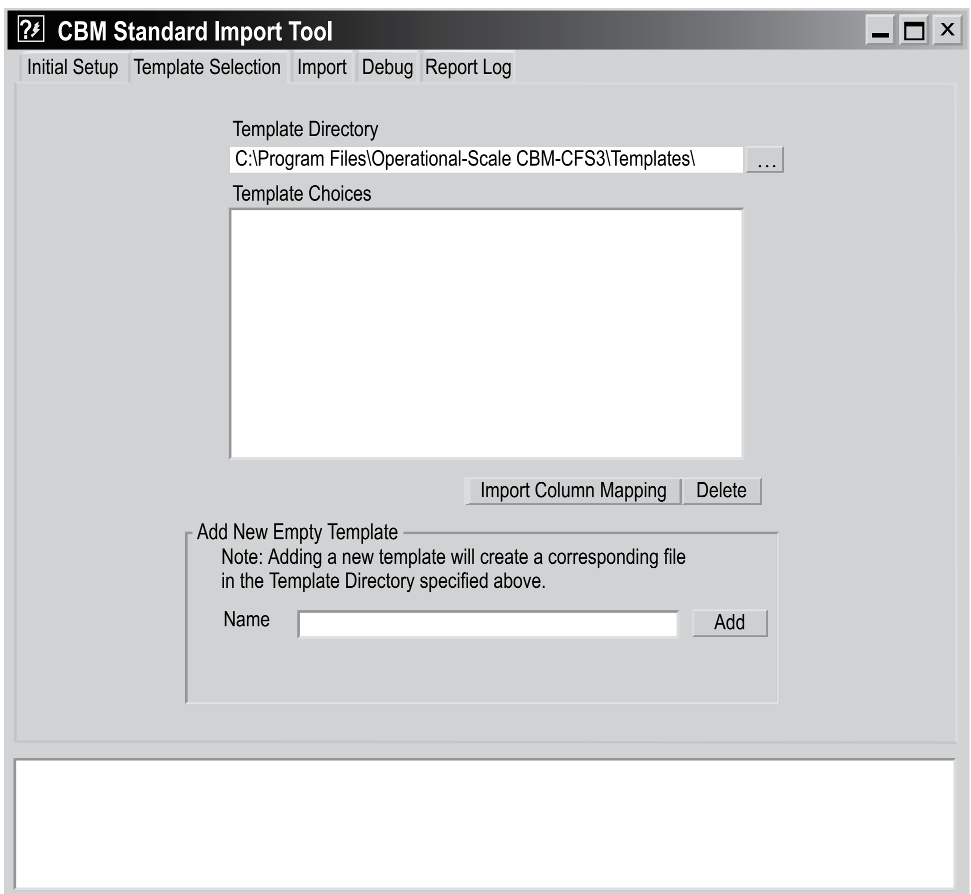


Figure 3-14. The "CBM Standard Import Tool" window with the "Template Selection" tab selected.

Note: Designating a different folder for template storage

To designate a different folder for template storage

Click on the "…" button

A "Browse for Folder" window (Figure 3-15) will pop up.

Point to or create a template folder (this folder should be located or created in the following directory: C:\Program Files\Operational Scale CBM-CFS3\)

Click on the "OK" button to proceed

or

Click on the "Cancel" button to terminate the process

or

Click on the "New Folder" button to create a Template folder

A user can reuse existing templates from previously imported data when importing additional data into the same project (details in section 3.4). To create and select a new template

7. **Enter a template name in the "Name" box**
8. **Click on the "Add" button**
9. **In the "Template Choices" box, click on the new template name that has been added**

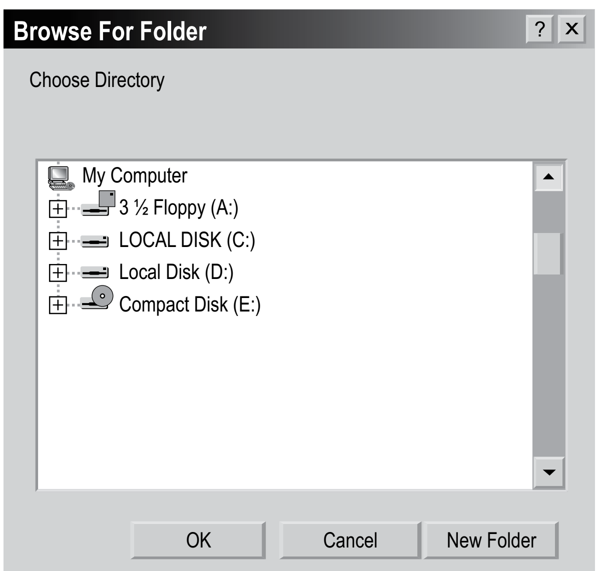


Figure 3-15. The "Browse for Folder" window prompting the user to choose a directory.

Note: Reusing column mapping to import files

A user importing files from Microsoft Access tables or Microsoft Excel who wants to use column mapping created during a previous data import process (and thus avoid having to manually map columns again in the "Table Preview and Column Mapping" window) can click on the "Import Column Mapping" button (Figure 3-14). This will cause the "Template Column Mapping Import" window (Figure 3-16) to pop up. This window allows users to select the column mapping used in a template previously created for the current data table or worksheet import. To use this feature

1. **Click on the "Import Column Mapping" button (Figure 3-14)**

The "Current Directory" box (Figure 3-16) should point to the "Template" folder. If it does not, the user should browse to the C:\Program Files\Operational Scale CBM-CFS3\Templates directory by clicking on the "…" button. Existing template names (if any) will appear in the "Template Listings" box.

2. **Click on the name of the template that contains the appropriate column mapping in the "Template Listings" box**
3. **Click on the "Done" button**

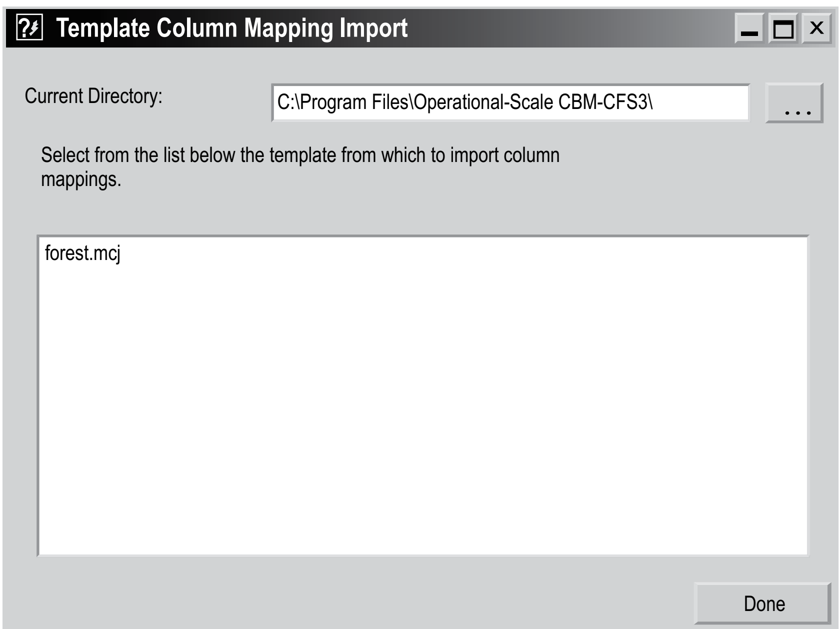


Figure 3-16. The "Template Column Mapping Import" window.

Note: Deleting a template

When the "Template Choices" box (Figure 3-14) becomes full of template names, the user may want to delete obsolete templates. To delete a template

Click on the name of a template in the "Template Choices" box (Figure 14)

Click on the "Delete" button

Importing

To begin importing files

10. Click on the "Import" tab (Figure 3-17)

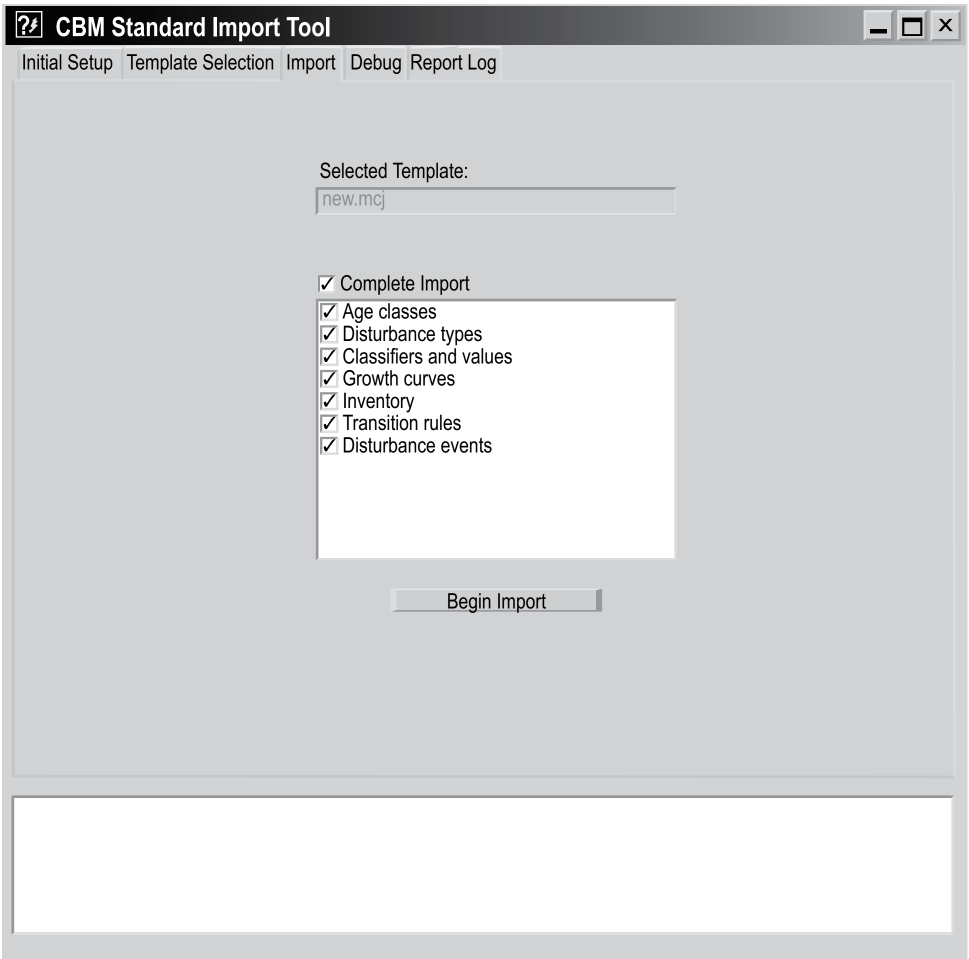


Figure 3-17. The "CBM Standard Import Tool" window with the "Import" tab selected.

The "Import" tab allows the user to import some or all of the available import files. Note that only "Growth and yield," "Inventory," and "Disturbance events" import files can be imported on their own. Check boxes are provided to indicate the import files to be imported. A check mark in the "Complete Import" check box is used to specify that all files are to be imported. If a specific import file type was previously imported for a project, it cannot subsequently be imported for the same project. To proceed once the appropriate files have been checked

11. Click on the "Begin Import" button

The CBM-CFS3 performs quality control checks of the user's file formats in the background before beginning to import the user's data. If a problem with a file is encountered, a "Scanning for formatting errors…" window (Figure 3-18) will pop up, identifying the problem and the file where it occurs, as well as "An Unhandled Exception

Error has Occurred" window (Figure 3-19). In this circumstance, the user should click on the "OK" button, close the CBM-CFS3, fix the file problem, and then restart the CBM- CFS3 and the import process.

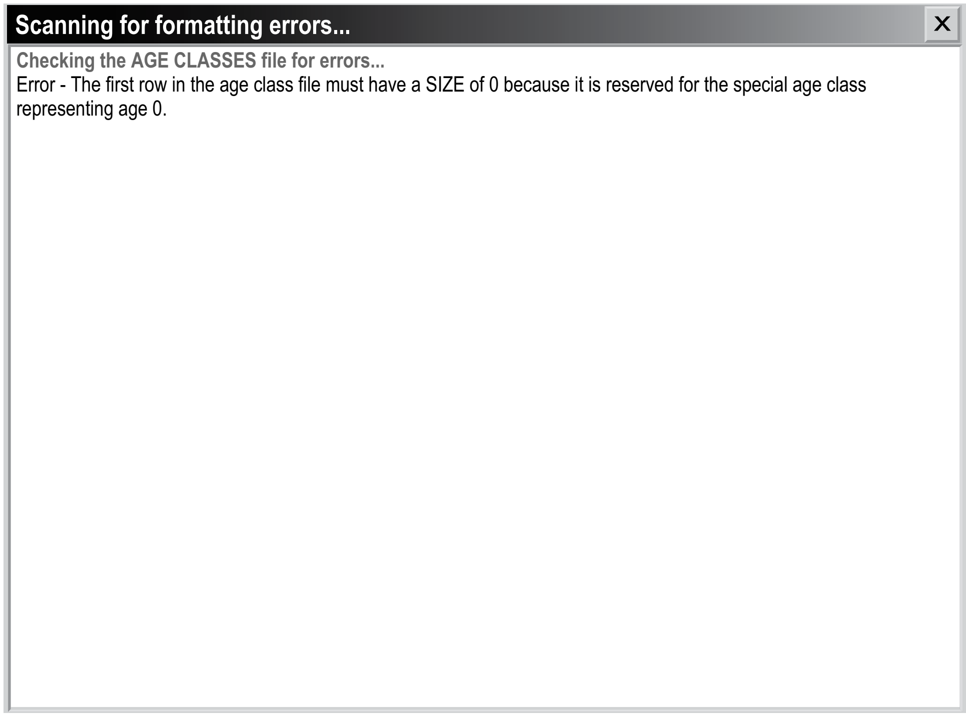


Figure 3-18. The "Scanning for formatting errors..." window.

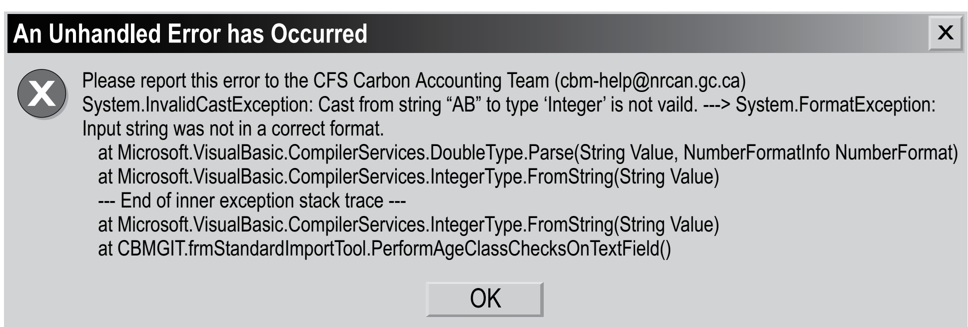


Figure 3-19. The "An Unhandled Error has Occurred" window.

Once the import files clear the quality control checks, the user must use the "Disturbance Type Mapping" window (Figure 3-20) to map the disturbances in the import files to those existing in the CBM-CFS3.

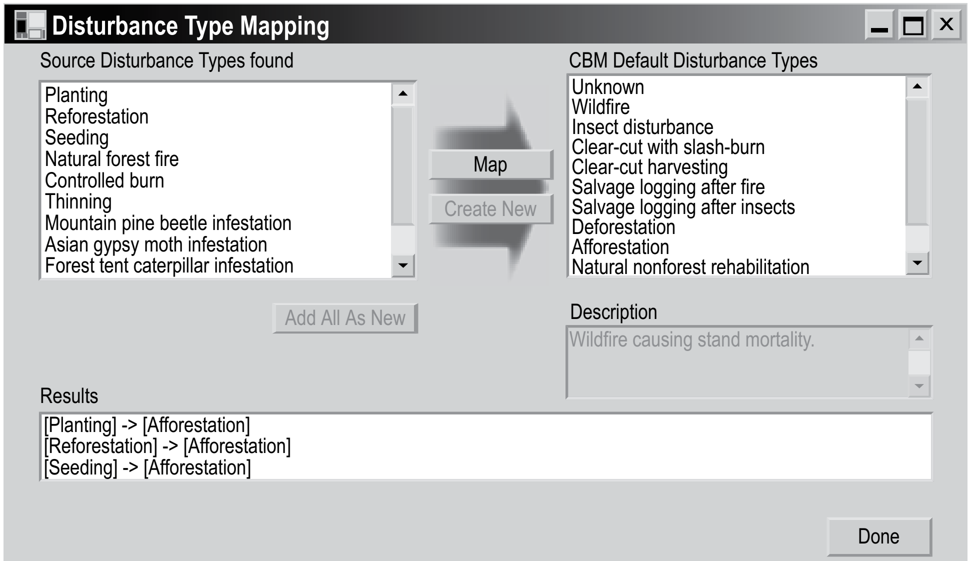


Figure 3-20. The "Disturbance Type Mapping" window.

The disturbance types appearing in the "Source Disturbance Types found" box are those in the "Disturbance Types" import file being imported. Those appearing in the "CBM Default Disturbance Types" box are those preprogrammed in the model and linked to carbon relationships through a disturbance matrix. The user can see a description of a disturbance type by clicking on its name. The description will appear in the "Description" box. Disturbance types in the "Source Disturbance Types found" box that are recognized by the CBM-CFS3 (by virtue of a name that is identical with the name of a preprogrammed disturbance type) will automatically map to the appropriate disturbance type in the "CBM Default Disturbance Types" box and will be grayed out. Disturbance types that do not match any of the default options in the model should be mapped to a default disturbance type with similar impacts on carbon. Once all source disturbances have been mapped to the same or a similar disturbance type and the import process is complete, the user can access the Disturbance Matrix Editor (see Chapter 6, section 6.3). If the effect of the source disturbance types on ecosystem carbon pool transfer values is known and is different from the default transfer values provided in the CBM-CFS3, the user can use the Disturbance Matrix Editor to edit the ecosystem carbon transfer values resulting from the disturbances to which the imported disturbance types have been mapped.

To map a disturbance that was not automatically mapped or to change the mapping for a disturbance

12. **Click on a disturbance type in the "Source Disturbance Types found" box**
13. **Click on a matching or similar disturbance type name**

    or

    Click on "Unknown" in the "CBM Default Disturbance Types" box
14. **Click on the "Map" button**

This process must be applied for each disturbance type that is imported. Each successfully mapped disturbance pair is displayed in the "Results" box at the bottom of the window. Should the user map a disturbance type incorrectly, the mapping can be overwritten by repeating steps 12 to 14 above for the disturbance type. Once the disturbance mapping process is complete,

15. **Click on the "Done" button**

Next, the "Classifiers and Values Mapping" window (Figure 3-21) will pop up.

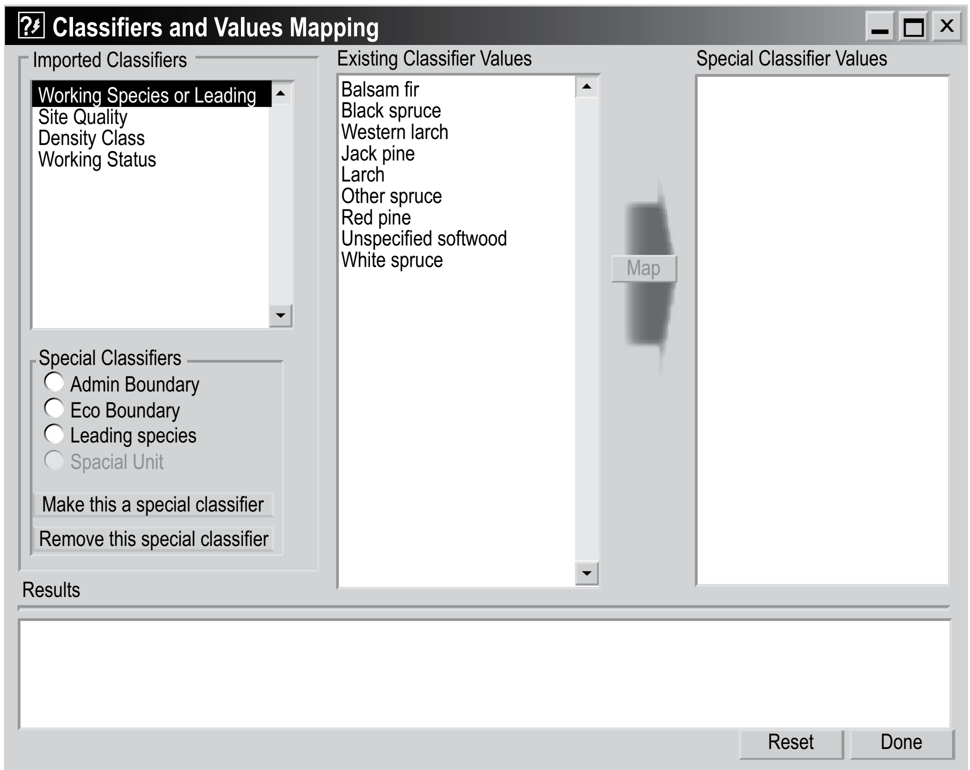


Figure 3-21. The "Classifiers and Values Mapping" window with the "Working Species or Leading" imported classifier selected.

The classifiers in the database being imported are displayed in the "Imported Classifiers" box. The user can observe the classifier values associated with a classifier by clicking on the classifier name as listed in the "Imported Classifiers" box. The values associated with that classifier will appear in the "Existing Classifier Values" box.

In this window, the user can identify special classifiers (i.e., administrative boundaries, ecological boundaries, or leading species) in the source database and can then link the associated classifier values to special classifier values in the CBM-CFS3 in the "Special Classifier Values" box. The user must set up leading species as a special classifier. Through the steps in this set-up process, the names of tree species in the import files being imported are mapped to those recognized and linked to specific species-based ecological carbon parameters in the CBM-CFS3.

Administrative boundaries refer to Canadian provinces and territories, with the exception of Newfoundland and Labrador, which has been split for programming reasons related to fire disturbance matrices, and ecological boundaries refer to the Terrestrial Ecozones of Canada as defined at http://www.ec.gc.ca/soer-ree/English/vignettes/Terrestrial/terr.cfm or in Environment Canada (1996). A map of the terrestrial ecozones of Canada used in the CBM-CFS3 appears as Figure 3-22.

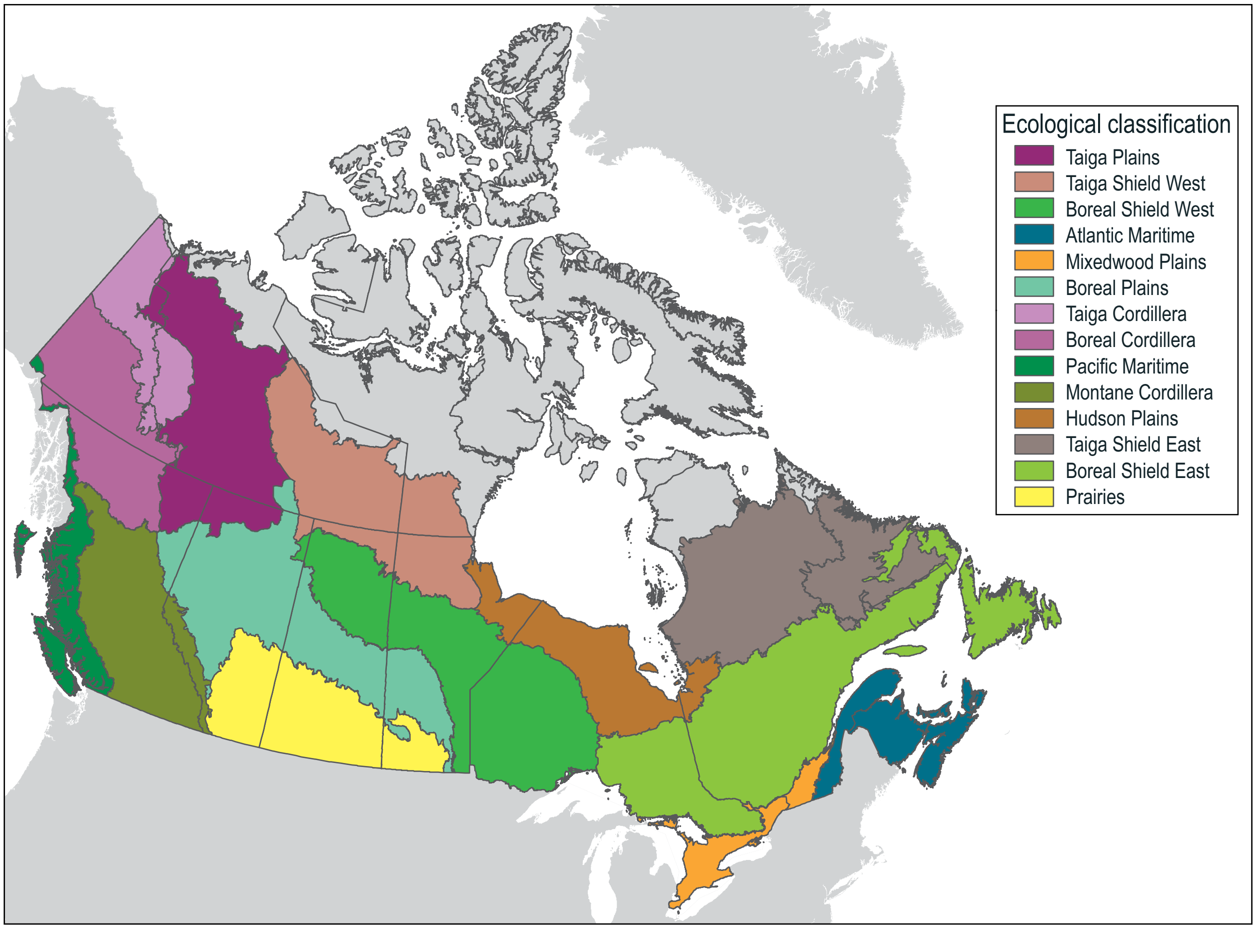


Figure 3-22. The terrestrial ecozones of Canada as used in the CBM-CFS3.

Note: Division of Boreal Shield and Taiga Shield ecozones

In the CBM-CFS3, the Boreal Shield and Taiga Shield ecozones have been divided into eastern and western parts because the west is typically colder and drier than the east. Hence, these subzones are modeled separately (Kurz et al. 1992).

If there are multiple administrative or ecological boundaries in the user's import files (i.e., classifiers identifying either type of boundary), the user must create special classifiers for both administrative boundaries and ecological boundaries. To set up a special classifier

16. **In the "Imported Classifiers" box, click on an imported classifier that is considered as a special classifier**
17. **Click on the appropriate radio button (Admin Boundary for an administrative boundary, Eco Boundary for an ecological boundary, or Leading Species for a leading tree species) in the "Special Classifiers" box**
18. **Click on the "Make this a special classifier" button**

The window will then display the default CBM-CFS3 classification values in the "Special Classifier Values" box.

When any classifier is made into a special classifier, the CBM-CFS3 will try to automatically map identical classifier values between the user's values and the default values in the model. Mapped classifier values will appear gray in the "Existing Classifier Values" box. If the CBM-CFS3 improperly maps a classifier value, the user can remap the value manually, and the previous mapping will be overwritten.

Any classifier values not automatically mapped by the CBM-CFS3 must be manually mapped to those in the CBM-CFS3. To do this

19. **Click on a classifier value in the "Existing Classifier Values" box**
20. **Click on a corresponding special classifier in the "Special Classifier Values" box (the box name will have changed to reflect the selected special classifier)**
21. **Click on the "Map" button**

The user should repeat steps 19 to 21 until all existing classifier values for the special classifier have been mapped to a default special classifier value. As each classifier pair is mapped, it appears in the "Results" box at the bottom of the window and the classifier in the "Existing Classifier Values" box will be grayed out. If an existing classifier value is mapped improperly, the user can simply repeat steps 19 to 21 to overwrite the incorrect mapping for that classifier value. The user also has the option of removing special classifiers that have been created by clicking on the appropriate classifier in the "Imported Classifiers" box and then clicking the "Remove this special classifier" button or, to reset the window, clicking on the "Reset" button.

Once the classifier mapping process is complete

22. **Click on the "Done" button**

If the user did not make any administrative or ecological boundaries into special classifiers, the model will continue to import the user's data until the "Select a Spatial Unit" window (Figure 3-23) pops up where the user must identify the administrative boundary and ecological boundary for their data.

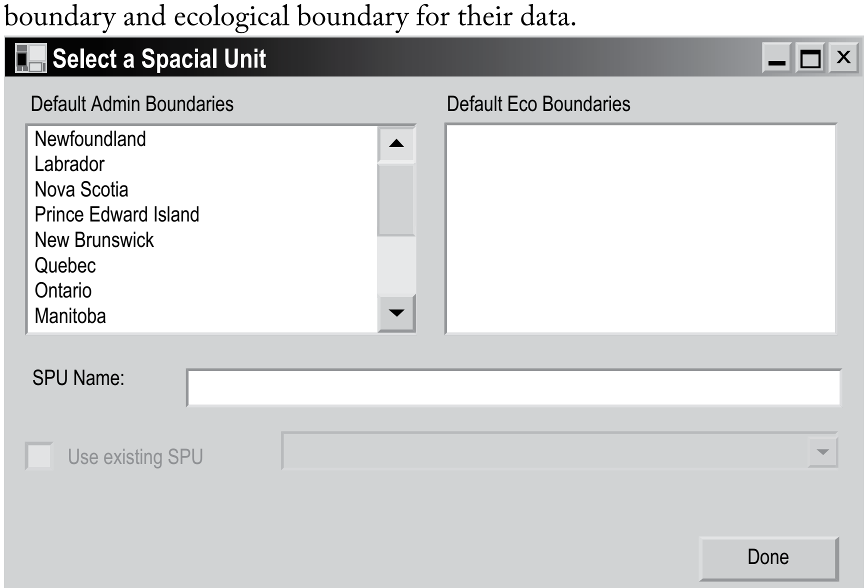


Figure 3-23. The "Select a Spatial Unit" window.

If the user did make one or more administrative and ecological boundaries into special classifiers, this window will not pop up, and the user can skip to the text following step 26.

In the "Select a Spatial Unit" window, the user must assign both an administrative boundary and an ecological boundary to the data being imported. To proceed

23. **Click on an appropriate administrative boundary listed in the "Default Admin Boundaries" box**
24. **Click on an appropriate Ecological boundary listed in the "Default Eco Boundaries" box**

Next, an SPU name (for example, the name of a forest management unit) can be assigned to the project data. The user can leave the "SPU Name" box blank, in which case the CBM-CFS3 will create a default name. Alternatively, to assign a name

25. **Type a name in the "SPU Name" box**

To complete this window

26. **Click on the "Done" button**

Next, the "Assumptions and Scenarios Labels" window (Figure 3-24) will pop up. This window allows the user to review and/or edit the default names and descriptions that the CBM-CFS3 has assigned to the imported data for SPU-Level (Figure 3-24) and Run-Level (Figure 3-25) scenarios. The user can edit any of the assigned names or descriptions for scenarios by clicking on the appropriate box and typing in the change. Once satisfied with the names and descriptions

27. **Click on the "Done" button**

The model will continue importing the user's data until the "Selected data groups successfully imported" window (Figure 3-26) pops up. To proceed

28. **Click on the "OK" button**
29. **Close the "CBM Standard Import Tool" window by clicking on the "X" button**

The "Project Explorer," "Simulation Explorer," "Results Explorer," "Message," and "Task List" windows will pop up. The user can choose to work in these windows or close them and work through the menu bar of the main CBM-CFS3 window. Details about the "Project Explorer," "Simulation Explorer," "Message," and "Task List" windows and their functions are provided in Chapter 5. Details about the "Results Explorer" window are provided in Chapter 8. Users can learn how to run the imported data through the model as a simulation in section 3.5.

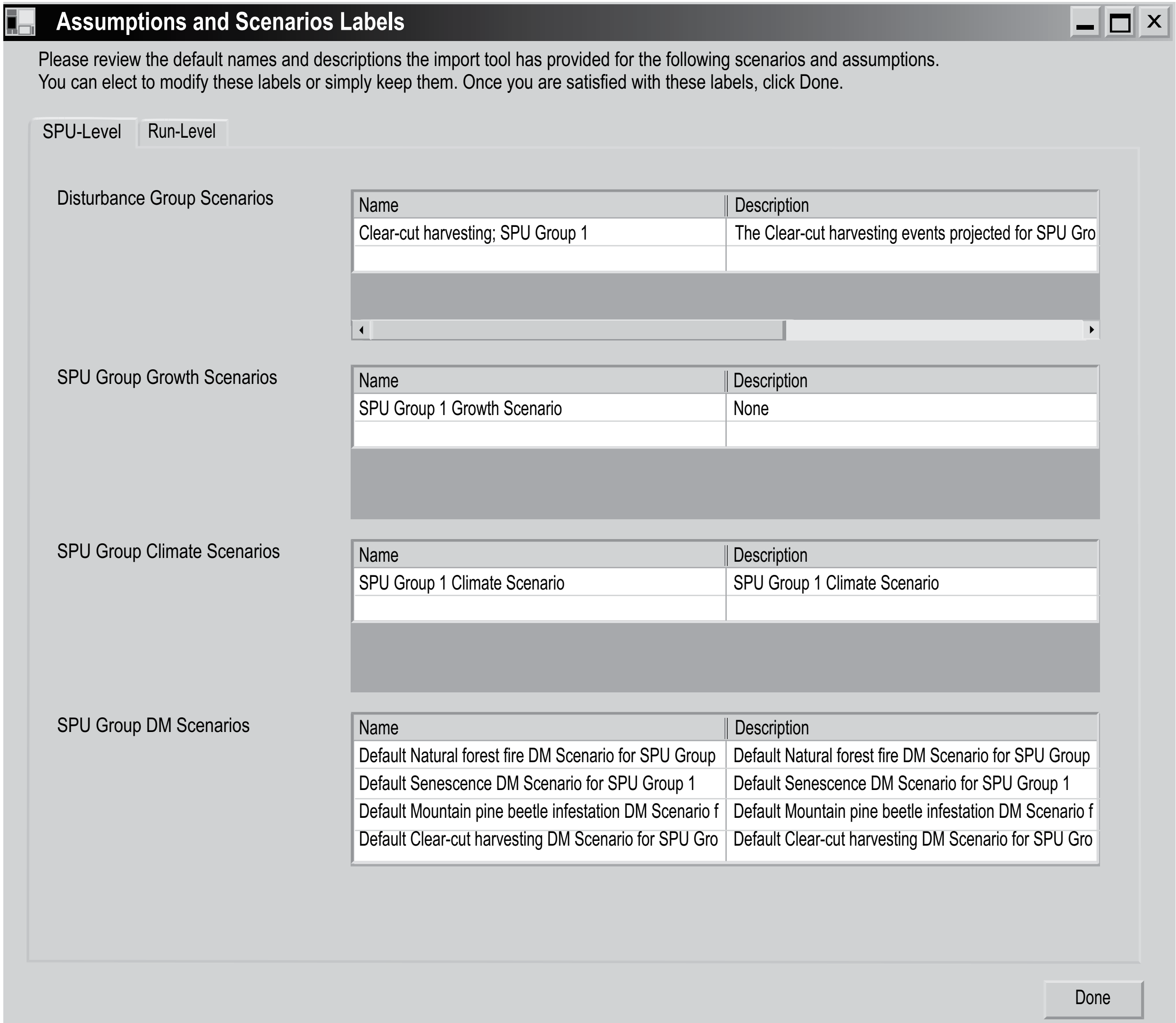


Figure 3-24. The "Assumptions and Scenarios Labels" window with the "SPU-Level" tab selected.

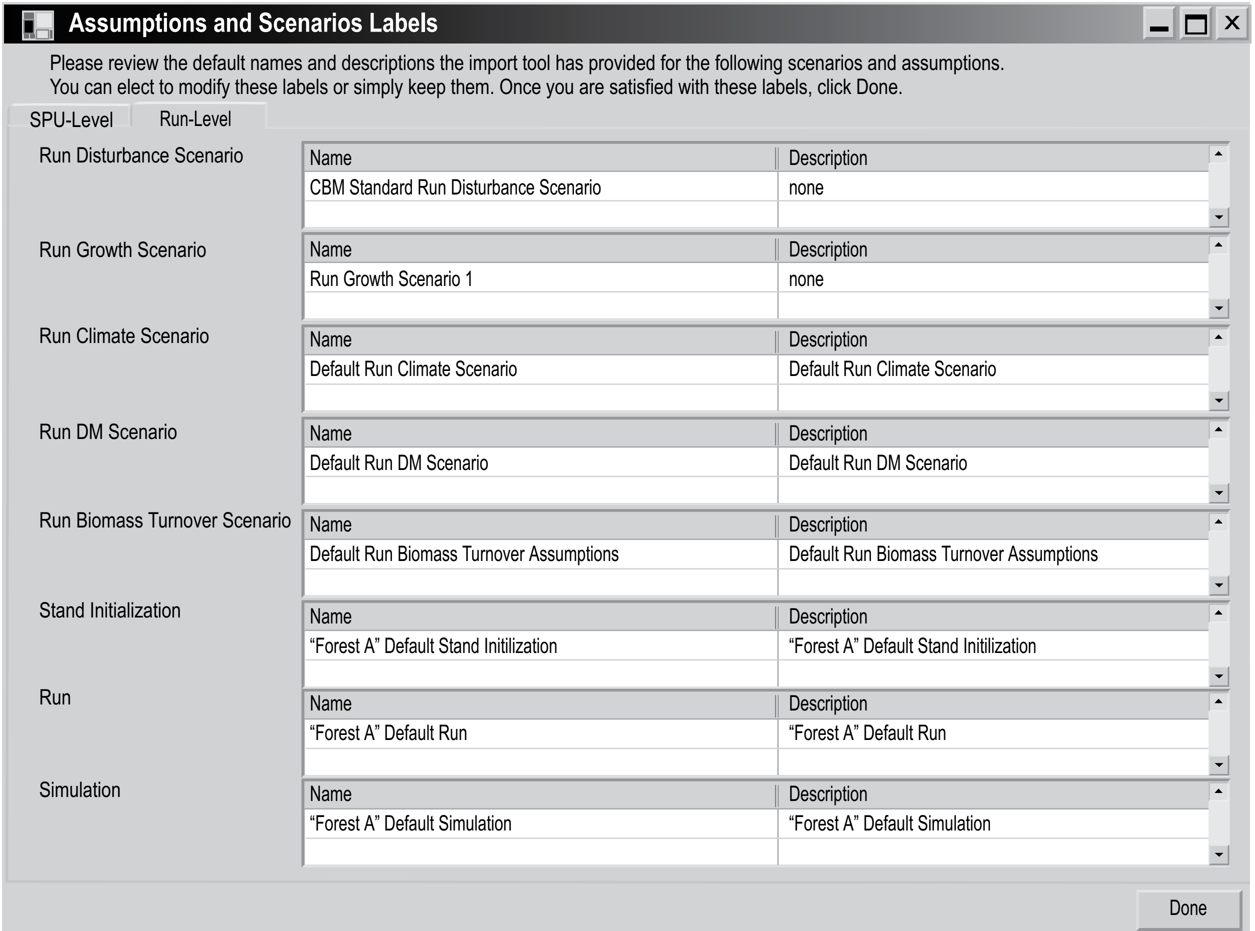


Figure 3-25. The "Assumptions and Scenarios Labels" window with the "Run-Level" tab selected.

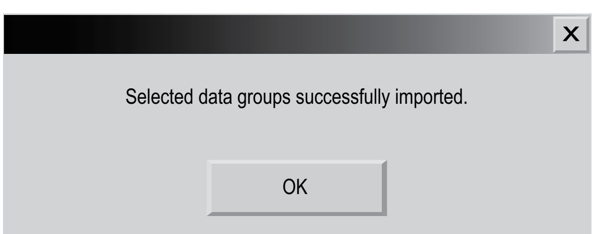


Figure 3-26. The "Selected data groups successfully imported" window.

3.2.2 Woodstock Import Tool

If the user chooses to import files using the Woodstock Import Tool (according to the steps at the beginning of section 3.2), the "Woodstock Import Tool" window (Figure 3-27) will pop up. Importing files with the Woodstock Import Tool involves three steps, which correspond to three of the tabs appearing in this window: Initial Setup, Template Selection, and Import. The "Report Log" tab contains a list of import tasks performed by the import tool; in the event of a problem, its contents can be copied and sent to the CFS-CAT for help with debugging problems.

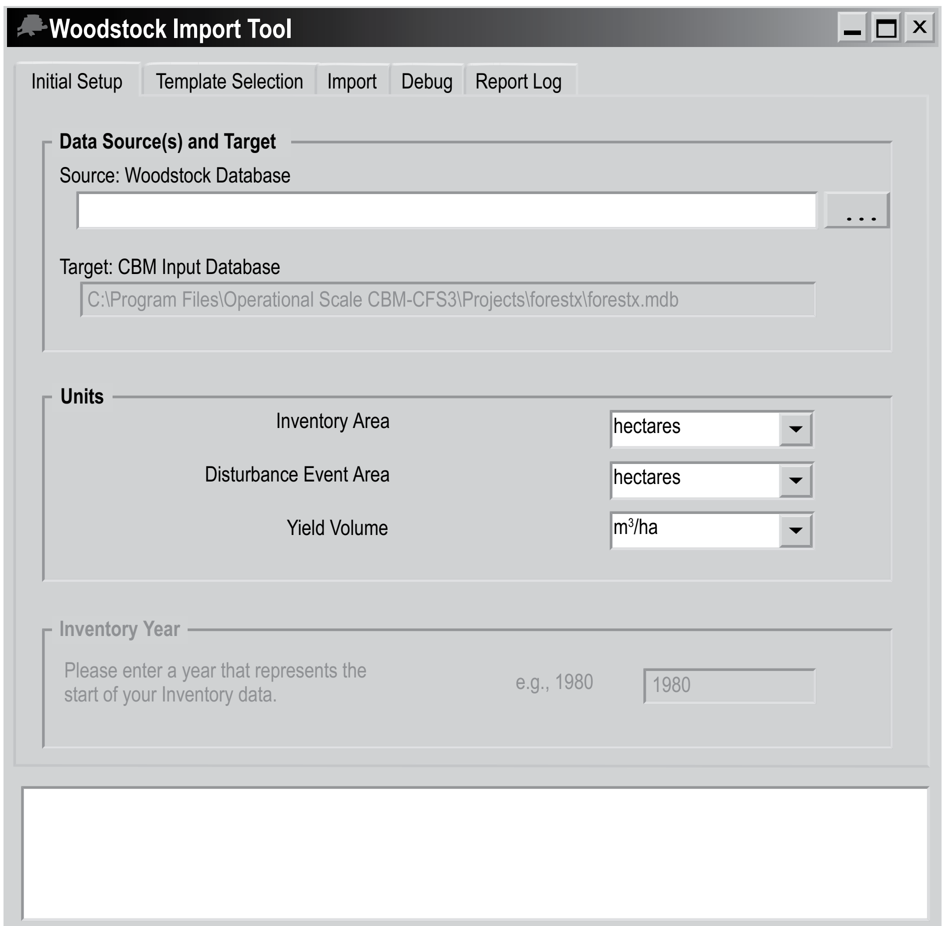


Figure 3-27. The "Woodstock Import Tool" window with the "Initial Setup" tab selected.

Initial Setup

On the "Initial Setup" tab (Figure 3-27)

1. **Click on the "…" button beside the "Source: Woodstock Database" box**

An "Open" window will pop up.

2. **Point to the source Microsoft Access database file (containing the exported Spatial Woodstock tables)**

3. **Click on the "Open" button to proceed**
   or
   Click on the "Cancel" button to terminate the process

Note: Selecting units and inventory year (currently disabled)

4. **To make changes from the default units displayed, select the appropriate Inventory Area, Disturbance Event Area, and Yield Volume units used in the data that is being imported by clicking on the drop list for each in the "Units" box**
5. **In the "Inventory Year" box, type the inventory year corresponding to the data that is being imported**

Template Selection

Next, the user must create and select a template. The template stores information about how the user maps import data classifiers to CBM-CFS3 classifiers during the data import process. If the user does only a partial import of data for a project, the template can be reused later to import the remaining datasets for the same project (see section 3.4). To proceed

6. **Click on the "Template Selection" tab (Figure 3-28)**

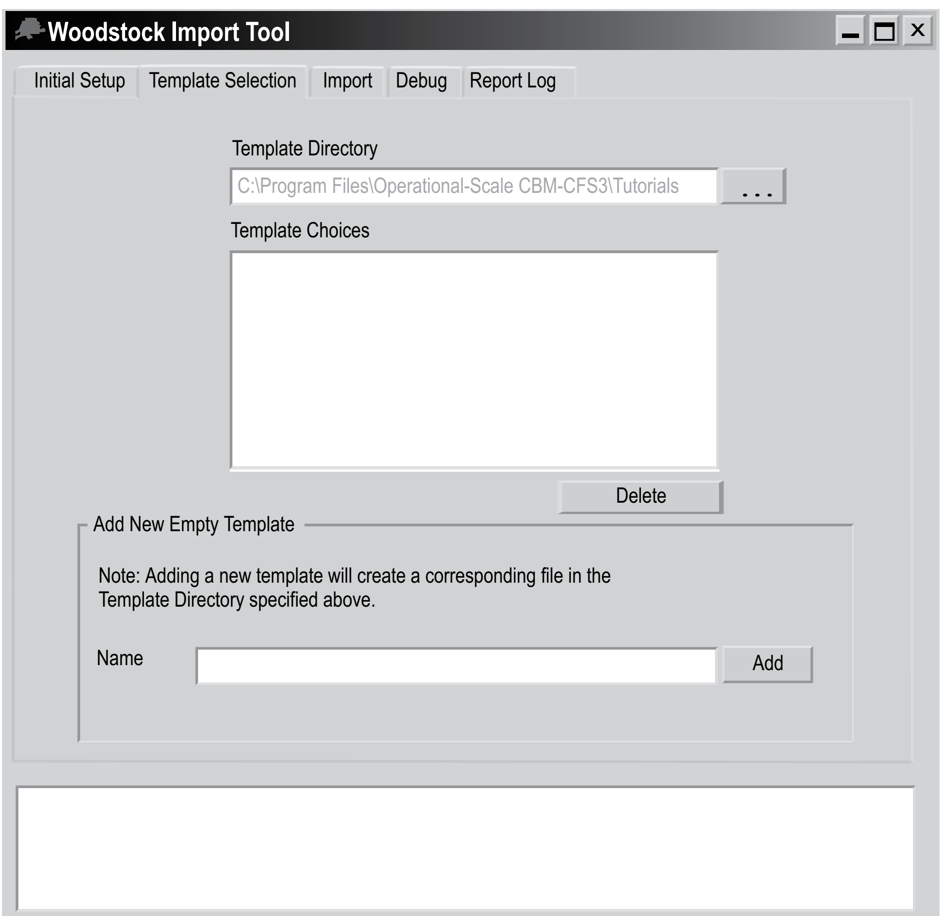


Figure 3-28. The "Woodstock Import Tool" window with the "Template Selection" tab selected.

The "Template Directory" box points to the "Templates" folder (C:\Program Files\Operational Scale CBM-CFS3\Templates\).

Note: Designating a different folder for template storage

To designate a different folder for template storage

Click on the "…" button

A "Browse for Folder" window (Figure 3-15) will pop up.

Point to or create a template folder (this folder should be located or created in the following directory: C:\Program Files\Operational Scale CBM-CFS3\)

Click on the "OK" button to proceed

or

Click on the "Cancel" button to terminate the process

or

Click on the "New Folder" button to create a Template folder

A user can reuse existing templates from previously imported data when importing additional data into the same project (details in section 3.4). To create and select a new template

7. **Type a template name in the "Name" box**
8. **Click on the "Add" button**
9. **In the "Template Choices" box, click on the new template name that has been added**

Note: Deleting a template

When the "Template Choices" box (Figure 3-28) becomes full of template names, the user may want to delete obsolete templates. To delete a template

Click on the name of a template in the "Template Choices" box (Figure 3-28)

Click on the "Delete" button

Importing

To begin importing files

10. **Click on the "Import" tab (Figure 3-29)**

The "Import" tab allows the user to import some or all of the available import files. Note that only the "Growth and yield," "Inventory," and "Disturbance events" import files can be imported on their own. Check boxes are provided to indicate the import files to be imported. A check mark in the "Complete Import" check box is used to specify that all files are to be imported. If a specific import file type was previously imported for a project, it cannot subsequently be imported for the same project. To proceed once the appropriate files have been checked

11. **Click on the "Begin Import" button**

As the model begins to import the user's data, the user must use the "Disturbance Type Mapping" window (Figure 3-20) to map the disturbances in the import tables to those existing in the CBM-CFS3.

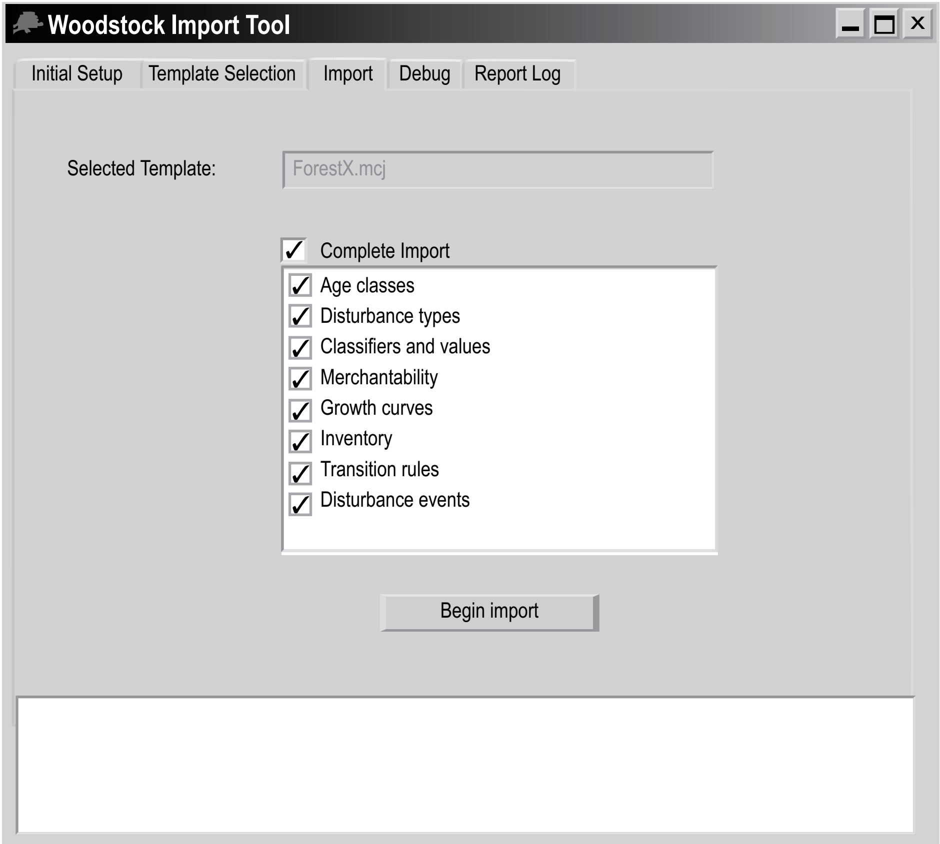


Figure 3-29. The "Woodstock Import Tool" window with the "Import" tab selected.

The disturbance types appearing in the "Source Disturbance Types found" box are those in the "Disturbance Types" import file being imported. Those appearing in the "CBM Default Disturbance Types" box are those preprogrammed in the model and linked to carbon relationships through a disturbance matrix. The user can see a description of a disturbance type by clicking on its name. The description will appear in the "Description" box. Disturbance types in the "Source Disturbance Types found" box that are recognized by the CBM-CFS3 (by virtue of a name that is identical with the name of a preprogrammed disturbance type) will automatically map to the appropriate disturbance type in the "CBM Default Disturbance Types" box and will be grayed out. Disturbance types that do not match any of the default options in the model should be mapped to a default disturbance type with similar impacts on carbon. Once all source disturbances have been mapped to the same or a similar disturbance type and the import process is complete, the user can access the Disturbance Matrix Editor (see Chapter 6, section 6.3). If the effect of the source disturbance types on ecosystem carbon pool transfer values is known, and is different from the default transfer values provided in the CBM-CFS3, the user can use the Disturbance Matrix Editor to edit the ecosystem carbon transfer values resulting from the disturbances to which the imported disturbance types have been mapped.

To map a disturbance that was not automatically mapped or to change the mapping for a disturbance

12. **Click on a disturbance type in the "Source Disturbance Types found" box**
13. **Click on a matching or similar disturbance type name**

    or

    Click on "Unknown" in the "CBM Default Disturbance Types" box
14. **Click on the "Map" button**

This process must be applied for each disturbance type that is imported. Each successfully mapped disturbance pair is displayed in the "Results" box at the bottom of the window. Should the user map a disturbance type incorrectly, the mapping can be overwritten by repeating steps 12 to 14 above for the disturbance type. Once the disturbance mapping process is complete

15. **Click on the "Done" button**

Next, the "Classifiers and Values Mapping" window (Figure 3-21) will pop up. The classifiers in the database being imported are displayed in the "Imported Classifiers" box. The user can observe the classifier values associated with a classifier by clicking on the classifier name as listed in the "Imported Classifiers" box. The values associated with that classifier will appear in the "Existing Classifier Values" box.

In this window, the user can identify special classifiers (i.e., administrative boundaries, ecological boundaries, or leading species) in the source database and can then link the associated classifier values to special classification values in the CBM-CFS3 in the "Special Classification" box. The user must set up leading species as a special classifier. Through the steps in this set-up process, the names of tree species in the import files being imported are mapped to those recognized and linked to specific species-based ecological carbon parameters in the CBM-CFS3.

Administrative boundaries refer to Canadian provinces and territories, with the exception of Newfoundland and Labrador, which has been split for programming reasons related to fire disturbance matrices, and ecological boundaries refer to the Terrestrial Ecozones of Canada as defined at http://www.ec.gc.ca/soer-ree/English/vignettes/Terrestrial/terr.cfm or in Environment Canada (1996). A map of the terrestrial ecozones of Canada used in the CBM-CFS3 appears as Figure 3-22.

Note: Division of Boreal Shield and Taiga Shield ecozones

In the CBM-CFS3, the Boreal Shield and Taiga Shield ecozones have been divided into eastern and western parts because the west is typically being colder and drier than the east. Hence, these subzones are modeled separately (Kurz et al. 1992).

If there are multiple administrative or ecological boundaries in the user's import files (i.e., classifiers identifying either type of boundary), the user must make create special classifiers for administrative boundaries and ecological boundaries. To set up a special classifier

16. **In the "Imported Classifiers" box, click on an imported classifier that is considered as a special classifier**

17. **Click on the appropriate radio button (Admin Boundary for an administrative boundary, Eco Boundary for an ecological boundary, or Leading Species for a leading tree species) in the "Special Classifiers" box**
18. **Click on the "Make this a special classifier" button**

The window will then display the default CBM-CFS3 classification values in the "Special Classification" box.

When any classifier is made into a special classifier, the CBM-CFS3 will try to automatically map identical classifier values between the user's values and the default values in the model. Mapped classifier values will appear gray in the "Existing Classifier Values" box. If the CBM-CFS3 improperly maps a classifier value, the user can remap the value manually, and the previous mapping will be overwritten.

Any classifier values not automatically mapped by the CBM-CFS3 must be manually mapped to those in the CBM-CFS3. To do this

19. **Click on a classifier value in the "Existing Classifier Values" box**
20. **Click on a corresponding special classifier in the "Special Classifier Values" box (the box name will have changed to reflect the selected special classifier)**
21. **Click on the "Map" button**

The user should repeat steps 19 to 21 until all existing classifier values for the special classifier have been mapped to a default special classifier. As each classifier pair is mapped, it appears in the "Results" box at the bottom of the window and the classifier in the "Existing Classifier Values" box will be grayed out. If an existing classifier value is mapped improperly, the user can simply repeat steps 19 to 21 to overwrite the incorrect mapping for that classifier value. The user also has the option of removing special classifiers that have been created by clicking on the appropriate classifier in the "Imported Classifiers" box and then clicking the "Remove this special classifier" button, or, to reset the window, clicking on the "Reset" button.

Once the classifier mapping process is complete

22. **Click on the "Done" button**

If the user did not make any administrative or ecological boundaries into special classifiers, the model will continue to import the user's data until the "Select a Spatial Unit" window (Figure 3-23) pops up where the user must identify the administrative boundary and ecological boundary for their data.

If the user did make one or more administrative and ecological boundaries into special classifiers, this window will not pop up, and the user can skip to the text following step 26.

In the "Select a Spatial Unit" window, the user must assign both an administrative boundary and an ecological boundary to the data being imported. To proceed

23. **Click on an appropriate administrative boundary listed in the "Default Admin Boundaries" box**
24. **Click on an appropriate Ecological boundary listed in the "Default Eco Boundaries" box**

Next, an SPU name (for example, the name of a forest management unit) can be assigned to the project data. The user can leave the "SPU Name" box blank, in which case the CBM-CFS3 will create a default name. Alternatively, to assign a name

25. Type a name in the "SPU Name" box

To complete this window

26. Click on the "Done" button

Next, the "GC [growth curve] Component Select" window (Figure 3-30) will pop up. In this window, the user must identify the appropriate "Name/Code" column values from the imported data that represents either the total merchantable volume component or the merchantable softwood and hardwood volume components.

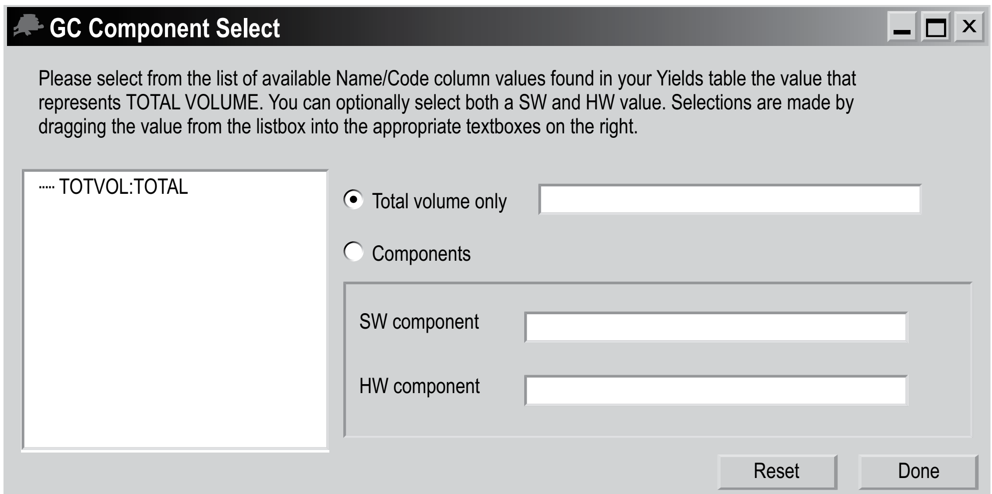


Figure 3-30. The "GC Component Select" window. GC = growth curve, SW = softwood, HW = hardwood.

Note: Identifying Woodstock total merchantable volume

A Woodstock database may have a number of different types of curves. It is important to identify for the CBM-CFS3 which curve type represents the total merchantable volume or the total merchantable softwood and total merchantable hardwood volumes. Because the name used to refer to these merchantable volume curves in Woodstock is variable, the "GC Component Select" window is needed.

To proceed

27. Click on the "Total volume only" radio button if the values in the "Name/Code" column to be selected represent total volume, choose the name of the appropriate value in the "Name/Code" column as displayed in the box, and drag it into the "Total volume only" box

or

Click on the "Components" radio button if the values in the "Name/Code" columns to be selected represent softwood and hardwood components, choose the name of the appropriate value in the "Name/Code" column representing softwood as displayed in the box and drag it into the "SW Component" box, and choose the name of the appropriate value in the "Name/Code" column representing hardwood as displayed in the box and drag it into the "HW Component" box

Tip: Resetting the "GC Component Select" window

If a name from the "Name/Code" column is dragged into the wrong box, simply click on the "Reset" button to reset the window.

28. Click on the "Done" button

Next, the "Period Size" window (Figure 3-31) will pop up, so that the user can enter the period size used in the Woodstock Schedule table. To proceed

29. Type the period size in the "Period size (years)" box

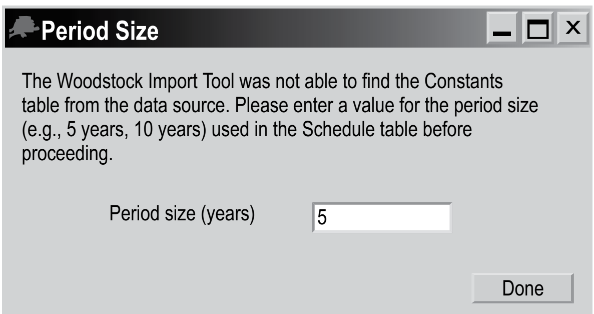


Figure 3-31. The "Period Size" window.

Next, the "Assumptions and Scenarios Labels" window (Figure 3-24) will pop up. This window allows the user to review and/or edit the default names and descriptions that the CBM-CFS3 has assigned to the imported data for SPU-level (Figure 3-24) and run-level (Figure 3-25) scenarios and assumptions.

The user can edit any of the assigned names or descriptions for scenarios by clicking on the appropriate box and typing in the change. Once satisfied with the names and descriptions

30. Click on the "Done" button

The model will continue importing the user's data until the "Selected data groups successfully imported" window (Figure 3-26) pops up. To proceed

31. Click on the "OK" button

32. Close the "Woodstock Import Tool" window by clicking on the "X" button

The "Project Explorer," "Simulation Explorer," "Results Explorer," "Message," and "Task List" windows will pop up. The user can choose to work in these windows or close them and work through the menu bar of the main CBM-CFS3 window. Details about the "Project Explorer," "Simulation Explorer," "Message," and "Task List" windows and their functions are provided in Chapter 5. Details about the "Results Explorer" window are provided in Chapter 8. Users can learn how to run the imported data through the model as a simulation in section 3.5.

3.2.3 SFMM Import Tool

If the user chooses to import files using the SFMM Import Tool (according to the steps at the beginning of section 3.2), the "SFMM Import Tool" window (Figure 3-32) will pop up. Importing files with the SFMM Import Tool involves three steps, which correspond to three of the tabs appearing in this window: Initial Setup, Template Selection, and Import. The "Report Log" tab contains a list of import tasks performed by the import tool; in the event of a problem, its contents can be copied and sent to the CFS-CAT for help with debugging problems.

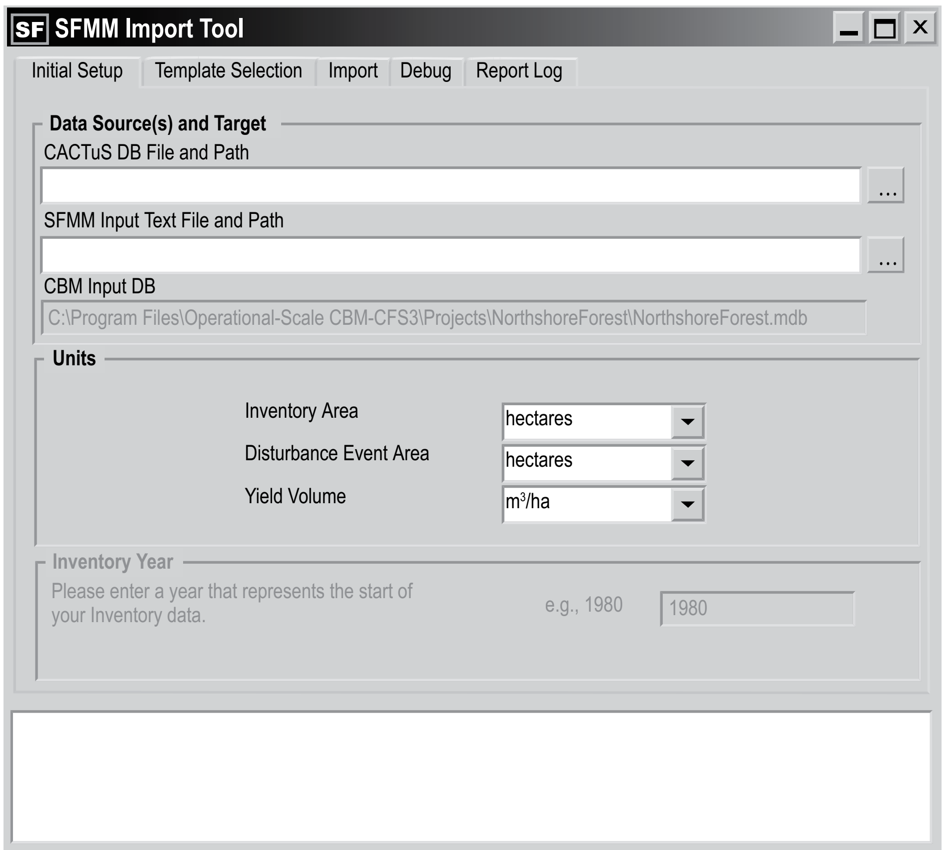


Figure 3-32. The "SFMM Import Tool" window with the "Initial Setup" tab selected.

Initial Setup

On the "Initial Setup" tab (Figure 3-32), the directory for the project database file will be named in the "CBM Input DB" box. To proceed

1. **Click on the "…" button next to the "CACTuS DB File and Path" box**

An "Open" window will pop up.

2. **Browse to the appropriate CACTuS database file to be imported**
3. **Click on the "Open" button to proceed**

   or

   Click on the "Cancel" button to terminate the process

To proceed after clicking on the "Open" button

4. **Click on the "…" button next to the "SFMM Input File and Text Path" box**

An "Open" window will pop up.

5. **Browse to the appropriate SFMM input file corresponding to the CACTuS database file**
6. **Click on the "Open" button to proceed**

   or

   Click on the "Cancel" button to terminate the process

Note: Selecting units and inventory year (currently disabled)

7. **To make changes from the default units displayed, select the appropriate Inventory Area, Disturbance Event Area, and Yield Volume units used in the data that is being imported by clicking on the drop list for each in the "Units" box**
8. **In the "Inventory Year" box, type in the inventory year corresponding to the data that is being imported**

Template Selection

Next, the user must create and select a template. The template stores information about how the user maps data classifiers to CBM-CFS3 classifiers during the data import process. In future versions of the model, users of the SFMM Import Tool may be able to reuse templates for subsequent partial data imports for existing projects that were created with the same template. To proceed

9. **Click on the "Template Selection" tab (Figure 3-33)**

The "Template Directory" box points to the "Templates" folder (C:\Program Files\Operational Scale CBM-CFS3\Templates\).

Note: Designating a different folder for template storage

To designate a different folder for template storage

Click on the "…" button

A "Browse for Folder" window (Figure 3-15) will pop up.

Point to or create a template folder (this folder should be located or created in the directory C:\Program Files\CBM\)

Click on the "OK" button to proceed

or

Click on the "Cancel" button to terminate the process

or

Click on the "New Folder" button to create a Template folder

To create and select a new template

10. **Enter a template name in the "Name" box**
11. **Click on the "Add" button**
12. **In the "Template Choices" box, click on the new template name that has been added**

Note: Deleting a template

When the "Template Choices" box (Figure 3-33) becomes full of template names, the user may want to delete obsolete templates. To delete a template

Click on the name of a template in the "Template Choices" box (Figure 3-33)

Click on the "Delete" button

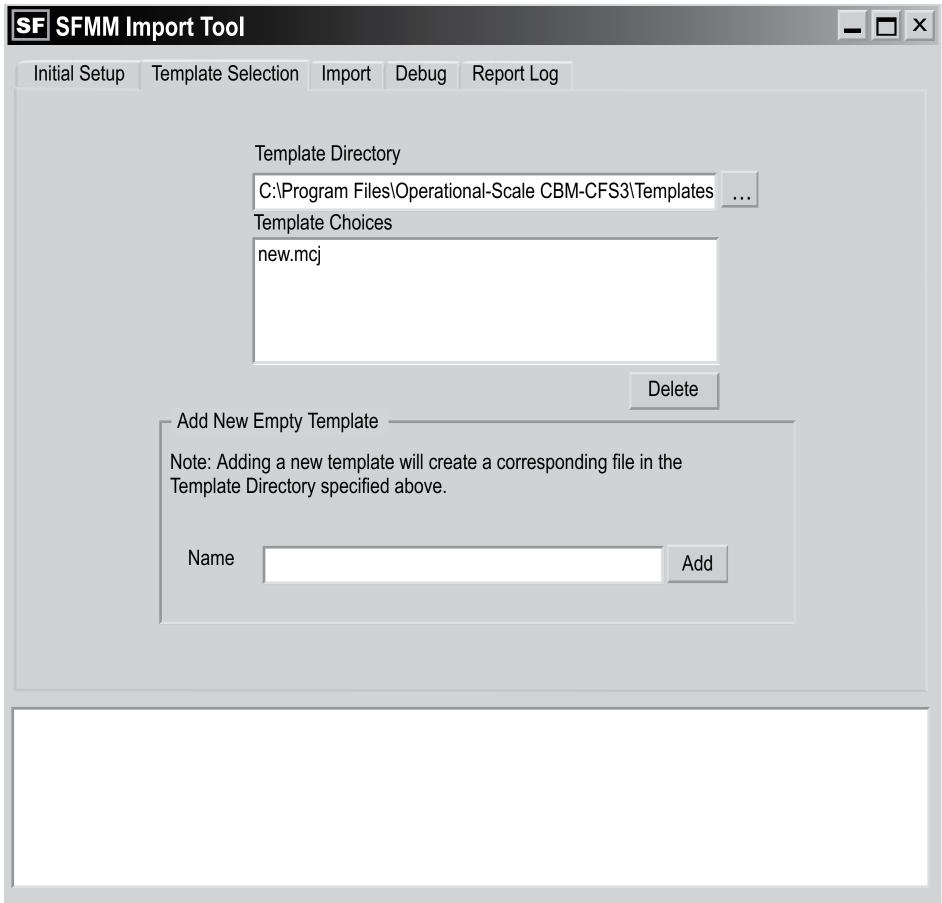


Figure 3-33. The "SFMM Import Tool" window with the "Template Selection" tab selected.

Importing

To begin importing files

13. Click on the "Import" tab (Figure 3-34)

Users of the SFMM Import Tool must perform complete imports at this time, although partial imports are possible with the CBM Standard Import Tool (see section 3.2.1) and the Woodstock Import Tool (see section 3.2.2). To proceed with importing SFMM input files, make sure the "Complete Import" box is checked and

14. Click on the "Begin Import" button

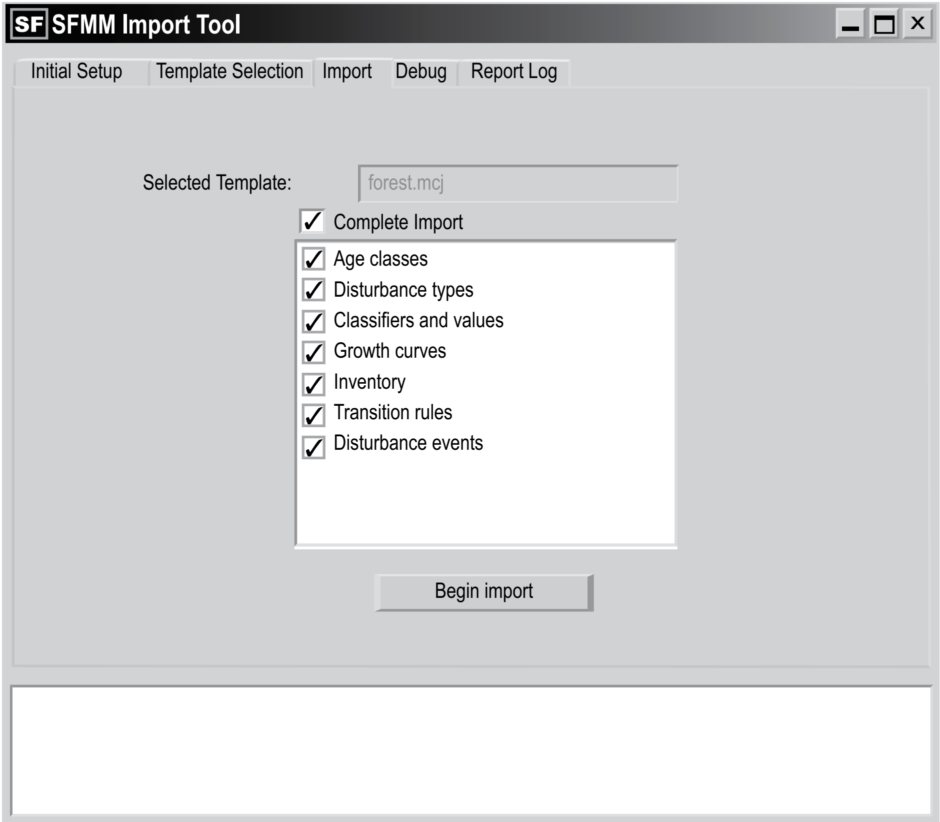


Figure 3-34. The "SFMM Import Tool" window with the "Import" tab selected.

Next, the "Model Number Filter Selection" window (Figure 3-35) will pop up and prompt the user to select an SFMM Model Number to filter the data that are about to be imported. Often a CACTuS database contains several sets of data associated with different forest management units. The Model Number Filter allows the SFMM Import Tool to focus on a single set of data associated with a single forest management unit. It may be that there is only one model number to choose from, which means that the chosen CACTuS database contains data for only one forest management unit. The SFMM Import Tool finds these model numbers in the CACTuS table named tbl_model_details. To filter

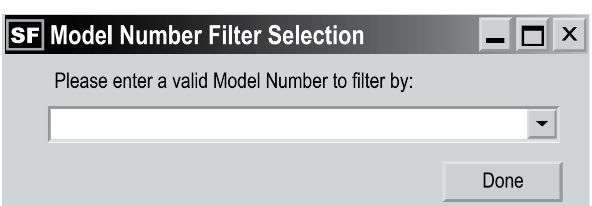


Figure 3-35. The "Model Number Filter Selection" window.

15. **Click on the drop list box and select a model number from the list that appears**
16. **Click on the "Done" button**

The model will begin to import the user's data. Next, the user must use the "Disturbance Type Mapping" window (Figure 3-18) to map the disturbances in the import files to those existing in the CBM-CFS3.

The disturbance types appearing in the "Source Disturbance Types found" box are those in the "Disturbance Types" import file being imported. Those appearing in the "CBM Default Disturbance Types" box are those preprogrammed in the model and linked to carbon relationships through a disturbance matrix. The user can see a description of a disturbance type by clicking on its name. The description will appear in the "Description" box. Disturbance types in the "Source Disturbance Types found" box that are recognized by the CBM-CFS3 (by virtue of a name that is identical with the name of a preprogrammed disturbance type) will automatically map to an appropriate disturbance type in the "CBM Default Disturbance Types" box and will be grayed out. Disturbance types that do not match any of the default options in the model should be mapped to a default disturbance type with similar impacts on carbon.

Once all source disturbances have been mapped to the same or a similar disturbance type and the import process is complete, the user can access the Disturbance Matrix Editor (see Chapter 6, section 6.3). If the effect of the source disturbance types on ecosystem carbon pool transfer values is known and is different from the default transfer values provided in the CBM-CFS3, the user can use the Disturbance Matrix Editor to edit the ecosystem carbon transfer values resulting from the disturbances to which the imported disturbance types have been mapped.

To map a disturbance that was not automatically mapped or to change the mapping for a disturbance

17. **Click on a disturbance type in the "Source Disturbance Types found" box**
18. **Click on a matching or similar disturbance type name or click on "Unknown" in the "CBM Default Disturbance Types" box**
19. **Click on the "Map" button**

This process must be applied for each disturbance type that is imported. Each successfully mapped disturbance pair is displayed in the "Results" box at the bottom of the window. Should the user map a disturbance type incorrectly, the mapping can be overwritten by repeating steps 17 to 19 above for the disturbance type. Once the disturbance mapping process is complete

20. **Click on the "Done" button**

Next, the SFMM "Classifiers and Values Mapping" window (Figure 3-36) will pop up. The classifiers in the input files being imported are displayed in the "Imported Classifiers" box. The user can observe the classifier values associated with a classifier by clicking on the classifier name as listed in the "Imported Classifiers" box. The values associated with that classifier will appear in the "Existing Classifier Values" box.

In this window, the user can identify special classifiers (i.e., administrative boundaries or ecological boundaries) in the input files and can then link the associated classifier values to special default classification values in the CBM-CFS3 in the "Special Classifier Values" box.

Administrative boundaries refer to Canadian provinces and territories with the exception of Newfoundland and Labrador, which has been split for programming reasons related to fire disturbance matrices, and ecological boundaries refer to the Terrestrial Ecozones of Canada as defined at http://www.ec.gc.ca/soer-ree/English/vignettes/Terrestrial/terr.cfm or in Environment Canada (1996). A map of the terrestrial ecozones of Canada used in the CBM-CFS3 appears as Figure 3-22.

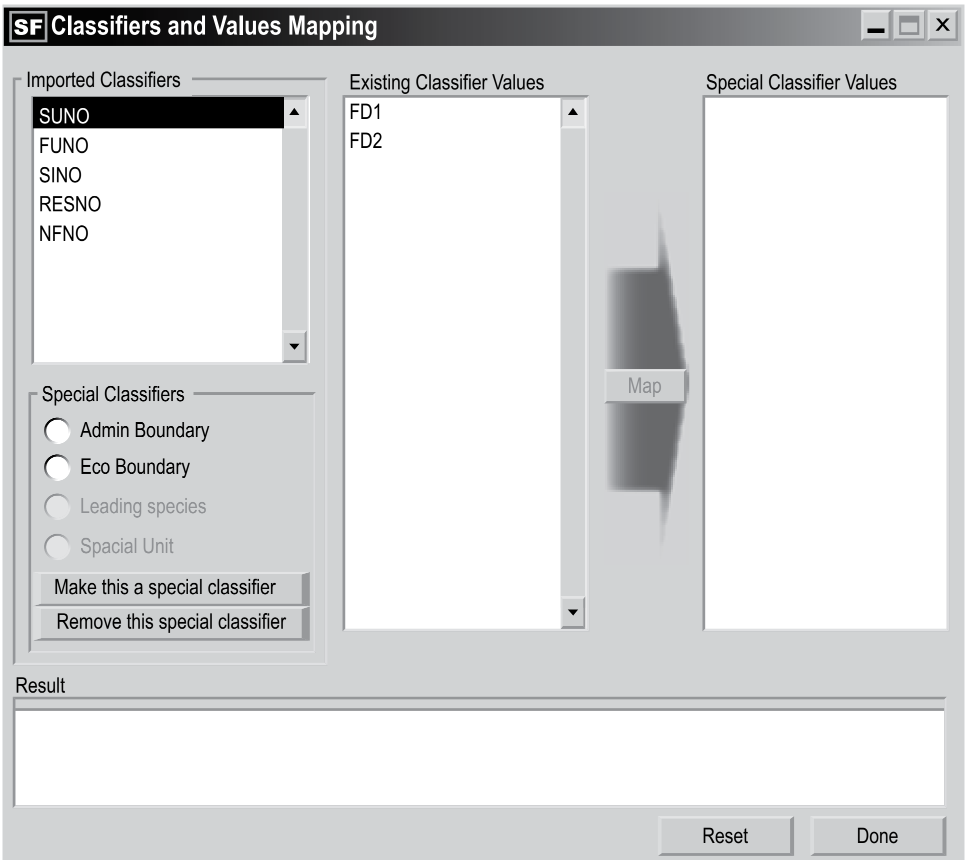


Figure 3-36. The SFMM "Classifiers and Values Mapping" window with the "SUNO" imported classifier selected.

Note: Division of Boreal Shield and Taiga Shield ecozones

In the CBM-CFS3, the Boreal Shield and Taiga Shield ecozones have been divided into eastern and western parts because the west is typically being colder and drier than the east. Hence, these subzones are modeled separately (Kurz et al. 1992).

If there are multiple administrative or ecological boundaries in the user's input files (i.e., classifiers identifying either type of boundary), the user must create special classifiers for both administrative boundaries and ecological boundaries. To set up a special classifier

21. **In the "Imported Classifiers" box, click on an imported classifier that is considered as a special classifier**
22. **Click on the appropriate radio button (Admin Boundary for an administrative boundary or Eco Boundary for an ecological boundary) in the "Special Classifiers" box**
23. **Click on the "Make this a special classifier" button**

The window will then display the default CBM-CFS3 classification values in the "Special Classifier Values" box.

When any classifier is made into a special classifier, the CBM-CFS3 will try to automatically map any identical classifier values between the user's values and the default values in the model. Mapped classifier values will appear gray in the "Existing Classifier Values" box. If the CBM-CFS3 improperly maps a classifier value, the user can remap the value manually, and the previous mapping will be overwritten.

Any classifier values not automatically mapped by the CBM-CFS3 must be manually mapped to those in the CBM-CFS3. To proceed

24. **Click on a classifier value in the "Existing Classifier Values" box**
25. **Click on a corresponding default special classifier value in the "Special Classifier Values" box (the box name will have changed to reflect the selected special classifier)**
26. **Click on the "Map" button**

The user should repeat steps 24 to 26 until all existing classifier values for the special classifier have been mapped to a default special CBM-CFS3 classifier value. As each classifier pair is mapped, it appears in the "Results" box at the bottom of the window and the classifier in the "Existing Classifier Values" box will be grayed out. If an existing classifier value is mapped improperly, the user can simply repeat steps 24 to 26 to overwrite the incorrect mapping for that classifier value. The user also has the option of removing special classifiers that have been created by clicking on the appropriate classifier in the "Imported Classifiers" box and then clicking the "Remove this special classifier" button, or, to reset the window, clicking on the "Reset" button.

Once the classifier mapping process is complete

27. **Click on the "Done" button**

The "Default Species Type Mapping" window (Figure 3-37) will then pop up so that the user can map tree species in the source data to the CBM-CFS3 default species.

The CBM-CFS3 will automatically map any of the user's tree species that it recognizes (i.e., those with identical names) to those found in the CBM-CFS3 database. Names of successfully mapped species will appear gray in the "Your Tree Species Types" box (Figure 3-37). The user can verify if these species have been mapped correctly by clicking each one in turn and seeing which species is highlighted in the "CBM Default Species Types" box. To manually map any remaining unmapped species or to remap any incorrectly mapped species

28. **Click on tree species name in the "Your Tree Species Types" box**
29. **Click on an appropriate tree species name in the "CBM Default Species Types" box**
30. **Click on the "Map" button**

Repeat steps 28 to 30 until all of the tree species being imported have been mapped and then

31. **Click on the "Done" button**

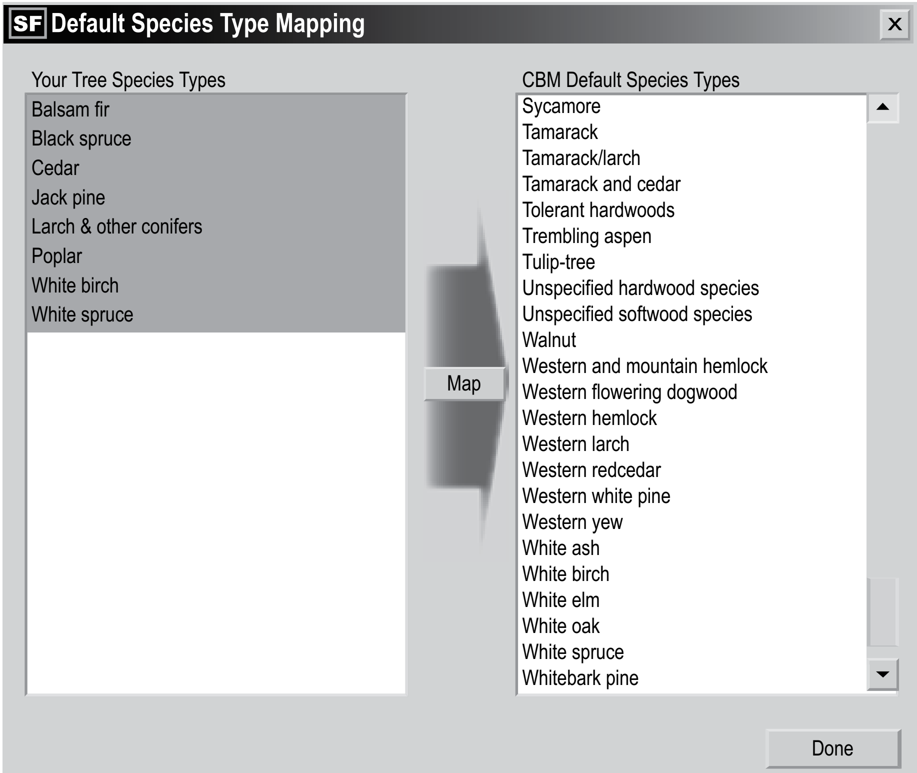


Figure 3-37. The "Default Species Type Mapping" window.

If the user did not make any administrative or ecological boundaries into special classifiers in the SFMM "Classifiers and Values Mapping" window (Figure 3-36), the model will continue to import the user's data until the "Select a Spatial Unit" window (Figure 3-23) pops up where the user must identify the administrative boundary and ecological boundary for their data.

If the user did make one or more administrative and ecological boundaries into special classifiers, this window will not pop up, and the user can skip to the text following step 35.

In the "Select a Spatial Unit" window, the user must assign both an administrative boundary and an ecological boundary to the data being imported. To proceed

32. **Click on an appropriate administrative boundary listed in the "Default Admin Boundaries" box**
33. **Click on an appropriate Ecological boundary listed in the "Default Eco Boundaries" box**

Next, an SPU name (for example, the name of a forest management unit) can be assigned to the project data. The user can leave the "SPU Name" box blank, in which case the CBM-CFS3 will create a default name. Alternatively, to assign a name

34. **Type a name in the "SPU Name" box**

To complete this window

35. **Click on the "Done" button**

The import process will continue until the "Pre-forest Type Classifier Mapping" window (Figure 3-38) pops up. A pre-forest type classifier represents a nonforest land cover type. Each pre-forest land cover type is associated with an initial DOM pool size. If a pre-forest type is not expected to convert to forest during the project simulation, it should be removed from the inventory in the import files. In the CBM-CFS3, the DOM pool values are attained by iteratively growing and disturbing forest stands using a regional stand-replacing disturbance interval until the Slow DOM pool reaches a state where it changes by less than 0.1% between successive return intervals. This method cannot be used to initialize DOM pools for any nonforest stands that will become forest during the course of a project simulation. Instead, the user is asked during the data import process to map pre-forest type classifiers in the imported data to CBM-CFS3 pre-forest type classifiers and thus to assign DOM pools to any existing nonforest stands that will be converted to forest in the future. To map pre-forest type classifiers using the "Pre-forest Type Classifier Mapping" window (Figure 3-38)

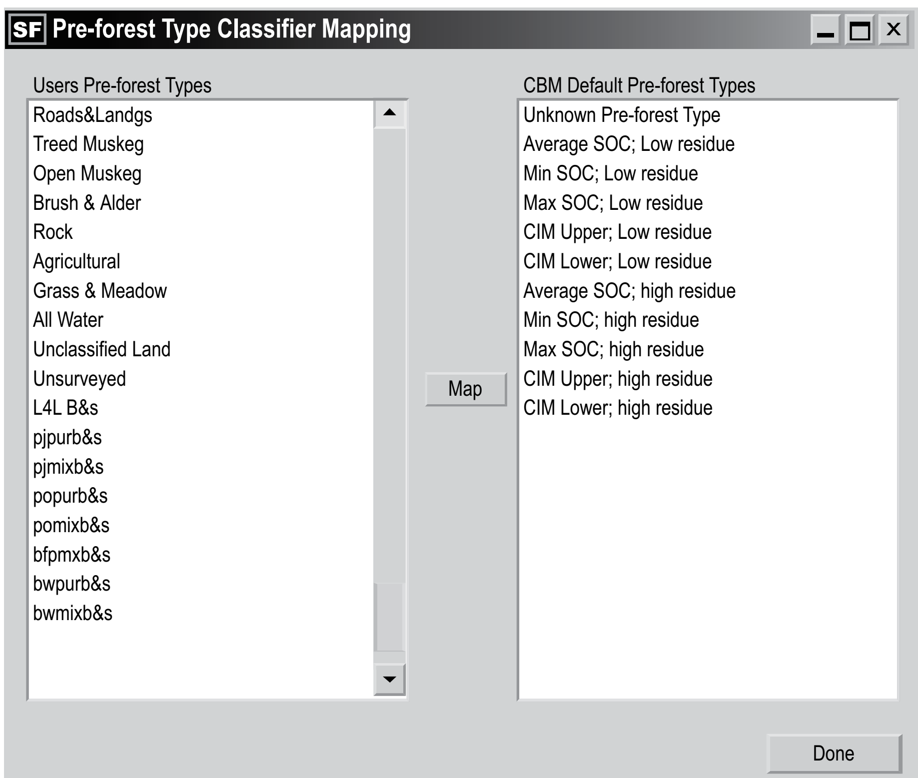


Figure 3-38. The "Pre-forest Type Classifier Mapping" window.

36. **Click on the name of a pre-forest type classifier in the "Users Pre-forest Types" box.**
37. **Click on the name of a pre-forest type classifier in the "CBM Default Pre-forest Types" box**
38. **Click on the "Map" button**
39. **Repeat steps 36 to 38 for any remaining pre-forest type classifiers**
40. **Click on the "Done" button**

The import process will continue until the "Transition Rules / Disturbance Events Selector" window (Figure 3-39) pops up. The user must indicate in this window any transition rules and/or disturbance events that should be imported into the CBM-CFS3. A check mark in the check box beside a transition rule or disturbance event indicates that it will be imported (the default is that all boxes are checked).

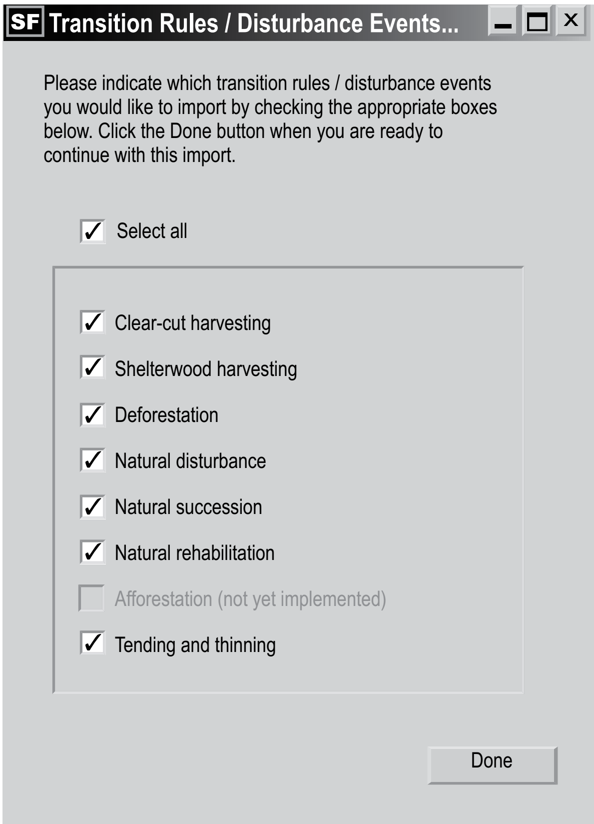


Figure 3-39. The "Transition Rules/Disturbance Events Selector" window.

Note: To uncheck or recheck a check box

Click on the appropriate check box beside a particular transition rule or disturbance event, if required.

41. Click on the "Done" button

Once this step is complete, the "Disturbance Events Term Selection" window (Figure 3-40) will pop up, allowing the user to select the years associated with disturbance events that are to be imported.

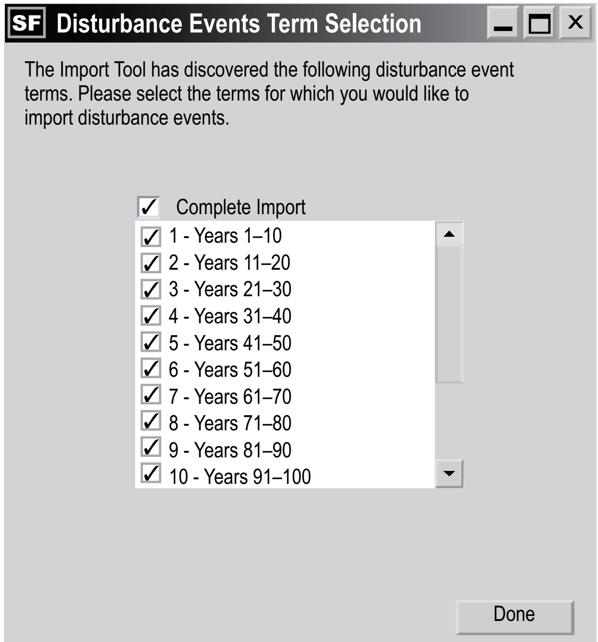


Figure 3-40. The "Disturbance Events Term Selection" window.

A check mark in a check box beside a year term indicates that it will be imported (all year terms are automatically selected for import). To import all terms, skip to step 42. To select specific terms (if required)

Click on the "Complete Import" check box, so that the check mark is removed

Select the check box (or check boxes) for the year term (or terms) to be imported

Once this has been completed

42. **Click on the "Done" button**

Next, the "Assumptions and Scenarios Labels" window (Figure 3-24) will pop up. This window allows the user to review and/or edit the default names and descriptions that the CBM-CFS3 has assigned to the imported data for SPU-level (Figure 3-24) and run-level (Figure 3-25) scenarios.

The user can edit any of the assigned names or descriptions for scenarios by clicking on the appropriate box and typing in the change. Once satisfied with the names and descriptions

43. **Click on the "Done" button**

The model will continue importing the user's data until the "Selected data groups successfully imported" window (Figure 3-26) pops up. To proceed

44. **Click on the "OK" button**
45. **Close the "SFMM Import Tool" window by clicking on the "X" button**

The "Project Explorer," "Simulation Explorer," "Results Explorer,", "Message," and "Task List" windows will pop up. The user can choose to work in these windows or close them and work through the menu bar of the main CBM-CFS3 window. Details about the "Project Explorer," "Simulation Explorer," "Message," and "Task List" windows and their functions are provided in Chapter 5. Details about the "Results Explorer" window are provided in Chapter 8. Users can learn how to run the imported data through the model as a simulation in section 3.5.

3.3 Stand-Level Project Creator

The Stand-Level Project Creator should be used by those dealing with one or a small number of natural, managed, afforested, or planted stands. To create a project with the Stand-Level Project Creator from the "Project Manager" window (Figure 2-10)

1. **Right-click on the "Connected Projects" box and click on "New Project" on the menu that appears**

   or

   Click on the "New" button

   or

   On the menu bar of the main CBM-CFS3 window, click on "File," click on "New" on the menu that appears, and then click on "Project" on the side menu that appears

These steps will open up the "New Project" window (Figure 3-9). In this window, the user names the project and selects the appropriate import tool for importing data, depending on the source of the data and/or the kind of project that is being created. To proceed

2. **Enter a project name in the "Name" box**
3. **Enter a folder location for the project in the "Location" box and skip to the text following step 5**

   or

   Click on the "Browse" button to browse to a location (if the C:\Program Files\Operational Scale CBM-CFS3\Projects is not the appropriate location)

If the user clicks on the "Browse" button, the "Browse for Folder" window (Figure 3-10) will pop up.

Browse to the C:\Program Files\Operational Scale CBM-CFS3\Projects folder or any other designated folder for the project

Click on the "OK" button to proceed

or

Click on the "Cancel" button to terminate the process

or

Click on the "New Folder" button to create a new folder

Note: Automated process for locating "Projects" folder

The CBM-CFS3 will remember the folder location when future projects are created, so this series of steps need be completed only once. However, the user must go through these steps again if a different folder is chosen for projects at a later date.

Once an appropriate location is displayed in the "Location" box, the project path and project name will be displayed below the "Location" box.

To proceed

4. **Click on the Stand-Level Project Creator icon in the "Templates" box (Figure 3-9)**
5. **Click on the "OK" button to proceed**

   or

   Click on the "Cancel" button to terminate this process

   or

   Click on the "Help" button to access the program's help features

If the user clicks on the "OK" button, the "Stand-Level Project Creator" window (Figure 3-41) will pop up. This window displays the several steps the user must follow to create a project. To begin

6. **Click on the "Next" button to proceed**

   or

   Click on the "Cancel" button to terminate the process

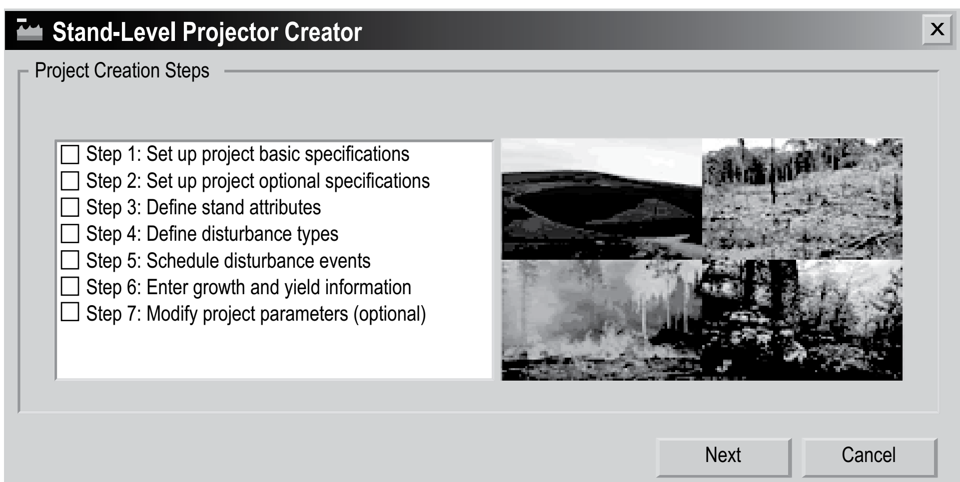


Figure 3-41. The "Stand Level Project Creator" window.

If the user clicks on the "Next" button, the "Project Basic Specifications" window (Figure 3-42) will pop up. In this window, the user enters details about the project location, species, and nonforest initializations (initial nonforest land cover types). To proceed

7. **Click on the "Administrative Boundary" box and make an appropriate selection from the drop list that appears**
8. **Click on the "Ecological Boundary" box and make an appropriate selection from the drop list that appears**

Next, the user must indicate which species to include in the stand.

9. **Click on a tree species name in the "Available Species" box**
10. **Click on the "Select>>" button**

The species name will appear in the "Species Included in this Project" box.

11. Repeat steps 9 and 10 to add more species

If the user accidentally selects an incorrect tree species, it can be removed. To do this

Click on the tree species name in the "Species Included in this Project" box

Click on the "<<Remove" button

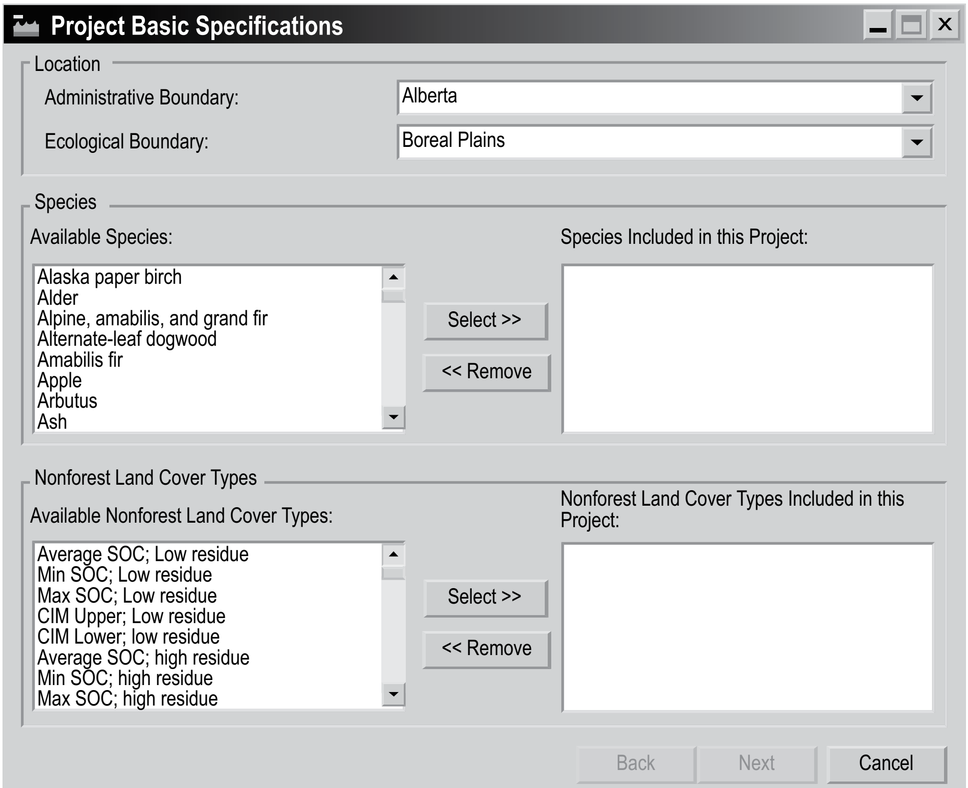


Figure 3-42. The "Project Basic Specifications" window.

If the project being created contains transitions in land cover type from nonforest to forest, proceed with steps 12 to 14; otherwise, proceed to step 15.

In the "Available Nonforest Land Cover Types" box, "Average SOC," "Min SOC," and "Max SOC" refer respectively to the regional average, minimum, and maximum soil organic carbon content for the mineral soil, and "CIM Upper" and "CIM Lower" refer respectively to the regional upper and lower confidence interval of the mean determined from Soil Landscapes of Canada, version 2.1, available at (http://sis.agr.gc.ca/cansis/nsdb/slc/intro.html), combined with expert judgment about soil types that are likely to be targeted for afforestation. The nonforest land cover type that the user selects will determine the initial value for the belowground slow DOM pool in the CBM-CFS3. The user should select the average SOC values for the region of interest. The minimum and maximum values are provided for sensitivity analyses. "Low residue" and "high residue" refer to the amount of herbaceous litter (in roots and shoots) present on the site before planting. The type of residue that the user selects will be used to determine the initial aboveground and belowground DOM pools in the CBM-CFS3. All other DOM pools are assumed to be empty.

Note: Initialization of DOM Pools

The initialization of DOM pools in the CBM-CFS3 for nonforest soils is currently under review. Model predictions of carbon stock change in the slow soil pools obtained with the current initialization method are highly uncertain. Users should exercise caution when interpreting the predictions of changes in carbon stocks in soil pools after afforestation, as these are strongly determined by the choice of starting values for these pools.

To proceed

12. **Click on the name of a nonforest land cover type in the "Available Nonforest Land Cover types" box**
13. **Click on the "Select>>" button in the "Nonforest Land Cover Types" box**

The nonforest land cover type will be added to the "Nonforest Land Cover Types Included in this Project" box. If the user accidentally adds an incorrect nonforest land cover type, it can be removed. To do this

Click on the nonforest land cover type name in the "Nonforest Land Cover Types Included in this Project" box

Click on the "<<Remove" button in the "Nonforest Land Cover Types" box.

To proceed

14. **Repeat steps 12 and 13 to add more nonforest land cover types**
15. **Click on the "Next" button to proceed**

    or

    Click on the "Back" button to return to the previous window

    or

    Click on the "Cancel" button to terminate the project creation process

If the user clicks on the "Next" button, the "Project Optional Specifications" window (Figure 3-43) will pop up, where the user can enter simulation options and optional classifiers for the project. To proceed

16. **Click on the "How many stands do you want to create? (1-100)" box and use the arrow buttons to select an appropriate number (or type in a number)**
17. **Click on the "How many time steps do you want to run?" box and use the arrow buttons to select an appropriate number (or type in a number)**
18. **Click on the "What default maximum age for growth curves would you like to use?" box and use the arrow buttons to select an appropriate number (or type in a number)**
19. **Click on the "What growth curve interval would you like to use? (e.g., 5 years, 10 years)" box and use the arrow buttons to select an appropriate number (or type in a number), if required**

The CBM-CFS3 automatically creates the following classifiers for the data to be imported: Stand ID, Leading Species, and Land Cover Type.

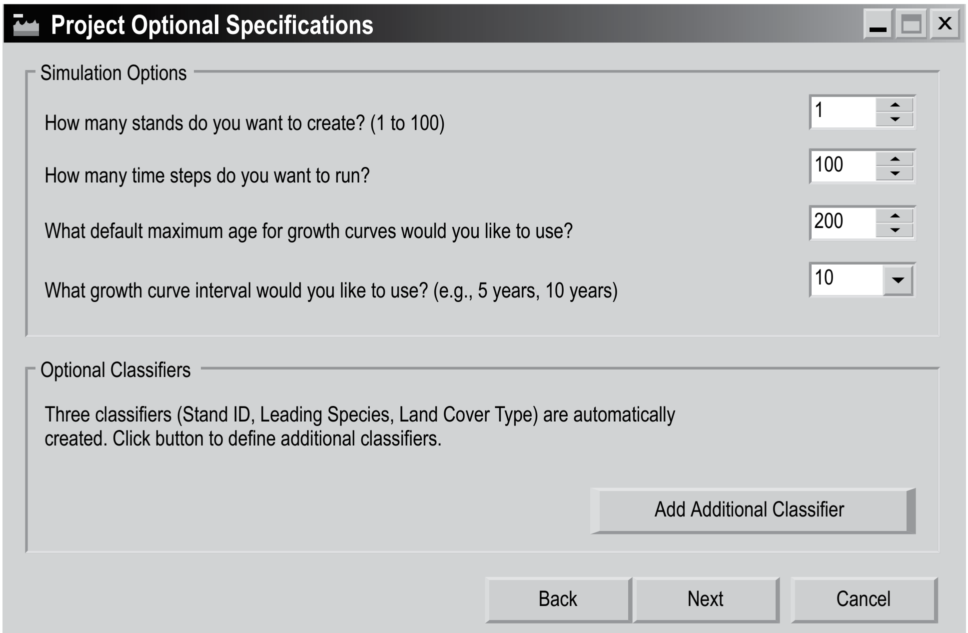


Figure 3-43. The "Project Optional Specifications" window.

☞ *Tip: Creating additional classifiers*

To create additional classifiers

1. **Click on the "Add Additional Classifier" button**

The "Optional Classifiers" window (Figure 3-44) will pop up. In this window, the user must name, describe, and add the new classifier(s).

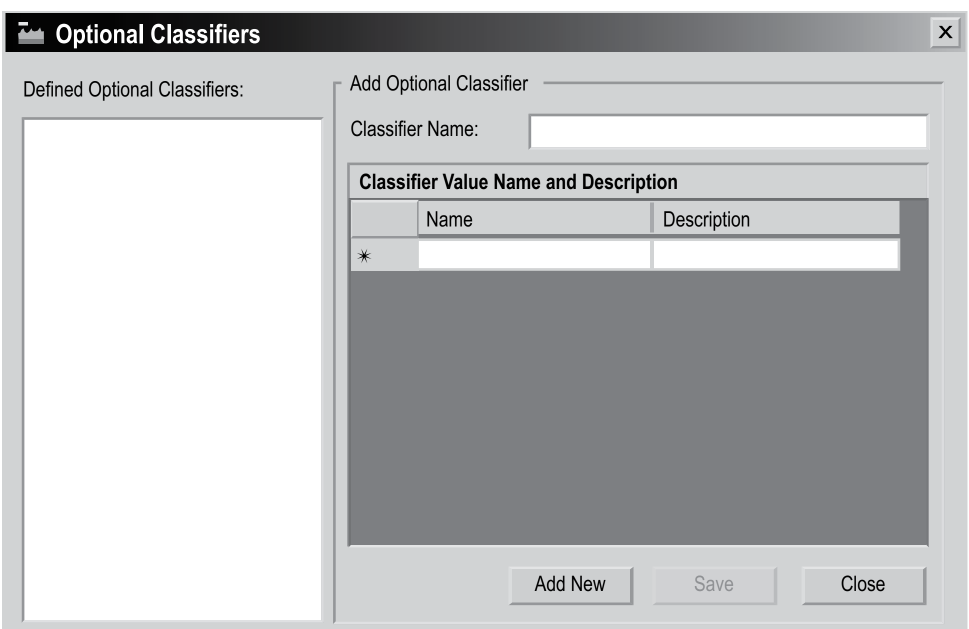


Figure 3-44. The "Optional Classifiers" window.

☞ *Tip: Continued*

2. **Click on the "Add New" button.**
3. **Type a classifier name in the "Classifier Name" box**
4. **Type a classifier value name in the "Name" column of the "Classifier Value Name and Description" table**
5. **Type a description for the classifier value in the "Description" column of the "Classifier Value Name and Description" table**
6. **Click on the "Save" button**

An "Add Optional Classifier" window will pop up stating, "Optional classifier and values have been added."

7. **Click on the "OK" button**

The new classifier will then appear in the "Defined Optional Classifiers" box.

8. **Repeat steps 2 to 7 to add additional classifiers**

To delete a classifier that was added

Click on the name of the classifier in the "Defined Optional Classifiers" box

Press the "Delete" key on your keyboard

A "Delete a Classifier" window will pop up asking the user to confirm deletion of the selected classifier.

Click on the "Yes" button to proceed

or

Click on the "No" button to cancel the deletion process

To return to the "Project Optional Specifications" window

9. **Click on the "Close" button**

---

20. **Click on the "Next" button to proceed**

or

Click on the "Back" button to go back to the previous window

or

Click on the "Cancel" button to terminate the project-creation process

If the user clicks on the "Next" button, the "Define Stand Attributes" window (Figure 3-45) will pop up. This window contains two tabs, the "Define Stand Attributes" tab (Figure 3-45) and the "Review Stand Attributes" tab (Figure 3-46). On the "Define Stand Attributes" tab, the user selects the stand attributes for each stand that is being created. On the "Review Stand Attributes" tab, the user can review the stand attributes selected for all of the stands that are being created. To define stand attributes on the "Define Stand Attributes" tab

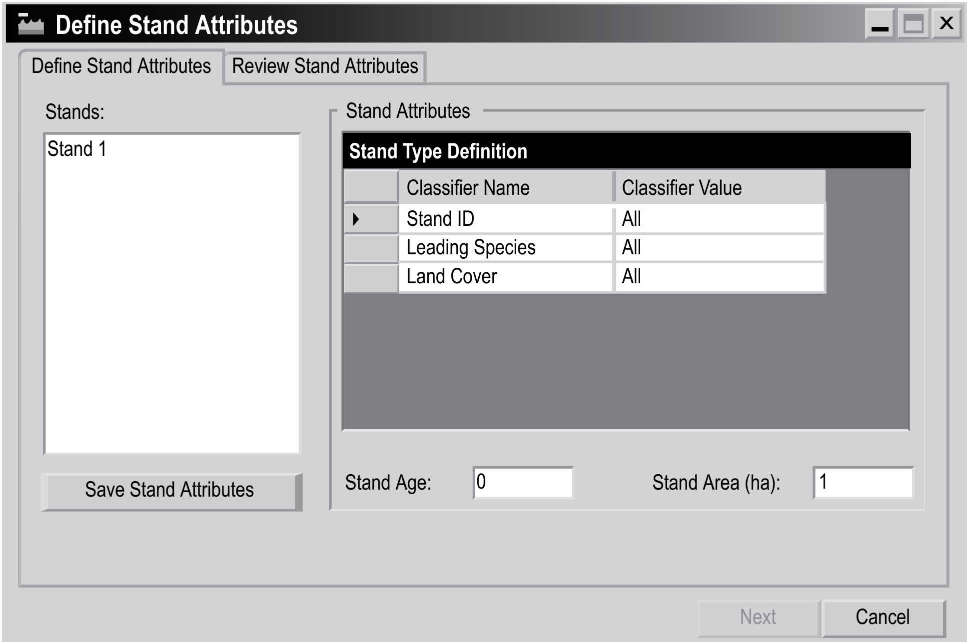


Figure 3-45. The "Define Stand Attributes" window with the "Define Stand Attributes" tab selected.

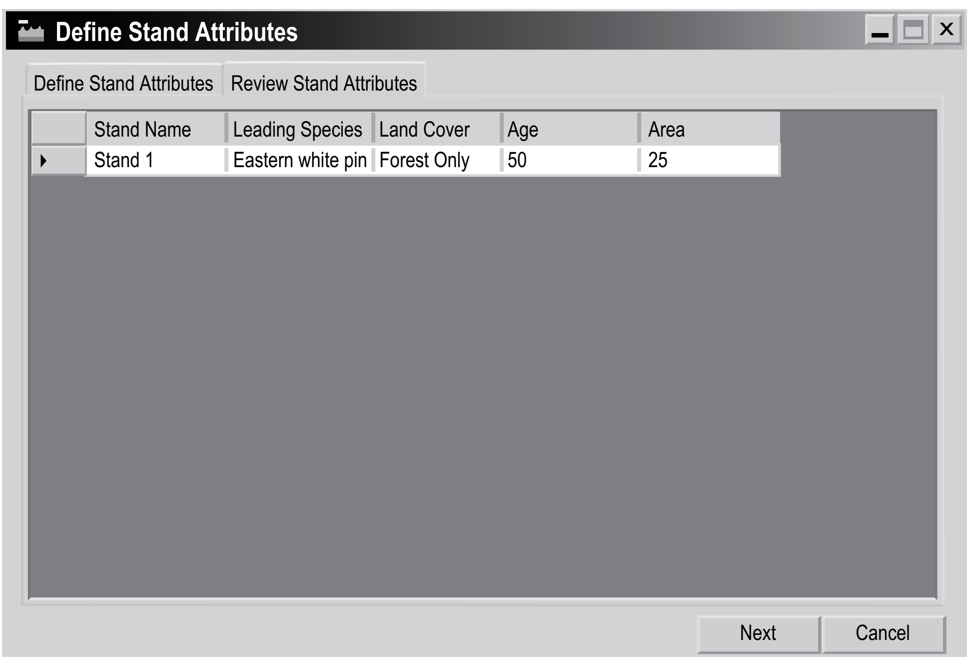


Figure 3-46. The "Define Stand Attributes" window with the "Review Stand Attributes" tab selected.

21. **Click on the name of a stand in the "Stands" box**
22. **Click on the "Stand Age" box and type in a stand age**
23. **Click on the "Stand Area (ha)" box and type in the number of hectares for the stand**
24. **Click on each cell in the "Classifier Value" column of the "Stand Type Definition" table and make a selection from the drop list that appears**
25. **Click on the "Save Stand Attributes" button**
26. **Repeat steps 21 to 25 for any remaining stands**

Note: Reviewing stand attributes

To review the attributes saved for the stand(s) that are being created

Click on the "Review Stand Attributes" tab

27. **Click on the "Next" button to proceed**

or

Click on the "Back" button to return to the previous window

or

Click on the "Cancel" button to terminate the project-creation process

If the user clicks on the "Next" button, the "Define Disturbance Types" window (Figure 3-47) will pop up. In this window, the user must select the disturbance type(s) to be included in the project and the options to initialize the stand(s). Fire is automatically included as a disturbance type to initialize soil pools. To select other disturbance types

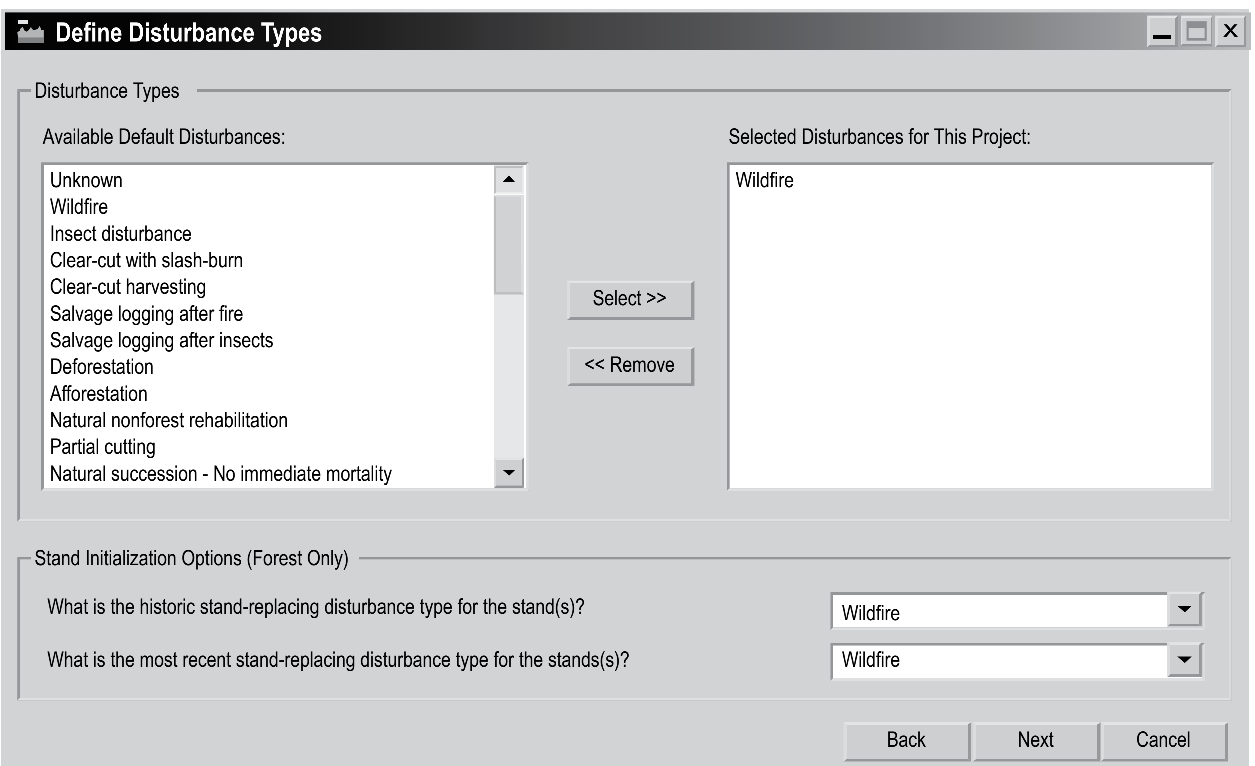


Figure 3-47. The "Define Disturbance Types" window.

28. Click on the name of a disturbance type in the "Available Default Disturbances" box

29. Click on the "Select>>" button

The disturbance type will be added to the "Selected Disturbances for This Project" box.

30. Repeat steps 28 and 29 to add more disturbance types

If the user needs to remove a disturbance type from the "Selected Disturbances for This Project" box

Click on the name of the disturbance type in the "Selected Disturbances for This Project" box

Click on the "<<Remove" button

Next, the user must set stand initialization options, which specify the historical stand-replacing disturbance type for a stand and the most recent stand-replacing disturbance type (if different). This information is used to initialize soil carbon pools in forested stands before a simulation. To proceed

31. Click on the "What is the historic stand-replacing disturbance type for the stand(s)?" box and make a selection from the drop list that appears

32. Click on the "What is the most recent stand-replacing disturbance type for the stand(s)?" box and make a selection from the drop list that appears

33. Click on the "Next" button to proceed

or

Click on the "Back" button to return to the previous window

or

Click on the "Cancel" button to terminate the project-creation process

If the user clicks on the "Next" button, the "Schedule Disturbance Events" window (Figure 3-48) will pop up. This window contains two tabs, the "Schedule Disturbance" tab (Figure 3-48) and the "Review Disturbance Schedule" tab (Figure 3-49). On the "Schedule Disturbance" tab, the user can assign disturbance events to each stand that has been created and create a stand-type transition rule (the stand type to which the original stand will convert following the disturbance event, if different) for that event. The user can also delete disturbance events that have been created in error.

If no disturbance event is created, the user can skip to step 42. Following step 42, the "Schedule Disturbance Events" window will pop up asking the user to confirm that no disturbances are to be scheduled.

Click on the "Yes" button to proceed

or

Click on the "No" button to add disturbance events

To create disturbance events and transition rules

34. Click on the "Disturbance Target" box and select a stand name from the drop list that appears

35. Click on the "Disturbance" box and select a disturbance type from the drop list that appears

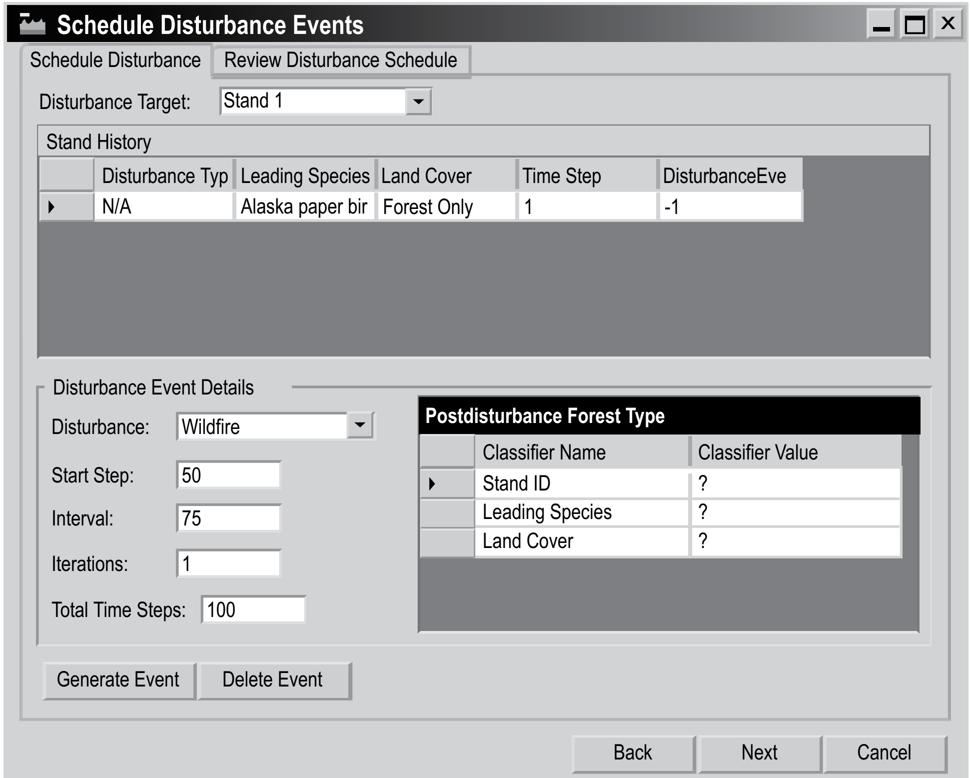


Figure 3-48. The "Schedule Disturbance Events" window with the "Schedule Disturbance" tab selected.

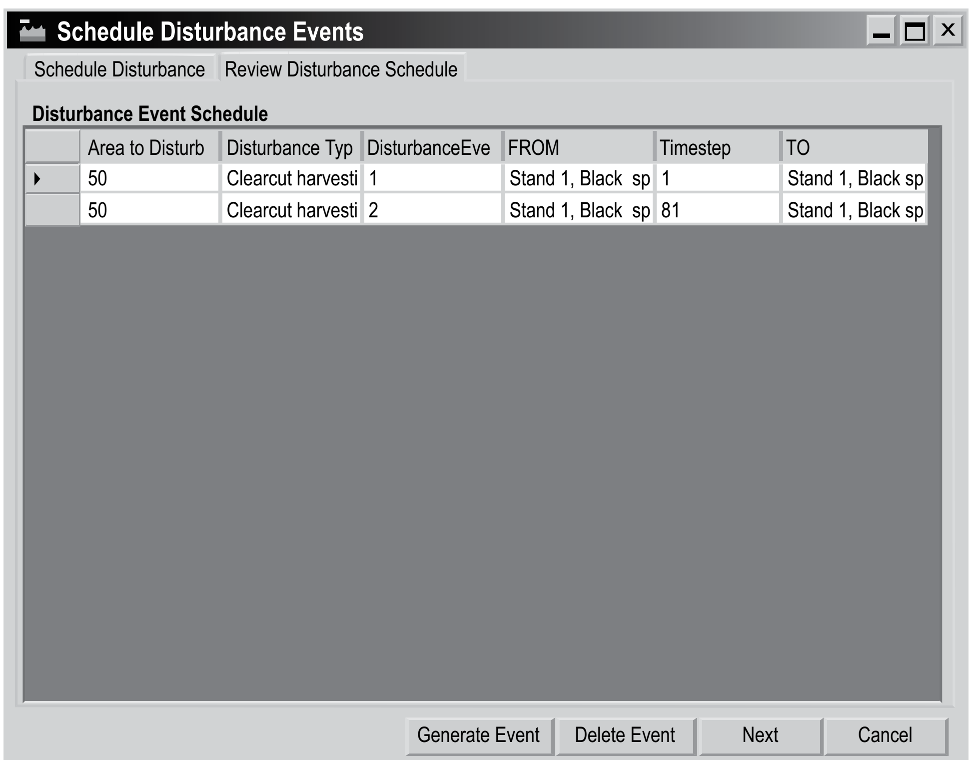


Figure 3-49. The "Schedule Disturbance Events" window with the "Review Disturbance Schedule" tab selected.

Next, the user must enter a Start Step for the disturbance event. The Start Step refers to the time step from the beginning of the simulation run at which the disturbance will occur. For example, if the disturbance is to occur 50 years after the beginning of the simulation, the Start Step is 50. To proceed

36. **Click on the "Start Step" box and enter an appropriate year**

Next, the user must enter the number of years between disturbance events of this kind in the "Interval" box.

37. **Click on the "Interval" box and enter an appropriate number of years**

Next, the user must enter the number of iterations, which represents the number of times the disturbance event is to be repeated.

38. **Click on the "Iterations" box and type in the number of iterations**

Note: Using the "Total Time Steps" box

The "Total Time Steps" box shows the number of time steps selected for simulation in the "Project Optional Specifications" window and cannot be edited in this window. This information is provided here to help users choose an appropriate Start Step, Interval, and number of iterations for each disturbance event that is created.

Next, the user must provide details about the stand type that will result after the disturbance event(s).

39. **Click on each "Classifier Name" in the "Postdisturbance Forest Type" table, and select an appropriate "Classifier Value" from the drop list that appears**
40. **Click on the "Generate Event" button**
41. **Repeat steps 34 to 40 to generate more disturbance events**

If the user accidentally creates an unwanted disturbance event, it can be deleted. To delete an event

In the "Stand History" table (Figure 3-48), click on the gray cell next to the row containing the disturbance event to be removed

Click on the "Delete Event" button

A "Delete Disturbance Events" window will pop up asking the user to confirm deletion of the selected event.

Click on the "Yes" button to proceed

or

Click on the "No" button to cancel the deletion process

Note: Reviewing disturbance events

To review all of the disturbance event details for stand(s) in one table

Click on the "Review Disturbance Schedule" tab

42. **Click on the "Next" button to proceed**

    or

    Click on the "Back" button to return to the previous window

    or

    Click on the "Cancel" button to terminate the process

If the user clicks on the "Next" button, the "Enter Growth and Yield Information" window (Figure 3-50) will pop up. In this window, the user must define the volumes corresponding to the age classes for each species (if more than one) for each stand.

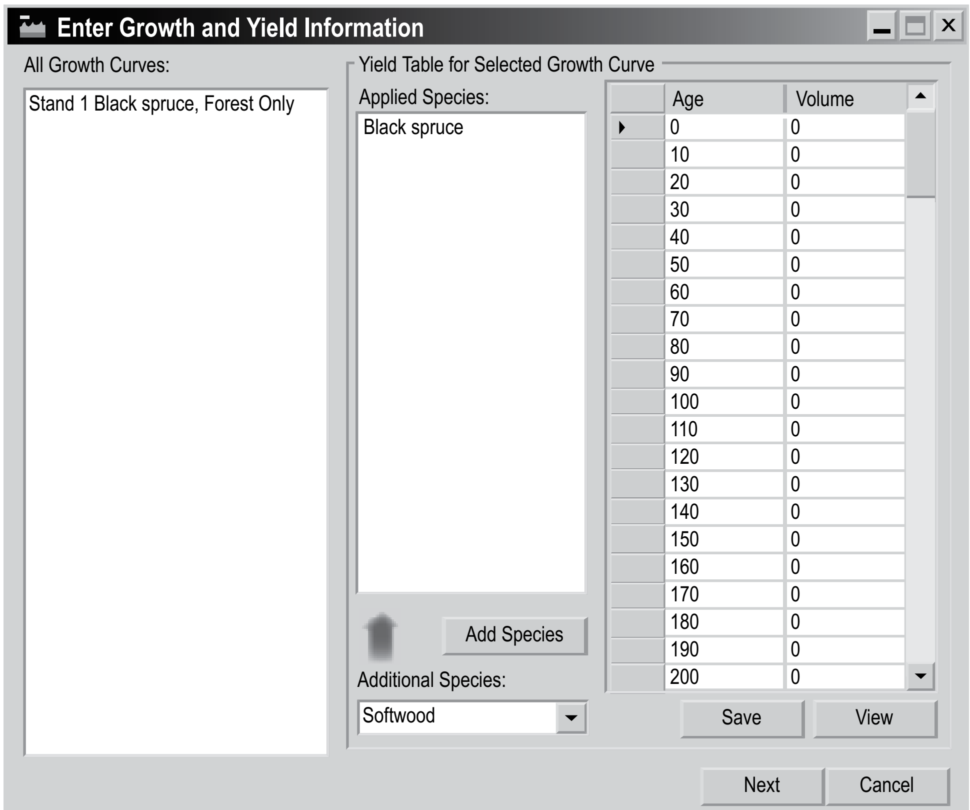


Figure 3-50. The "Enter Growth and Yield Information" window.

Note: Adding additional species to a stand

The user has the option of using the "Enter Growth and Yield Information" window to add additional species to a stand that has been created. Only species added to the project in the "Project Basic Specifications" window (Figure 3-42), or a general "hardwood" or "softwood" species, can be added to a stand along with growth and yield information. To proceed

1. **Click on a stand name in the "All Growth Curves" box**
2. **Click on the "Additional Species" box and select a species name from the drop list that appears**
3. **Click on the "Add Species" button**
4. **Repeat steps 2 and 3 to add more species**

Note: Continued

If the user adds an incorrect species to the "Applied Species" box, it can be deleted.

To delete a species

Click on the name of the species in the "Applied Species" box

Press the "Delete" key on your keyboard

The "Delete Species" window (Figure 3-51) will pop up asking the user to confirm deletion of the selected species

Click on the "Yes" button to proceed

or

Click on the "No" button to cancel the deletion

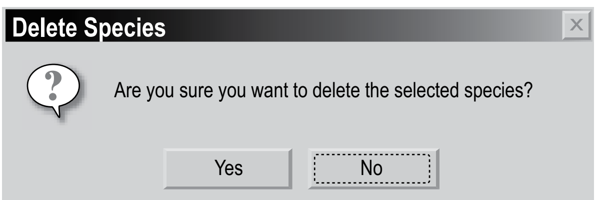


Figure 3-51. The "Delete Species" window.

To add corresponding volumes to each age class for each species in a stand (if more than one species)

43. **Click on a stand name in the "All Growth Curves" box**
44. **Click on a species name in the "Applied Species" box**
45. **Click on a cell in the "Volume" column of the table and enter a volume appropriate for the age class in the "Age" column**

Tip: Copying or pasting volumes

To make volume entry easier for users, volumes can be copied from a Microsoft Excel spreadsheet and pasted into the table shown in Figure 3-50. Volumes in the table can also be copied and pasted into another age–volume table. To copy volumes in the table or paste volumes into the table

1. **Click on the gray cell next to the first age–volume pair and drag down to the gray cell next to the last age–volume pair**
2. **Right-click and click on "Copy" (to copy the age–volume pairs) or "Paste" (to paste in new age–volume pairs) on the menu that appears**

---

46. **Repeat step 45 for each age class**
47. **Click on the "Save" button**
48. **Repeat steps 44 to 47 for any remaining species in the "Applied Species" box**

☞ *Tip: Editing volumes after they have been saved*

A user can edit the volumes after saving them by making the necessary edits and clicking on the "Save" button again.

49. Repeat steps 43 to 48 for any remaining stands in the "All Growth Curves" box

To view, edit, print, save, or export the growth and yield curves created for an applied species

50. Click on a species in the "Applied Species" box

51. Click on the "View" button

The "Growth Curve – 'stand name'" window (Figure 3-52) will pop up, displaying a graph and table of the volume–age pairs for the selected species.

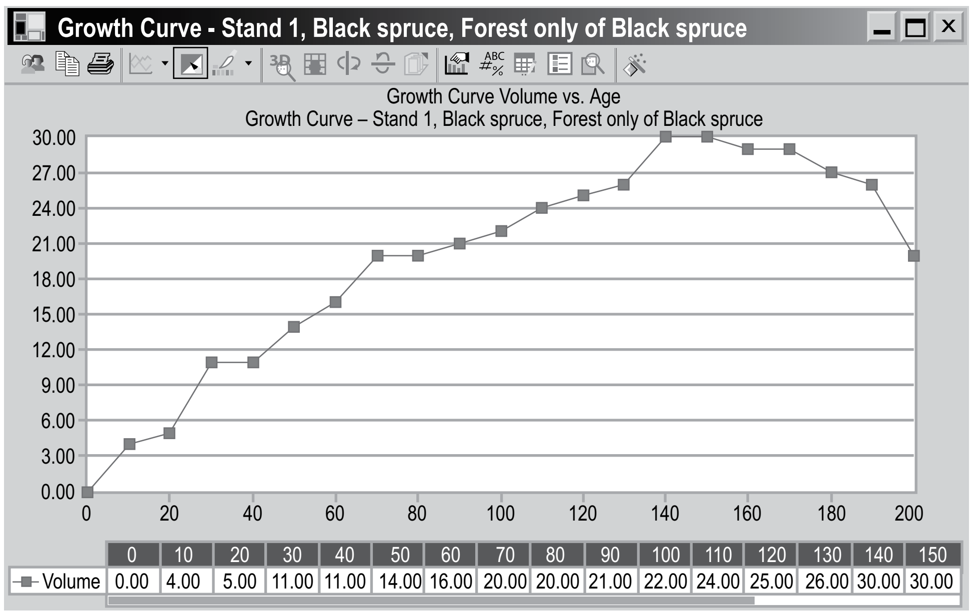


Figure 3-52. The "Growth Curve — 'stand name' " window.

The user can modify the displayed components of the graph and table, and/or print, save, or export the graph by using the icon toolbar features at the top of the graph. For more details about how to manipulate a graph or table, see Chapter 9. To continue the project-creation process

52. Click on the "X" button to close the "Growth Curve – 'stand name'" window

53. Click on the "Next" button to proceed

or

Click on the "Back" button to return to the previous window

or

Click on the "Cancel" button to terminate the project-creation process

If the user clicks on the "Next" button, the "Modify Regional Default Parameters" window (Figure 3-53) will pop up. In this window, the user has the option of modifying the CBM-CFS3 default biomass turnover parameters, DOM turnover parameters, and other DOM parameters. The user must also enter parameters for any nonforest initial conditions that were applied in the "Project Basic Specifications" window (Figure 3-42). Parameters are described in Table 3-1.

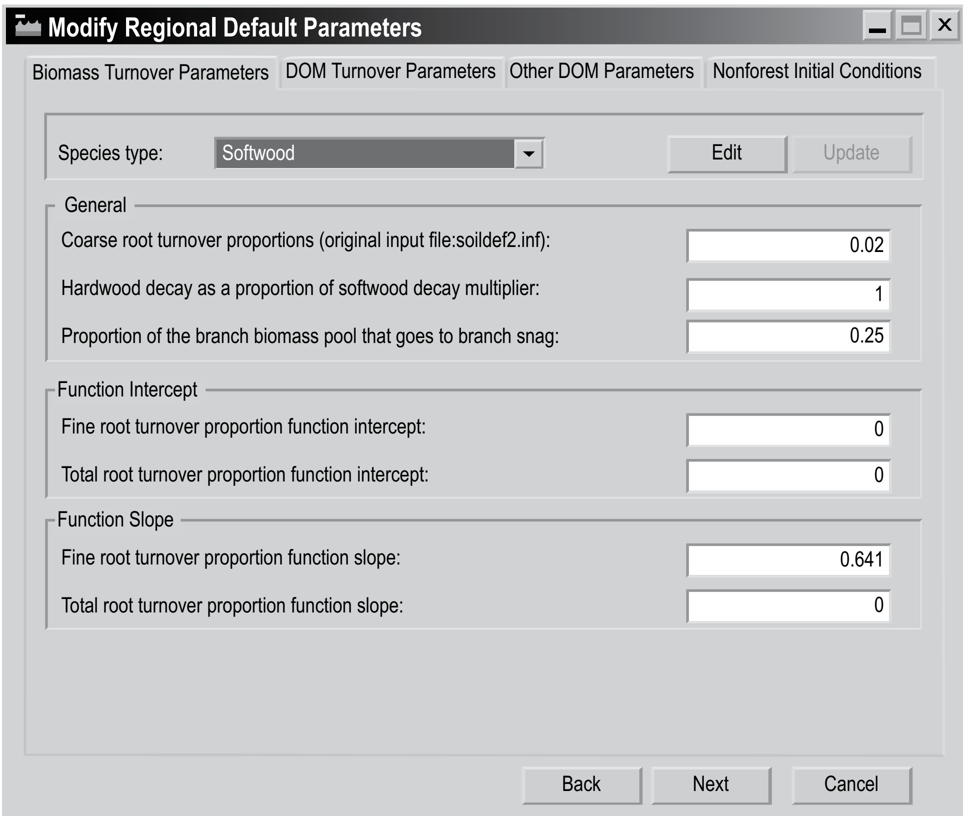


Figure 3-53. The "Modify Regional Default Parameters" window with the "Biomass Turnover Parameters" tab selected.

Note: Modifying default parameters

To modify default biomass turnover parameters

1. **Click on the "Biomass Turnover Parameters" tab (Figure 3-53)**
2. **Click on the "Edit" button**
3. **Click on the "Species Type" box and select "Softwood" or "Hardwood" from the drop list that appears**
4. **Edit the parameters**
5. **Click on the "Update" button once all edits are complete**
6. **Repeat steps 2 to 5 to edit parameters for any remaining species types for consistency**

To modify default DOM turnover parameters

Table 3-1. Definitions of parameters and pools in the "Modify Regional Default Parameters" window (Figures 3-53 to 3-56; units in parentheses)

Tab	Box name	Parameter or pool	Definition
Biomass Turnover Parameters	General	Coarse root turnover proportion (0 to 1)	Proportion of coarse root biomass carbon that transfers to the fast belowground DOM[a] pool annually
		Hardwood decay as a proportion of softwood decay multiplier (0 to maximum defined by user)	A number that can be used to increase or decrease decay rates of DOM pools for hardwood relative to softwood
		Proportion of branch biomass pool that goes to branch snag (0 to 1)	Proportion of branch turnover that transfers to the branch snag pool annually
	Function Intercept	Fine root turnover proportion function intercept	Currently disabled; in future versions in the model users will be able to change this parameter (see equations Li et al. 2003)
		Total root turnover proportion function intercept	Currently disabled; in future versions in the model users will be able to change this parameter (see equations Li et al. 2003)
	Function Slope	Fine root turnover proportion function slope	Currently disabled; in future versions in the model users will be able to change this parameter (see equations Li et al. 2003)
		Total root turnover proportion function slope	Currently disabled; in future versions in the model users will be able to change this parameter (see equations Li et al. 2003)
DOM Turnover Parameters	Average	Slow DOM Pool (t ha^{-1})	Initial slow DOM pool value for the forest stand used by the stand initialization program (MAKELIST) that is run at the start of a simulation
		Decay Multiplier (0 to maximum defined by user)	Sensitivity analysis multiplier that alters the decay rates of all pools
		Stand-Replacing Disturbance Interval (years)	Average number of years between stand-replacing disturbances, which is used in MAKELIST to grow the stand(s) in an iterative process until equilibrium is reached in the slow DOM pool
	Turnover Rate (0 to 1)	Softwood Branch	Proportion of softwood branches that die annually
		Stem Annual	Proportion of stems that die annually
		Hardwood Branch	Proportion of hardwood branches that die annually
	Snag Fall Rate (0 to 1)	Softwood Stem	Proportion of softwood stem snags that transfer to the medium soil pool annually
		Softwood Branch	Proportion of softwood branch snags that transfer to the fast aboveground pool
		Hardwood Stem	Proportion of hardwood stem snags that transfer to the medium soil pool annually
		Hardwood Branch	Proportion of hardwood branch snags that transfer to the fast aboveground pool
	Foliage Fall Rate (0 to 1)	Softwood	Proportion of softwood foliage that transfers to the very fast aboveground pool

Table 3-1. Continued

Tab	Box name	Parameter or pool	Definition
DOM Turnover Parameters	Foliage Fall Rate (0 to 1)	Hardwood	Proportion of hardwood foliage that transfers to the very fast aboveground pool
Other DOM Parameters	Decay Rate	Decay rate of organic matter at the reference temperature (yr^{-1})	Annual base decay rate of organic matter at the specified reference temperature
		Maximum decay rate multiplier for the soil pool types (softwood) (≤1)	Maximum decay rate value that can be used for softwood DOM pools
		Maximum decay rate multiplier for the soil pool types (hardwood) (<1)	Maximum decay rate value that can be used for hardwood DOM pools
	General	Reference mean annual temperature for decay rate (°C)	Mean annual temperature for the base decay rate used as a reference point for application of q10
		q10 (°C) (>1)	A parameter used to modify organic matter decay rates in response to mean annual temperature (e.g., a q10 value of 2 results in a doubling of the decay rate for every 10°C increase in mean annual temperature relative to the reference temperature)
		Proportion of carbon transferred from soil pools to atmosphere (0 to 1)	Proportion of carbon in the selected soil pool that transfers to the atmosphere; default value is 0.83 for all DOM pools except the slow aboveground and belowground pools, for which the default is 1
	Carbon Flux Rate (peat only)	Rate at which carbon is added to the given soil pool	Rate at which carbon is added to the peat pool
		Rate at which carbon is lost from the given soil pool	The rate at which carbon is lost from the peat pool
Nonforest Initial Conditions	Biomass Carbon Pool Value (t ha^{-1})	Total	Total biomass carbon in the nonforested stand; typically zero
		Merchantable	Carbon in merchantable stemwood
		Submerchantable	Carbon in submerchantable stemwood
		Coarse Root	Carbon in coarse roots
		Fine Root	Carbon in fine roots
		Foliage	Carbon in foliage
		Other	Carbon in sapling stemwood, merchantable stem bark, branches, tops, and stumps
	Dead Organic Matter (DOM) Carbon Pool Value (t ha^{-1})	Total	Total DOM carbon in the nonforested stand
		Aboveground Very Fast DOM	Carbon in DOM with input from foliage biomass and fine roots in the forest floor; very fast turnover rate
		Belowground Very Fast DOM	Carbon in DOM with input from fine root biomass in the mineral soil; very fast turnover rate

Table 3-1. Concluded

Tab	Box name	Parameter or pool	Definition
Nonforest Initial Conditions	Dead Organic Matter (DOM) Carbon Pool Value (t ha^{-1})	Aboveground Fast DOM	Carbon in DOM with input from branches, tops, stumps, and submerchantable trees; fast turnover rate
		Belowground Fast DOM	Carbon in DOM with input from coarse roots; fast turnover rate
		Aboveground Slow DOM	Carbon in DOM with input from very fast, fast and medium aboveground DOM pools; slow turnover rate
		Belowground Slow DOM	Carbon in DOM with input from very fast, fast and medium belowground DOM pools; slow turnover rate
		Softwood Stem Snag	Carbon in merchantable stemwood proportion of softwood snags
		Softwood Branch Snag	Carbon in all softwood snags excluding merchantable stemwood proportion
		Hardwood Stem Snag	Carbon in the merchantable stemwood proportion of hardwood snags
		Hardwood Branch Snag	Carbon in all hardwood snags excluding merchantable stemwood proportion
		Black Carbon	Stable carbon from incomplete combustion after fire; currently not included in calculations
		Medium DOM	Carbon in DOM with input from merchantable stemwood and/or stem snags; medium turnover rate
		Peat	Carbon in peat; currently not included in calculations

[a]DOM = dead organic matter.

Note (continued): Modifying default parameters

1. **Click on the "DOM Turnover Parameters" tab (Figure 3-54)**
2. **Edit the parameters**
3. **Click on the "Update" button**

To modify other default DOM parameters

1. **Click on the "Other DOM Parameters" tab (Figure 3-55)**
2. **Click on the "Edit" button**
3. **Click on the "Soil Pool" box and click on a soil pool name on the drop list that appears**

In determining the decay rate for a given DOM pool, CBM-CFS3 uses an initial decay rate for each pool referenced to 10°C. The decay rate is then recalculated for each time step to correspond to the mean annual temperature values provided by the user. The parameters on this tab are used by the CBM-CFS3 to determine the temperature-adjusted decay rates.

4. **Edit the parameters**
5. **Click on the "Update" button**
6. **Repeat steps 2 to 5 for any remaining soil types**

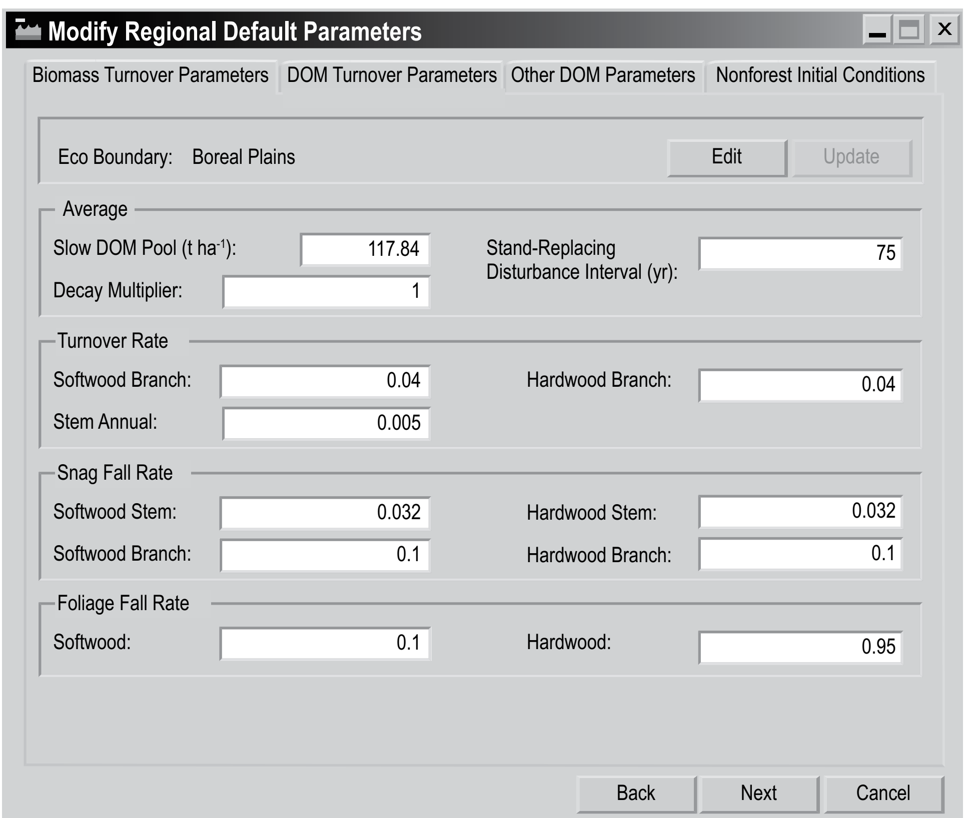


Figure 3-54. The "Modify Regional Default Parameters" window with the "DOM Turnover Parameters" tab selected.

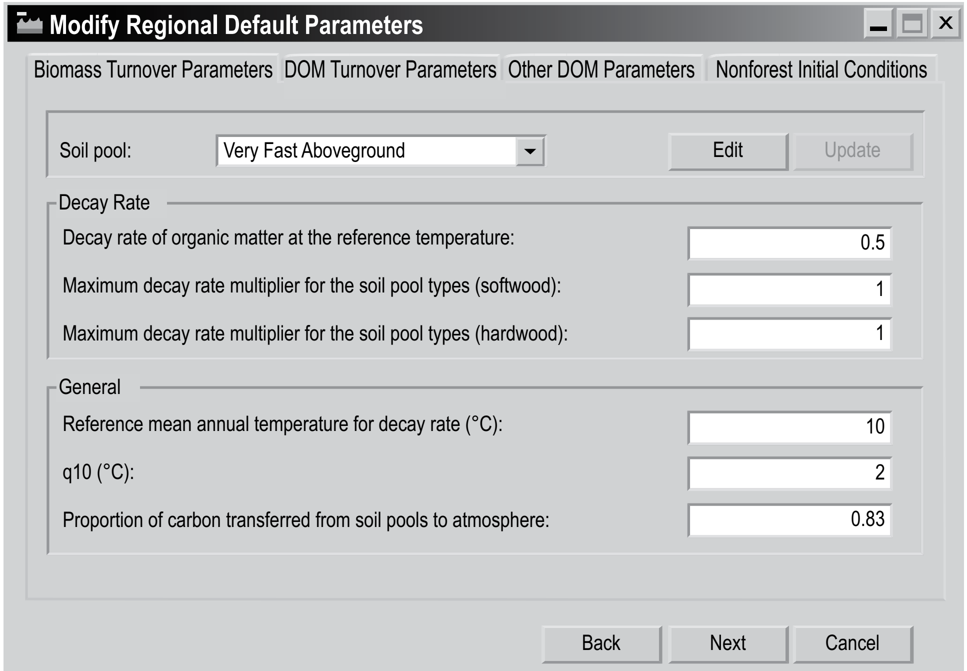


Figure 3-55. The "Modify Regional Default Parameters" window with the "Other DOM Parameters" tab selected. DOM = dead organic matter.

Note (continued): Modifying default parameters

If the user selects one or more nonforest land cover types in the "Project Basic Specifications" window (Figure 3-42) and is creating forest from nonforest land, parameters must be set for each nonforest stand. To do this

7. **Click on the "Nonforest Initial Conditions" tab (Figure 3-56)**
8. **Click on the "Edit" button**
9. **Click on the "Stand" box and click on a stand name on the drop list that appears**

Definitions of the carbon parameters can be found in Table 3-1.

10. **Type in numbers representing carbon (as tonnes per hectare) for each of the parameter boxes listed in the "Biomass Carbon Pool Value" box (Merchantable, Submerchantable, Coarse Root, Fine Root, Foliage, and Other)**
11. **Type in numbers representing carbon (as tonnes per hectare) for each of the parameter boxes listed in the "Dead Organic Matter (DOM) Carbon Pool Value" box (Aboveground Very Fast DOM, Belowground Very Fast DOM, Aboveground Fast DOM, Belowground Fast DOM, Aboveground Slow DOM, Belowground Slow DOM, Softwood Stem Snag, Softwood Branch Snag, Hardwood Stem Snag, Hardwood Branch Snag, Black Carbon, Medium DOM, and Peat)**
12. **Click on the "Update" button**
13. **Repeat steps 8 to 12 for any remaining stands generated from nonforest conditions**

54. Click on the "Next" button to proceed

or

Click on the "Back" button to return to the previous window

or

Click on the "Cancel" button to terminate the project-creation process

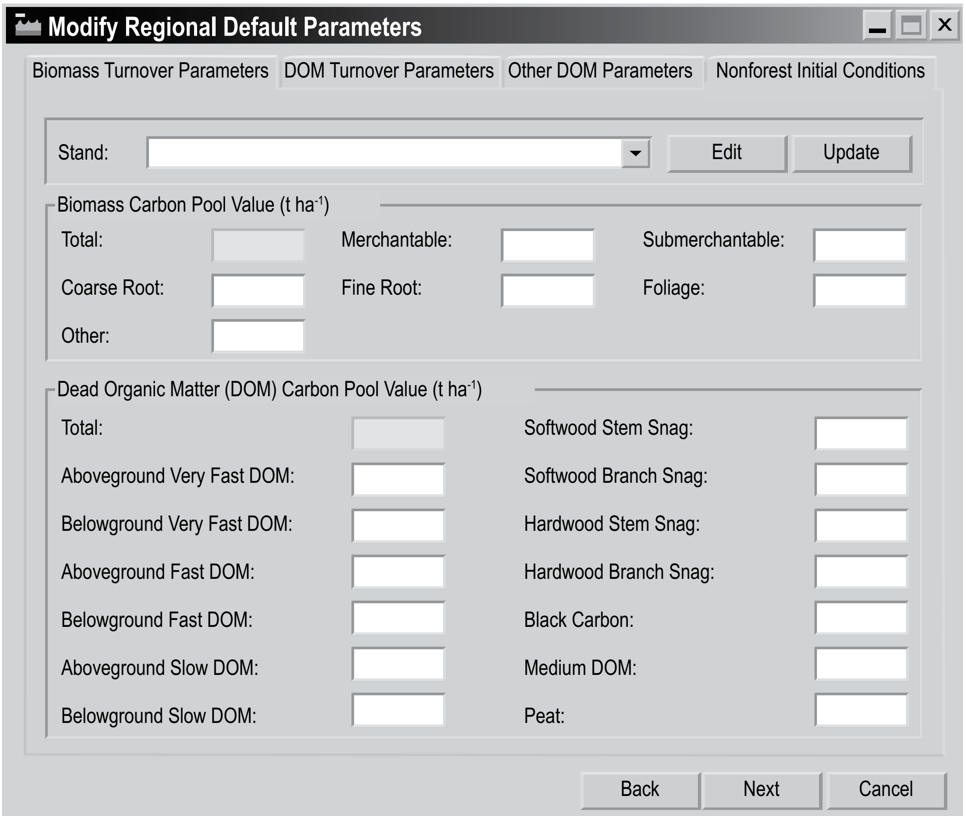


Figure 3-56. The "Modify Regional Default Parameters" window with the "Nonforest Initial Conditions" tab selected.

If the user clicks the "Next" button, the "Project Summary" window (Figure 3-57) will pop up, displaying a summary of details for the project that the user has created. To proceed

55. Click on the "Done" button

The "Project Explorer," "Simulation Explorer," "Results Explorer," "Message," and "Task List" windows will pop up. The user can choose to work in these windows or close them and work through the menu bar of the main CBM-CFS3 window. Details about the "Project Explorer," "Simulation Explorer," "Message," and "Task List" windows and their functions are provided in Chapter 5, Exploring and Managing a Project. Details about the "Results Explorer" window are provided in Chapter 8. Users can learn how to run the imported data through the model as a simulation in section 3.5.

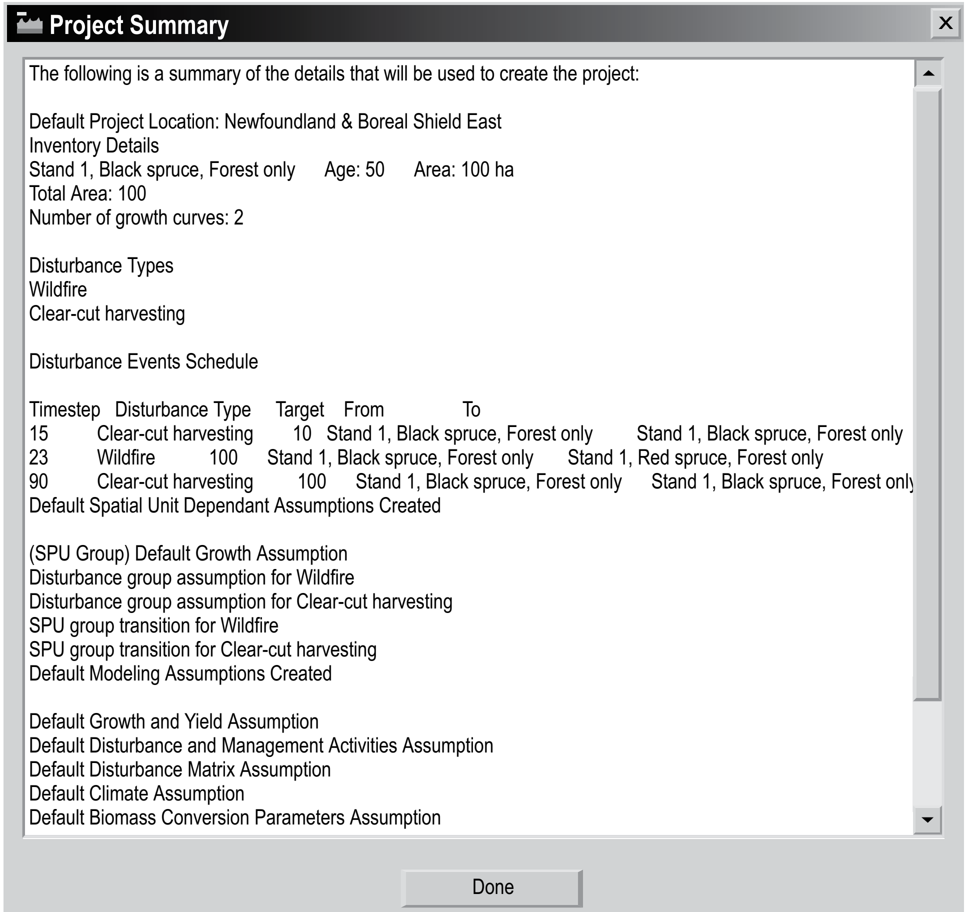


Figure 3-57. The "Project Summary" window.

3.4 Importing Additional Project Data

Users of the CBM Standard Import Tool and the Woodstock Import Tool may need to import missing data into an existing project if they did not import all the required data types for a project during the primary import process. To do this

1. **Open a project in the CBM-CFS3**
2. **Click on "Project" on the menu bar of the main CBM-CFS3 window**
3. **Select "Add to Current Project" from the drop list that appears**

The "Add New Data to Current Project" window (Figure 3-58) will pop up. To import additional data

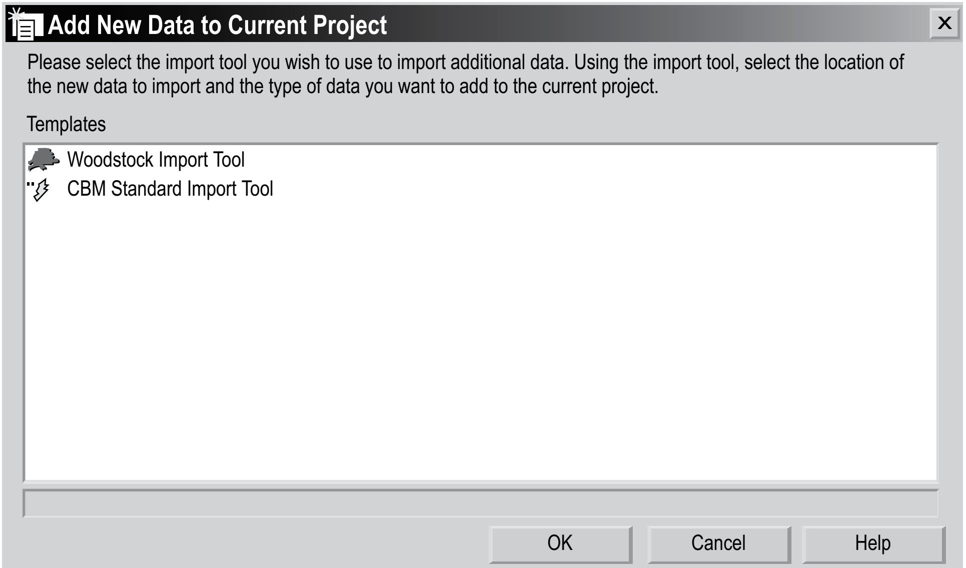


Figure 3-58. The "Add New Data to Current Project" window.

4. **Click on the name of the appropriate import tool in the "Templates" box**
5. **Click on the "OK" button to proceed**
   or
   Click on the "Cancel" button to terminate the process
   or
   Click on the "Help" button (currently disabled) for information on how to use features in this window

The user continues by following the steps outlined in section 3.2 for the selected import tool, importing only those data types that were not previously imported into the model for the project. Data types are selected in each import tool using the "Import" tab (Figure 3-17 or 3-29). To do this

6. **Click on the "Complete Import" check box to remove the check mark**
7. **Click on the check boxes for the data types to be imported**
8. **Click on the "Begin Import" button**
9. **Follow the import procedures as outlined in section 3.2 for the selected import tool**

Note: The "TR Scenario Selection" window

Users of the Standard Import Tool will encounter an additional window during the import of additional data, the "TR Scenario Selection" window (Figure 3-59). The "TR Scenario Selection" window will pop up during the import of disturbance events for each Disturbance Group Scenario that is being imported. These Disturbance Group Scenarios must be linked to SPU Group Transition Rule Scenarios. To perform this link for each Disturbance Group Scenario

1. **Click on the name of an SPU Group Transition Rule Scenario in the "Available TR Scenarios" box to be linked to the disturbance type group scenario displayed in the "Disturbance Group Scenario to be created" box**
2. **Click on the "Done" button**

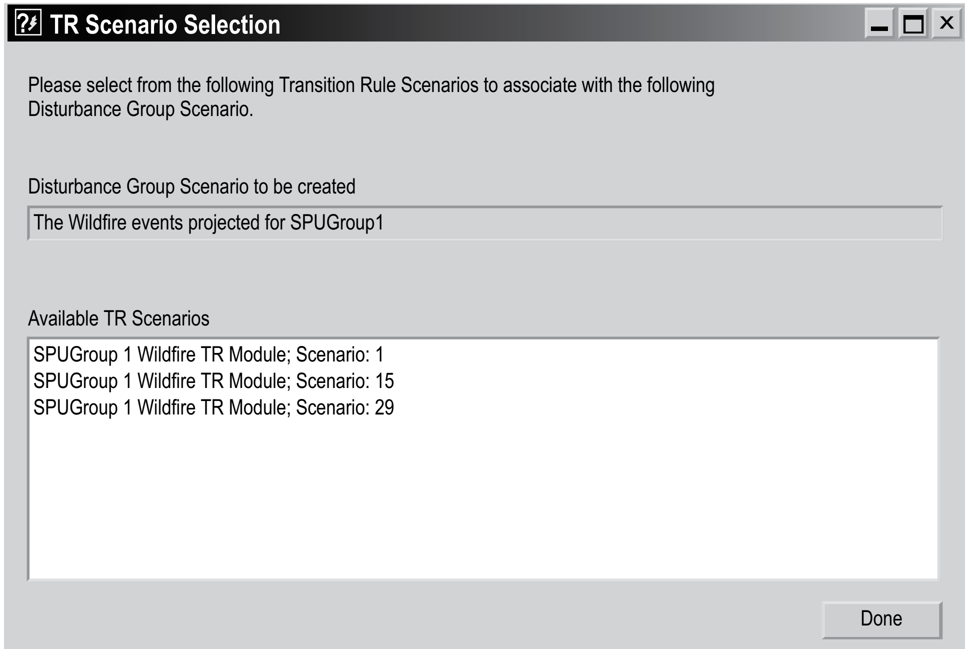


Figure 3-59. The "TR Scenario Selection" window. TR = transition rules.

3.5 Scheduling a Simulation

Once the data have been successfully imported (and if there are no new assumptions to be created with the Assumption Composer Tools (see Chapter 7), the user can proceed to the "Simulation Scheduler" window (Figure 3-60) and execute a CBM-CFS3 simulation. To proceed

1. **Click on "Tools" on the main CBM-CFS3 window menu bar**
2. **Select "Simulation Scheduler" from the drop list that appears**

When the "Simulation Scheduler" window pops up, the user should see the default name for the project simulation assumption, called "'project name' Default Simulation (#)", in the "Available Simulations" box. The number appearing at the end of the name is assigned according to how many other simulations have previously been created by the user. By clicking on a simulation name, the details about the simulation will appear on the "Simulations Details," "Stand Initialization Details," and "CBM Run Details" tabs (discussed in detail in Chapter 7, section 7.1). To select the simulation and run it through the model

3. **Click on the simulation name in the "Available Simulations" box**
4. **Click on the "Add" button to add it to the "Simulations to Process" box**
5. **Click on the "Run" button**

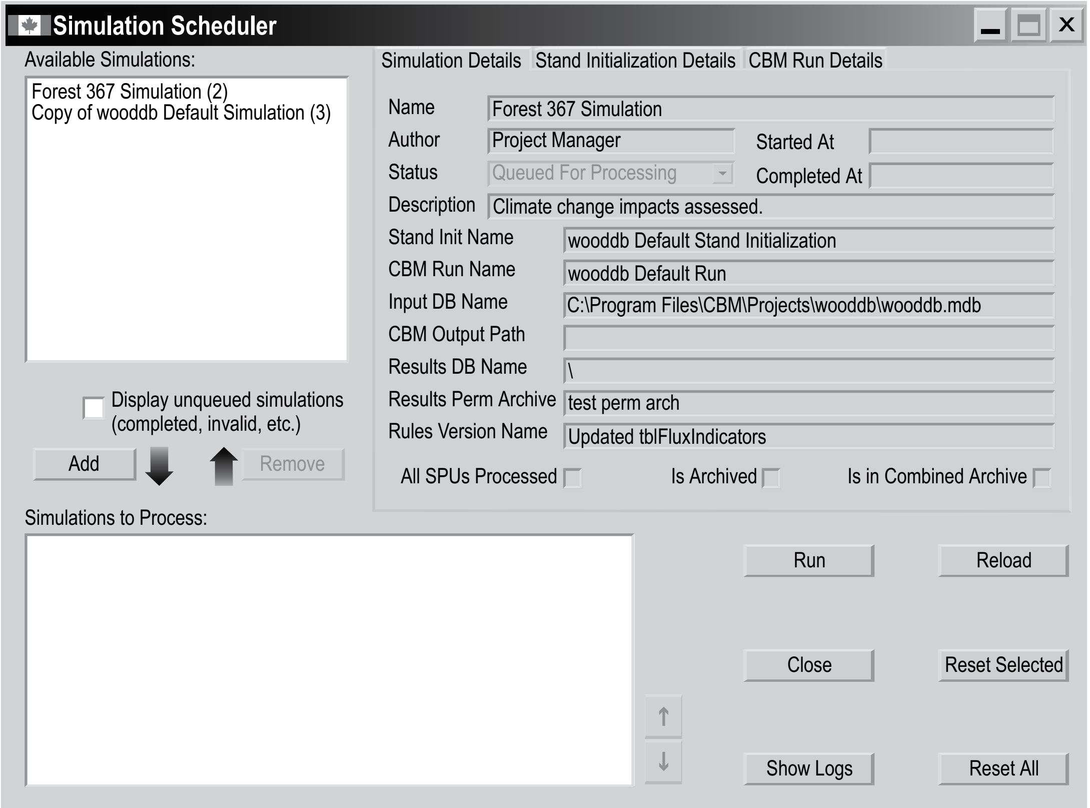


Figure 3-60. The "Simulation Scheduler" window with the "Simulation Details" tab selected.

The "Message" window (see Chapter 5, section 5.4), if open, will display the simulation progress and any errors that the model encounters while processing the user's data.

Whether or not the run is successful, a window will pop up stating "Successfully completed '#' of '#' selected simulations." The actual numbers displayed will depend on how many simulations were successfully processed through the model and how many simulations the user chose to run at once. If the simulation was successful

6. **Click on the "OK" button**
7. **Close the "Simulation Scheduler" window by clicking the "Close" button or the "X" button**

The user can then proceed to Chapter 8 to learn how to create and examine views for the results from the simulation run.

If the simulation run is unsuccessful, the user should consult the "Message" window to identify the problem, close the "Simulation Scheduler" window, and then correct the problem if possible. The user should contact the CFS-CAT for assistance if the problem persists (see Chapter 2, section 2.7).

CHAPTER 4

FOREST INVENTORY DEFINITIONS

This chapter describes the use of the Forest Inventory Definitions tool for viewing and modifying project data and information that has been opened, imported, and mapped into the CBM-CFS3 through the import process or entered using the Stand-Level Project Creator. To access the Forest Inventory Definitions tool

1. **Click on "Tools" on the menu bar in the main CBM-CFS3 window**
2. **Select "Data Editors" from the drop list that appears**
3. **Select "Forest Inventory Definitions" from the side drop list that appears**
4. **Select "Show All" or a specific inventory type from the second side drop list that appears**

The "Inventory Definition Editor" window will pop up, displaying all of the inventory tabs if "Show All" is selected (Figure 4-1) or an inventory-specific tab if one inventory type is selected. If the user makes changes to any of the definitions displayed, the project forest inventory must be edited in the Inventory Editor (see Chapter 6, section 6.5) to accommodate the changes.

4.1 Species Types

If the user clicks on the "Species Type" tab (Figure 4-1) in the "Inventory Definition Editor" window (or selects "Species Type" from the side drop list, above in step 4), the species (e.g., white pine) or species types (e.g., other softwoods) in the project inventory will be listed in the "Species Type Name" column in the table that appears. The user can add, edit, or delete species types in this table.

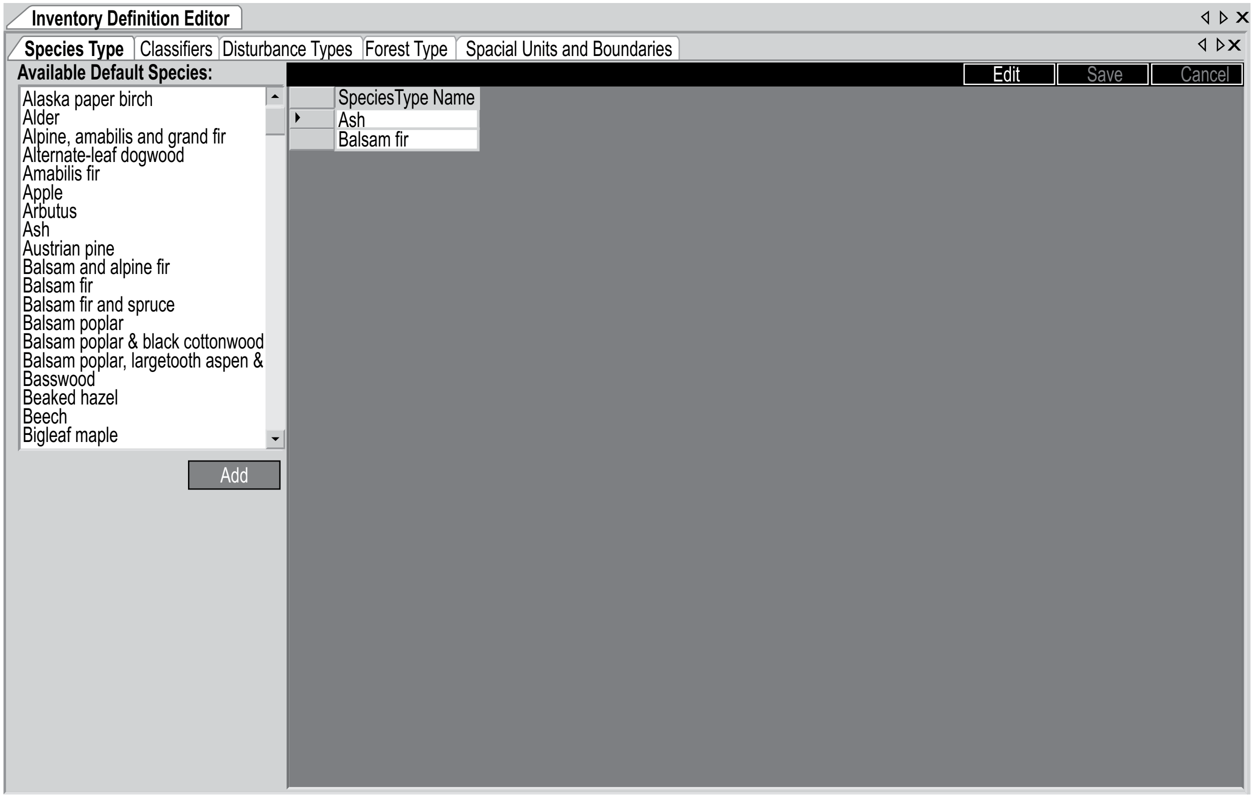


Figure 4-1. The "Inventory Definition Editor" window with the "Species Type" tab selected.

4.1.1 Adding a Species Type

To add a species type to the project data

1. **In the "Available Default Species" box, click on the name of a tree species that does not already appear in the "SpeciesTypeName" column in the table (Figure 4-1)**
2. **Click on the "Add" button**

An "Adding New Species" window (Figure 4-2) will pop up. In this window the user must link the new species to a spatial unit (SPU) and either an existing user-defined Volume-to-Biomass Assumption and Biomass-Turnover Assumption or a default Volume-to-Biomass Assumption and Biomass-Turnover Assumption. Biomass-Turnover Assumptions are described in Chapter 7, section 7.5 and Volume-to-Biomass Assumptions, in Chapter 7, section 7.11.

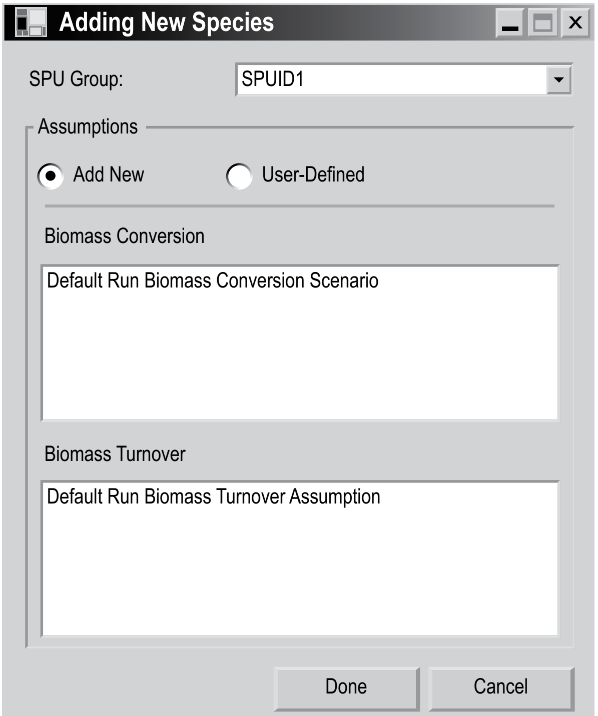


Figure 4-2. The "Adding New Species" window.

Linking a Species to User-Defined Biomass Assumptions

To link a new species to an existing user-defined Volume-to-Biomass Assumption and Biomass-Turnover Assumption in the "Adding New Species" window

1. **Click on the "SPU Group" box and select an option from the drop list that appears**
2. **Click on the "User-Defined" radio button**
3. **Select a user-defined Volume-to-Biomass Assumption in the "Biomass Conversion" box**
4. **Select a user-defined Biomass-Turnover Assumption in the "Biomass Turnover" box**
5. **Click on the "Done" button**

The new species will be added to the "SpeciesTypeName" column in the table on the "Species Type" tab (Figure 4-1).

6. **Click on the "Save" button to save the edits**

   or

   Click on the "Cancel" button to cancel the addition

Linking a Species to Default Biomass Assumptions

To link a new species to a default Volume-to-Biomass Assumption and Biomass-Turnover Assumption in the "Adding New Species" window

1. **Click on the "SPU Group" box and select an option from the drop list that appears**
2. **Click on the "Add New" radio button**
3. **Click on the "Done" button**

The new species will be added to the "SpeciesTypeName" column in the table on the "Species Type" tab (Figure 4-1).

4. **Click on the "Save" button to save the edits**

   or

   Click on the "Cancel" button to cancel the addition

4.1.2 Deleting a Species Type

To delete a species type from the "SpeciesTypeName" column in the table on the "Species Type" tab

1. **Click on the "Edit" button on the "Species Type" tab (Figure 4-1)**
2. **Click on the gray cell next to the row containing the species type to be deleted from the table**

☞ ***Tip: Selecting multiple species***

To select multiple species, left-click on one name and drag up or down to select the other species (if in succession in the table), or hold down the "Ctrl" (Control) key on the keyboard and click on each species in turn.

3. **Press the "Delete" key on the keyboard**
4. **Click on the "Save" button to save the edits**

   or

   Click on the "Cancel" button to cancel the deletion

4.1.3 Editing the Table on the "Species Type" Tab

To edit an entry in the table on the "Species Type" tab

1. **Click on the "Edit" button on the "Species Type" tab (Figure 4-1)**
2. **Make the necessary edits to the table entries**
3. **Click on the "Save" button to save the edits**

   or

   Click on the "Cancel" button to cancel the edits

4.2 Classifiers

If the user clicks on the "Classifiers" tab (Figure 4-3) in the "Inventory Definition Editor" window (or selects "Classifiers" from the side drop list in step 4 of the opening section of this chapter) the inventory classifiers that were imported for the project will be listed in the window that appears. In this window, new classifiers may be created and saved, or existing ones deleted. To observe the classifier value names and their descriptions for a particular classifier, click on the classifier in the "Defined Classifiers" box, and its values and descriptions will appear in a table under the "Name" and "Description" columns, respectively.

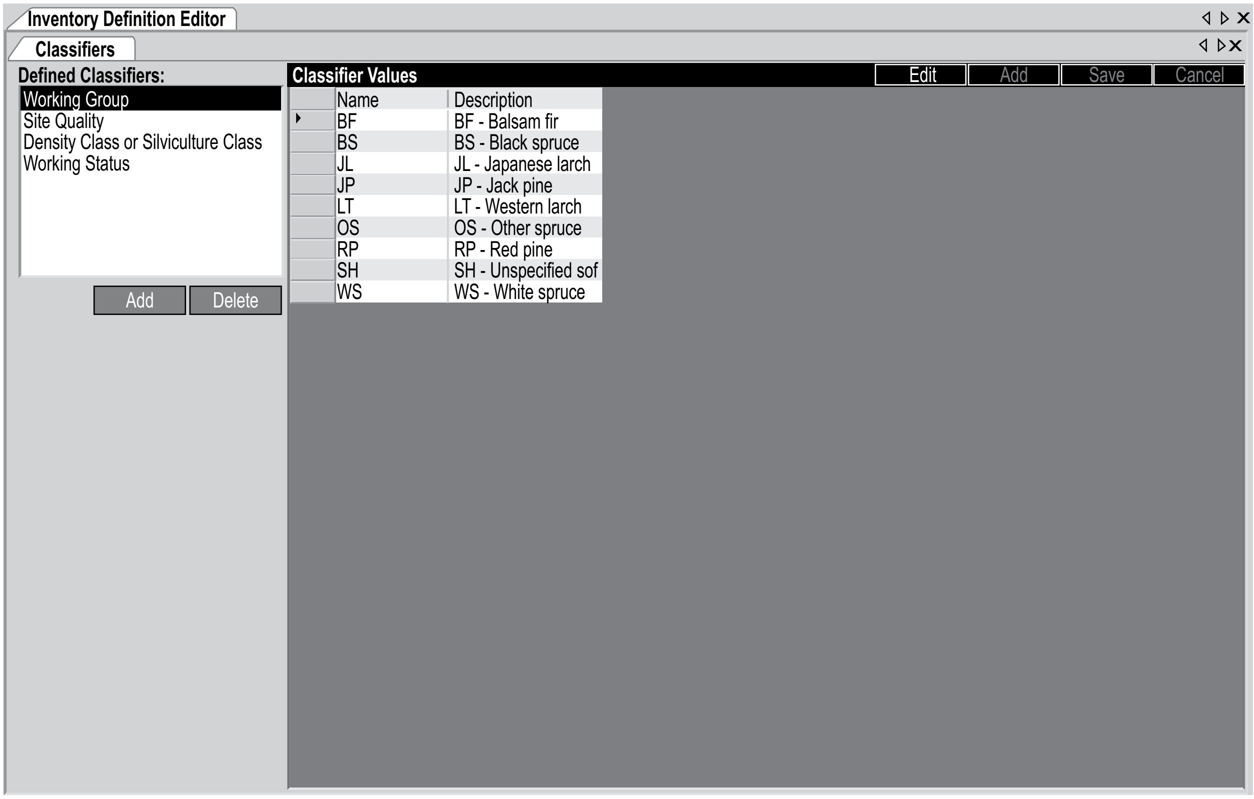


Figure 4-3. The "Inventory Definition Editor" window with the "Classifiers" tab selected.

4.2.1 Adding a Classifier

The CBM-CFS3 allows the user to stratify forest inventory data with up to 10 user-defined classifiers. To create a new classifier and its values and descriptions

1. **Click on the "Add" button on the "Classifiers" tab (Figure 4-3)**

The "Add Classifier and Values" window (Figure 4-4) will pop up. To proceed

2. **Type a name in the "Classifier Name" box**

In the "Classifier Value Name and Description" table

3. **Type classifier value names in the "Name" column and type their corresponding descriptions in the "Description" column**
4. **Click on the "Save" button to proceed**

   or

   Click on the "Close" button to cancel the process

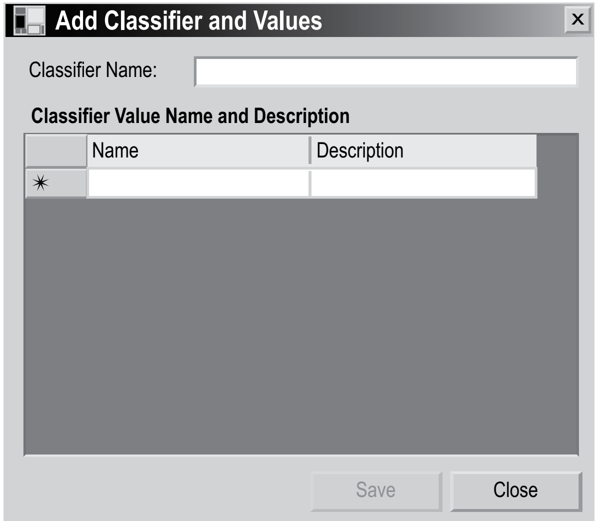


Figure 4-4. The "Add Classifier and Values" window.

If the user clicks on the "Save" button, an "Add Optional Classifiers" window will pop up, stating, "Optional classifier and values have been added". To proceed

5. **Click on the "OK" button**
6. **Click on the "Close" button**

4.2.2 Deleting a Classifier

To delete a classifier from the "Defined Classifiers" box of the "Classifiers" tab (Figure 4-3)

1. **Click on the name of the classifier in the "Defined Classifiers" box**
2. **Click on the "Delete" button**

A "Delete Classifiers" window will pop up, asking the user to confirm deletion of the selected classifier.

3. **Click on the "Yes" button to proceed**
   or
   Click on the "No" button to cancel the deletion

4.2.3 Adding Classifier Value Names and Descriptions

To add classifier value names and descriptions to an existing classifier

1. **Click on the name of a classifier in the "Defined Classifiers" box (Figure 4-3)**

In the "Classifier Values" table

2. **Click on the "Edit" button**
3. **Click on the "Add" button**

4. **Type in the new classifier value name(s) and description(s) in the "Name" and "Description" columns**
5. **Click on the "Save" button to proceed**

   or

   Click on the "Cancel" button to cancel the additions

4.2.4 Editing Classifier Value Names and Descriptions

To edit a classifier value name or description

1. **Click on the name of a classifier in the "Defined Classifiers" box (Figure 4-3)**

In the "Classifier Values" table

2. **Click on the "Edit" button**
3. **Edit the values in the "Name" and "Description" columns of the table as required**
4. **Click on the "Save" button to proceed**

   or

   Click on the "Cancel" button to cancel the edits

4.2.5 Deleting Classifier Value Names and Descriptions

To delete a classifier value and its description

1. **Click on a classifier in the "Defined Classifiers" box (Figure 4-3)**

In the "Classifier Values" table

2. **Click on the "Edit" button**
3. **Click on the gray cell beside the classifier name and description**
4. **Press the "Delete" key on your keyboard**
5. **Click on the "Save" button to proceed**

   or

   Click on the "Cancel" button to cancel the deletion

4.3 Disturbance Types

If the user clicks on the "Disturbance Types" tab (Figure 4-5) in the "Inventory Definition Editor" window (or selects "Disturbance Types" from the side drop list in step 4 of the opening section of this chapter), the CBM-CFS3 default disturbance types appear and those selected during the import process for the project appear in a table. In the table (Figure 4-5), the "DistTypeName" represents the name of an imported or created disturbance type, and the "Description" represents the description of the disturbance type.

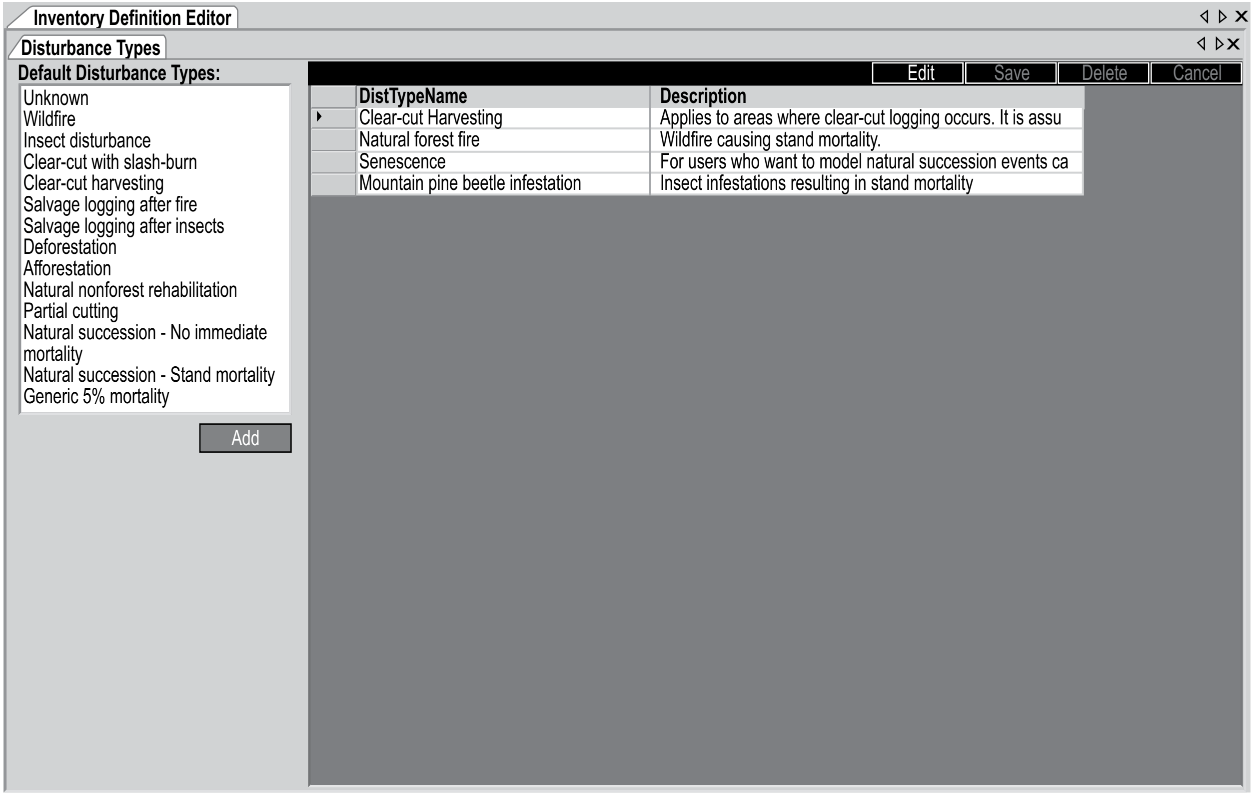


Figure 4-5. The "Inventory Definition Editor" window with the "Disturbance Types" tab selected.

The user can add, edit, or delete disturbance types associated with the project on this tab.

4.3.1 Adding a Disturbance Type

To add a disturbance type

1. **Click on a disturbance type in the "Default Disturbance Types" box (Figure 4-5)**
2. **Click on the "Add" button**

The "Add New Disturbance Type" window (Figure 4-6) will pop up.

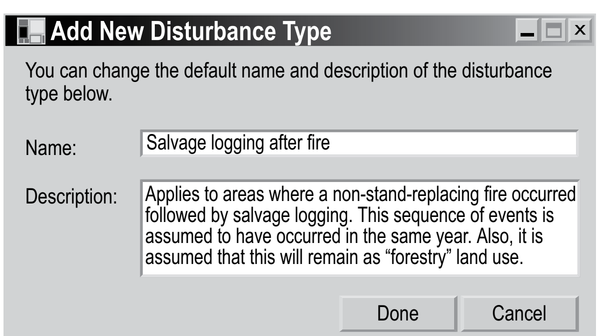


Figure 4-6. The "Add New Disturbance Type" window.

3. **Type a name for the disturbance in the "Name" box**
4. **Type a description of the disturbance in the "Description" box**
5. **Click on the "Done" button to proceed**

   or

   Click on the "Cancel" button to cancel the process

4.3.2 Editing a Disturbance Type

To edit a disturbance type in the table

1. **Click on the "Edit" button (Figure 4-5)**
2. **Make the necessary edits in the table**
3. **Click on the "Save" button when the edits are complete**

   or

   Click on the "Cancel" button to exit the editing process

4.3.3 Deleting a Disturbance Type

Deleting a disturbance type will also remove any associated disturbance matrix, disturbance events, and transition rules that the user has created for the disturbance type. To delete disturbance types

1. **Click on the "Edit" button (Figure 4-5)**
2. **Click on the gray cell next to the row containing the disturbance to be deleted**
3. **Press the "Delete" key on your keyboard**
4. **Click on the "Save" button**

4.4 Spatial Units and Boundaries

The user can click on the "Spatial Units and Boundaries" tab (Figure 4-7) in the "Inventory Definition Editor" window (or select "Spatial Units and Boundaries" from the side drop list in step 4 of the opening section of this chapter) to assign administrative and ecological boundaries to the inventory by spatial unit(s) (SPUs) and SPU group(s).

Administrative boundaries refer to Canadian provinces and territories, with the exception of Newfoundland and Labrador, which has been split for programming reasons related to fire disturbance matrices, and ecological boundaries refer to the Terrestrial Ecozones of Canada as defined at http://www.ec.gc.ca/soer-ree/English/vignettes/Terrestrial/terr.cfm or in Environment Canada (1996). A map of the terrestrial ecozones of Canada used in the CBM-CFS3 appears as Figure 3-22 in Chapter 3.

Note: Division of Boreal Shield and Taiga Shield ecozones

In the CBM-CFS3, the Boreal Shield and Taiga Shield ecozones have been divided into eastern and western parts because the west is typically colder and drier than the east. Hence, these subzones are modeled separately (Kurz et al. 1992).

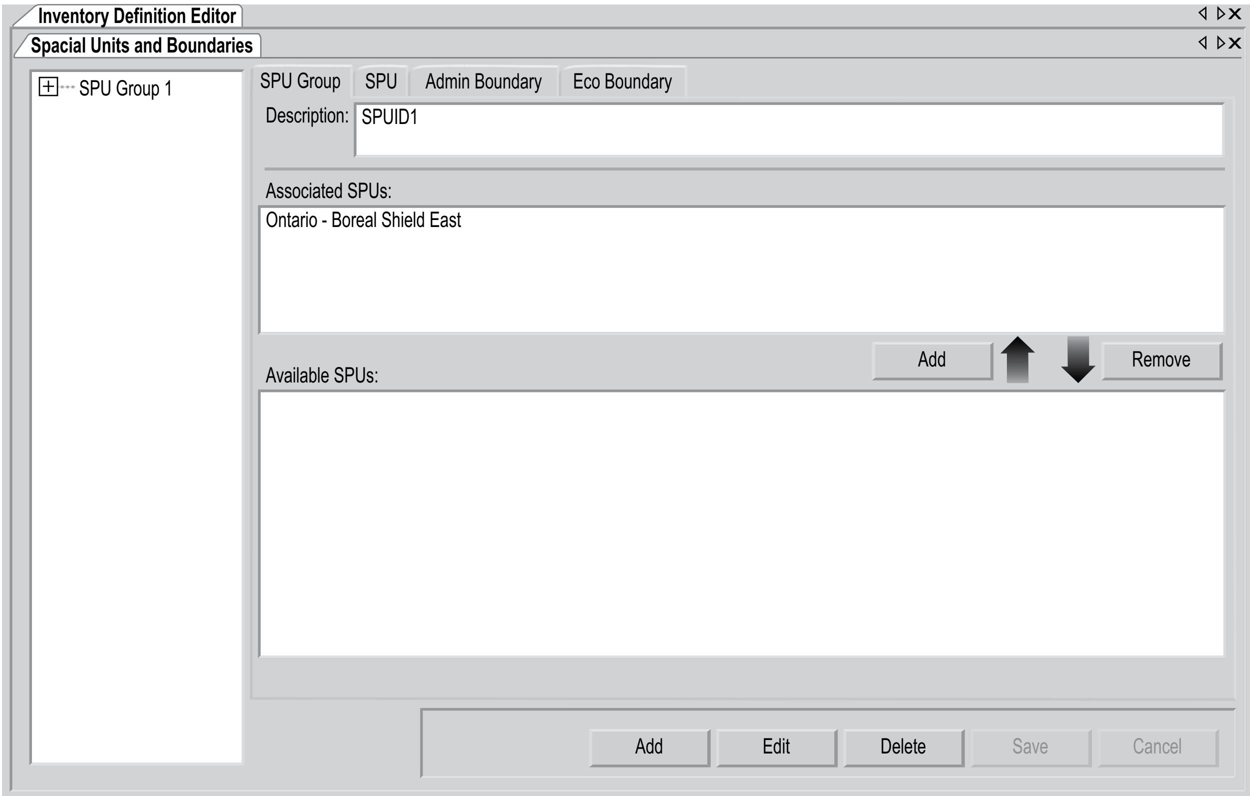


Figure 4-7. The "Inventory Definition Editor" window with the "Spatial Units and Boundaries" and "SPU Group" tabs selected.

Different parameters are applied to project data depending on the boundary types that the user applies during the import process.

SPUs are user-defined combinations of administrative and ecological boundaries that can be made applicable to all, or portions, of a user's project data. An SPU group is made up of one or more SPUs.

On the "Spatial Units and Boundaries" tab (Figure 4-7), the box on the far left displays a hierarchical directory tree of existing SPU Groups. In the directory tree, the user can double-click on a specific SPU Group name or click on the "+" next to the SPU Group to expand the tree and see the SPU(s) associated with it. Double-clicking an SPU name in the directory tree or clicking on the "+" next to it will expand the tree to display the administrative and ecological boundaries of the SPU. Clicking on a "–" in the directory tree will collapse that section of the directory tree. The user can also right-click in the directory tree box and select "Expand" or "Collapse" to expand or collapse the directory tree.

4.4.1 Spatial Unit Groups

On the "SPU Group" tab (Figure 4-7), the user can add, edit, or delete SPU groups or add or delete SPUs associated with an SPU group.

Adding or Removing an SPU Group

Any SPU group added by the user must be linked to one or more SPUs before it can be used by the CBM-CFS3. To add an SPU group

1. **Click on the "SPU Group" tab (Figure 4-7)**
2. **Click on the "Add" button**
3. **Type a description for the SPU group in the "Description" box**
4. **Click on the "Save" button to proceed**

   or

   Click on the "Cancel" button to terminate the process

If the user clicks on the "Save" button, the SPU group will be added to the directory tree box with the name "SPU Group '#'," where the number (#) will be assigned sequentially according to the number of pre-existing SPU groups in the directory tree box.

Next, the user must associate one or more SPUs with the SPU group. To do this

5. **Click on the name of the SPU group in the directory tree box**
6. **Click on one or more (by holding the Ctrl key while selecting) SPUs in the "Available SPUs" box**
7. **Click on the "Add" button above the "Available SPUs" box**

The SPU(s) will then appear in the "Associated SPUs" box and in the directory tree box linked to the selected SPU group. Before a new SPU group can be used by the CBM-CFS3, administrative and ecological boundaries must be associated with it and new inventory data must be entered with the Inventory Editor (see Chapter 6, section 6.5).

To remove an SPU from an SPU Group

1. **Click on the name of the SPU Group in the directory tree box**
2. **Click on the name of the SPU to be removed in the "Associated SPUs" box**
3. **Click on the "Remove" button**

Editing an SPU Group

To edit the description of an existing SPU group

1. **Click on the name of the SPU group in the directory tree box (Figure 4-7)**
2. **Click on the "Edit" button**
3. **Type a new description in the "Description" box**
4. **Click on the "Save" button to save the edits**

   or

   Click on the "Cancel" button to terminate the edits

Deleting an SPU Group

To delete an SPU group

1. **Click on the name of the SPU group in the directory tree box (Figure 4-7)**

Note: Warning about deleting an SPU group

Before deleting an SPU group, the user should consider the impact of this action on any inventory data to which the SPU group has been linked. Data not linked to an SPU group will be ignored during simulation and will be excluded from results.

2. **Click on the "Delete" button**

4.4.2 Spatial Units

Spatial units are user-defined combinations of administrative and ecological boundaries that can be applied to all or portions of the data for a project. Once created, an SPU must be added to an SPU group if it is to be used during a simulation run. The user can add, edit, or delete SPUs.

Adding SPUs

To add a new SPU

1. **Click on the "SPU" tab (Figure 4-8) of the "Spatial Units and Boundaries" tab of the "Inventory Definition Editor" window**

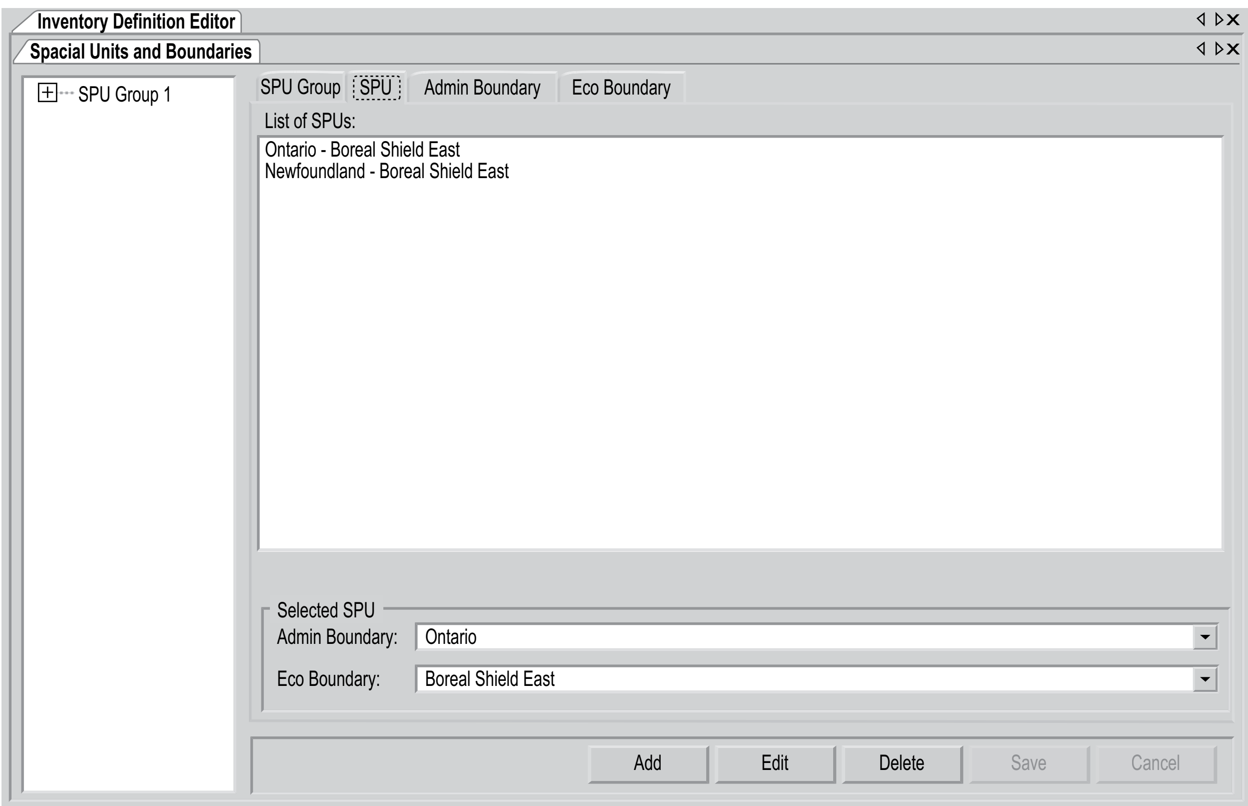


Figure 4-8. The "Inventory Definition Editor" window with the "Spacial Units and Boundaries" and "SPU" tabs selected.

2. **Click on the "Admin Boundary" box and make a selection from the drop list that appears**
3. **Click on the "Eco Boundary" box and make a selection from the drop list that appears**
4. **Click on the "Add" button**

The new SPU will appear in the "List of SPUs" box and will be named according to the administrative and ecological boundaries selected. Its name will also appear in the "Available SPUs" box on the "SPU Group" tab (Figure 4-7).

Editing SPUs

Existing SPUs displayed in the "List of SPUs" box on the "SPU" tab (Figure 4-8) can be edited. Before editing an SPU, the user should consider the impact of this action on any inventory data to which the SPU has been linked. By editing administrative or ecological boundaries assigned to an SPU, the user will change the ecological parameters that the CBM-CFS3 will apply to the data linked to that SPU during simulation.

To edit an SPU

1. **Click on the "SPU" tab (Figure 4-8)**
2. **Select an SPU name from the "List of SPUs" box**
3. **Click on the "Edit" button**
4. **Click on the "Admin Boundary" box and make a selection from the drop list that appears**
5. **Click on the "Eco Boundary" box and make a selection from the drop list that appears**
6. **Click on the "Save" button to proceed**

   or

   Click on the "Cancel" button to terminate the edit

Deleting SPUs

Before deleting an SPU, the user should consider the impact of this action on any SPU group(s) and inventory data to which the SPU has been linked. Data not linked to an SPU will be ignored during simulation and will be excluded from results. To delete an SPU

1. **Click on the "SPU" tab (Figure 4-8)**
2. **Select an SPU name from the "List of SPUs" box**
3. **Click on the "Delete" button**

A "Delete Spatial Units" window will pop up asking the user to confirm deletion of the selected SPU.

4. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the deletion

If the user clicks on the "Yes" button, the SPU will be deleted from the "List of SPUs" box.

4.4.3 Administrative Boundaries

As discussed in the opening paragraph of Section 4.4, an administrative boundary defines the geographic location of the land base. To be used in a project simulation run, an administrative boundary must be linked to an SPU (and that SPU must be linked to an SPU group). The user may add, edit, or delete administrative boundaries.

Adding an Administrative Boundary

An administrative boundary is always associated with an ecological boundary (section 4.4.4); hence, the two types of boundaries should be added at the same time. To add an administrative boundary

1. **Click on the "Admin Boundary" tab (Figure 4-9)**

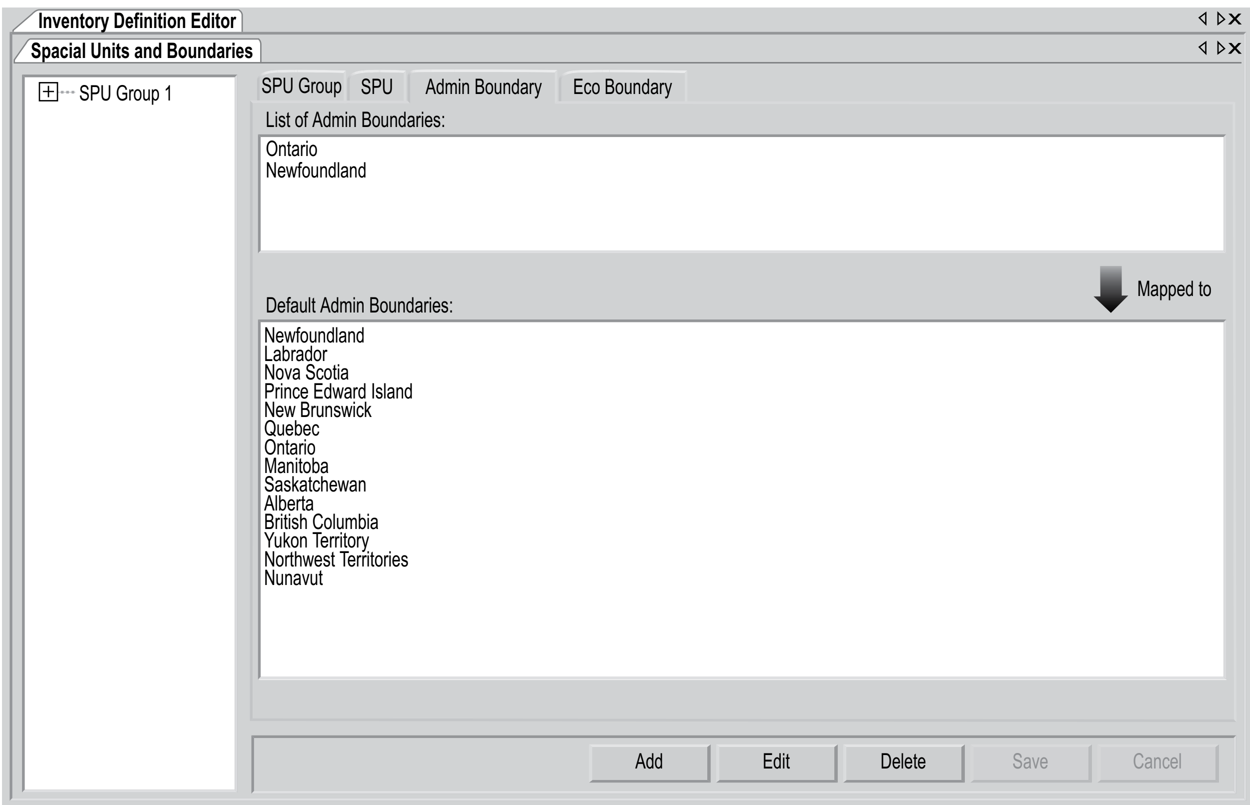


Figure 4-9. The "Inventory Definition Editor" window with the "Spacial Units and Boundaries" and "Admin Boundary" tabs selected.

2. **Click on the "Add" button**

The "Add or Update Boundary" window (Figure 4-10) will pop up. On the "Administrative Boundary" tab

3. **Click on the "Default Admin Boundary" box and select an administrative boundary from the drop list that appears**
4. **Type a new name for the administrative boundary in the "Name" box (optional)**

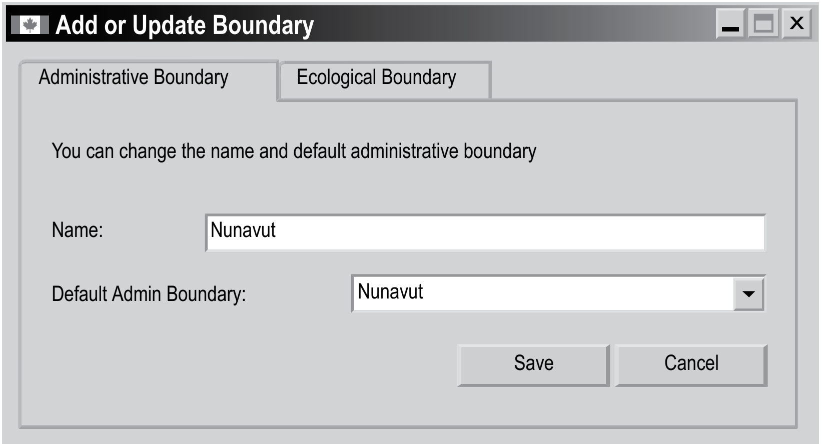


Figure 4-10. The "Add or Update Boundary" window with the "Administrative Boundary" tab selected.

5. **Click on the "Ecological Boundary" tab (Figure 4-11)**
6. **Click on the "Default Eco Boundary" box and select an ecological boundary from the drop list that appears**
7. **Type a new name for the ecological boundary in the "Name" box (optional)**
8. **Click on the "Save" button to proceed**

   or

   Click on the "Close" button to cancel the addition and close the window

If the user clicks on the "Save" button, the new administrative boundary will be added to the "List of Admin Boundaries" box on the "Admin Boundary" tab, and the ecological boundary will be added to the "List of Eco Boundaries" box on the "Eco Boundary" tab (see section 4.4.4). The new administrative boundary and ecological boundary will also become available for selection in the "Admin Boundary" and "Eco Boundary" boxes on the "SPU" tab (see Figure 4-8) so that the user can create a new SPU using these boundaries.

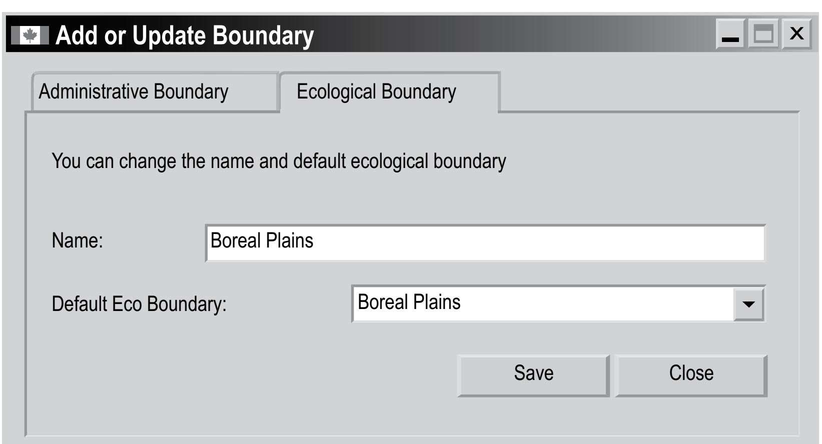


Figure 4-11. The "Add or Update Boundary" window with the "Ecological Boundary" tab selected.

Editing an Administrative Boundary

To edit an administrative boundary

1. **Click on the "Admin Boundary" tab (Figure 4-9)**
2. **In the "List of Admin Boundaries" box, click on the name of the administrative boundary to be edited**
3. **Click on the "Edit" button**

The "Add or Update Boundary" window (Figure 4-10) will pop up. On the "Administrative Boundary" tab

4. **Click on the "Default Admin Boundary" box and select an administrative boundary from the drop list that appears**
5. **Type a new name in the "Name" box**

If a new administrative boundary was not selected in step 4, skip to step 9; if a new administrative boundary was selected in step 4, proceed as follows

6. **Click on the "Ecological Boundary" tab (Figure 4-11)**
7. **Click on the "Default Eco Boundary" box and select an ecological boundary from the drop list that appears**
8. **Type a new name for the ecological boundary in the "Name" box**
9. **Click on the "Save" button to proceed**

   or

   Click on the "Close" button to cancel the edits and close the window

Deleting an Administrative Boundary

Before deleting an administrative boundary, the user should consider the impact of this action on any SPU(s) and inventory data to which the administrative boundary has been linked. Data that are not linked to an administrative boundary will be ignored during any simulations and will be excluded from results. To delete an administrative boundary

1. **Click on the "Admin Boundary" tab (Figure 4-9)**
2. **Click on the name of an administrative boundary in the "List of Admin Boundaries" box**
3. **Click on the "Delete" button**

A "Delete Administrative Boundaries" box will pop up asking the user to confirm deletion of the selected administrative boundary.

4. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the deletion

If the user clicks on the "Yes" button, the administrative boundary will be deleted from the "List of Admin Boundaries" box.

4.4.4 Ecological Boundaries

As discussed in the opening paragraph of Section 4.4, an ecological boundary defines the ecological location of a land base within an administrative boundary. To be used in a project simulation run, an ecological boundary must be linked to an SPU (and that SPU must be linked to an SPU group). The user may add, edit, or delete ecological boundaries.

Adding an Ecological Boundary

An ecological boundary is always associated with an administrative boundary (section 4.4.3); hence, the two types of boundaries should be added at the same time. To add an ecological boundary

1. **Click on the "Eco Boundary" tab (Figure 4-12)**
2. **Click on the "Add" button**

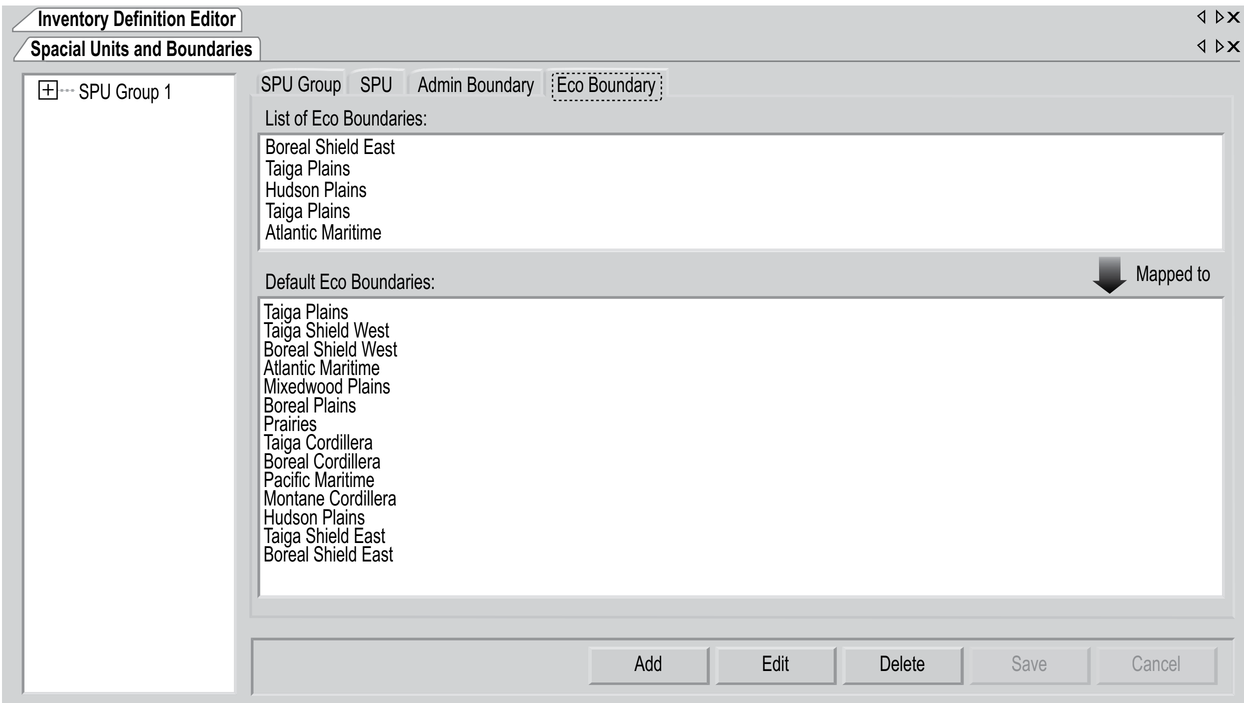


Figure 4-12. The "Inventory Definition Editor" window with the "Spacial Units and Boundaries" and "Eco Boundary" tabs selected.

The "Add or Update Boundary" window (Figure 4-11) will pop up. Because the administrative boundary selected affects the ecological boundary options, the appropriate administrative boundary should be selected first.

3. **Click on the "Administrative Boundary" tab (Figure 4-10).**
4. **Click on the "Default Admin Boundary" box and select an administrative boundary from the drop list that appears**
5. **Type a new name for the administrative boundary in the "Name" box (optional)**
6. **Click back on the "Ecological Boundary" tab (Figure 4-11)**
7. **Click on the name of an ecological boundary in the "Default Eco Boundary" box**

Note: Selecting an ecological boundary

In case of uncertainty about which ecological boundary to select, consult http://www.ec.gc.ca/soer-ree/English/vignettes/Terrestrial/terr.cfm or Environment Canada (1996) or the map of the terrestrial ecozones of Canada used in the CBM-CFS3 (Figure 3-22).

8. **Type a new name for the ecological boundary in the "Name" box (optional)**
9. **Click on the "Save" button to proceed**

   or

   Click on the "Close" button to cancel the addition and close the window

If the user clicks on the "Save" button, the new ecological boundary will be added to the "List of Eco Boundaries" box on the "Eco Boundary" tab, and the administrative boundary will be added to the "List of Admin Boundaries" box on the "Admin Boundary" tab (see section 4.4.3). The new ecological boundary and administrative boundary will also become available for selection in the "Eco Boundary" and "Admin Boundary" boxes on the "SPU" tab (see Figure 4-8) so that the user can create a new SPU using these boundaries.

Editing an Ecological Boundary

To edit an ecological boundary

1. **Click on the "Eco Boundary" tab (Figure 4-12)**
2. **Click on the name of an ecological boundary in the "List of Eco Boundaries" box**
3. **Click on the "Edit" button**

The "Add or Update Boundary" window (Figure 4-11) will pop up. To change the user-defined name, skip to step 9. To change the ecological boundary

4. **Click on the "Administrative Boundary" tab (Figure 4-10)**
5. **Click on the "Default Admin Boundary" box and select an administrative boundary from the drop list that appears**
6. **Type a new name in the "Name" box**
7. **Click on the "Ecological Boundary" tab (Figure 4-11)**
8. **Click on the "Default Eco Boundary" box and select an ecological boundary from the drop list that appears**
9. **Type a new name in the "Name" box**
10. **Click on the "Save" button to proceed**

    or

    Click on the "Close" button to cancel the edit and close the window

Deleting an Ecological Boundary

To delete an ecological boundary

1. **Click on the "Eco Boundary" tab (Figure 4-12)**
2. **Click on the name of an ecological boundary in the "List of Eco Boundaries" box**

Note: Warning about deleting an ecological boundary

Before deleting an ecological boundary, the user should consider the impact of this action on any SPU(s) and inventory data to which the ecological boundary has been linked. Data not linked to an ecological boundary will be ignored during simulations and will be excluded from results.

3. **Click on the "Delete" button**

A "Delete Ecological Boundaries" box will pop up asking the user to confirm deletion of the selected ecological boundary.

4. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the process

If the user clicks on the "Yes" button, the ecological boundary will be deleted from the "List of Eco Boundaries."

4.5 Forest Types

If the user clicks on the "Forest Type" tab (Figure 4-13) in the "Inventory Definition Editor" window (or selects "Forest Type" from the side drop list in step 4 of the opening section of this chapter), the forest types (named according to the classifiers that identify them) assigned to the inventory appear in a table. On this tab, the user can add a new forest type or delete an existing one.

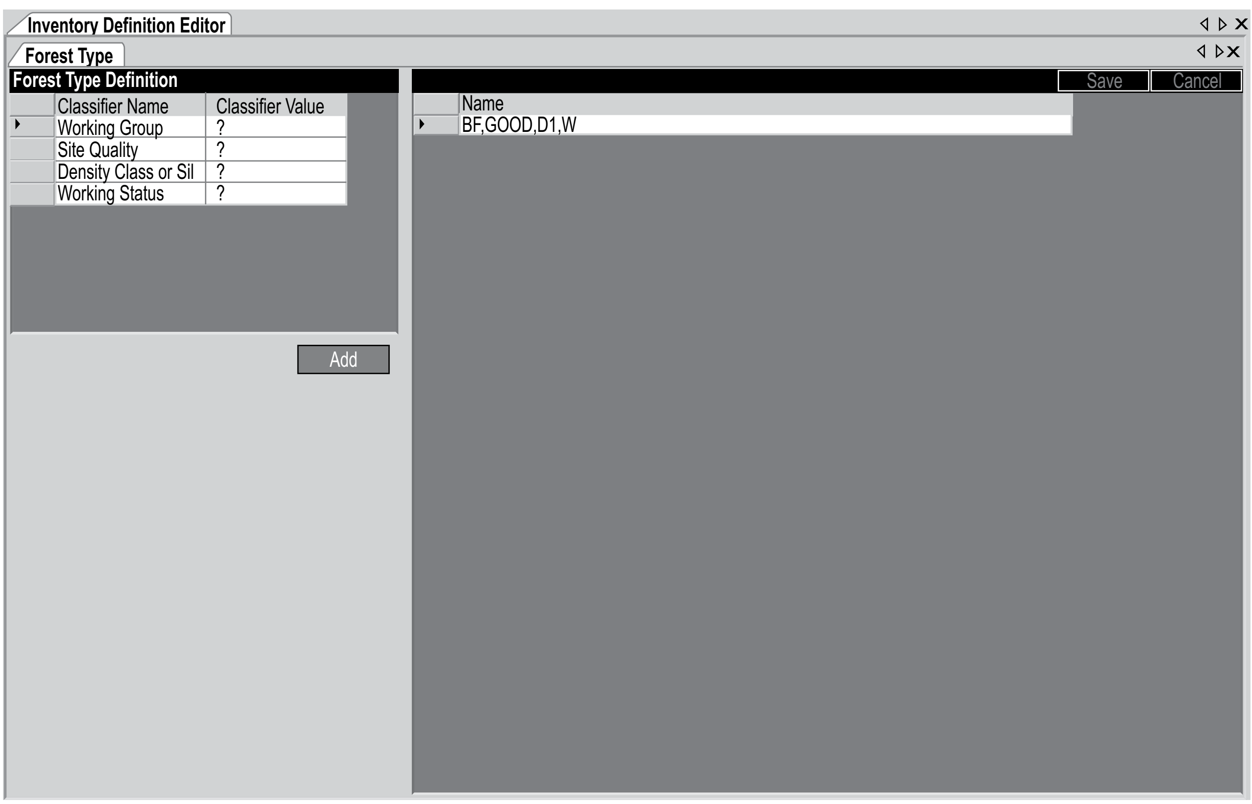


Figure 4-13. The "Inventory Definition Editor" window with the "Forest Type" tab selected.

4.5.1 Adding a Forest Type

To add a forest type, the user must select the appropriate classifier value for each classifier that will define the new forest type. To proceed

1. **Leave the value set to "?" to obtain all values for a classifier**

   or

   Click as required on each cell in the "Classifier Value" column beside a classifier name in the "Forest Type Definition" table, and click on a value on the drop list that appears
2. **Click on the "Add" button**

The new forest type will appear in the "Name" field of the window table at the bottom of the list of forest types.

3. **Click on the "Save" button to proceed**

   or

   Click on the "Cancel" button to terminate the process

4.5.2 Deleting a Forest Type

To delete a forest type

1. **In the table of added forest types (Figure 4-13), click on the gray cell beside the name of the forest type to be deleted**
2. **Press the "Delete" key on your keyboard**
3. **Click on the "Save" button to proceed**

   or

   Click on the "Cancel" button to terminate the process

CHAPTER 5

EXPLORING AND MANAGING A PROJECT

This chapter introduces and describes how to use the Project Explorer and Simulation Explorer, the Toolbox Properties tool, and the "Message," "Task List," and "Project Summary" windows. The Project Explorer allows the user to quickly view and access various assumption composing tools, as well as inventory definitions linked to an open project and its raw inventory in the CBM-CFS3. The Simulation Explorer allows the user to quickly view and access Simulation Assumptions, as well as lower-level assumptions contained within each Simulation Assumption. The Toolbox Properties allows the user to view and select databases, executable files, and templates that are opened in the CBM-CFS3 and to apply advanced features. The "Message" window displays output information resulting from simulation processing. The "Task List" window displays a table of project tasks that users must complete to prepare and run a project simulation. The "Project Summary" window contains a detailed summary of the contents of a project that is opened in the CBM-CFS3.

5.1 Using the Project Explorer

The "Project Explorer" window (Figure 5-1) will automatically pop up whenever the user successfully imports data and creates a new project or opens an existing project. Should the "Project Explorer" window be accidentally or intentionally closed, it can be reopened. To reopen the "Project Explorer" window

1. **Click on "View" on the main CBM-CFS3 window menu bar (Figure 2-9)**
2. **Select "Project Explorer" from the drop list that appears**

The "Project Explorer" window will pop up, displaying a directory tree of assumption composer tool names (under "Assumptions") and the names of existing default and/or user-defined assumptions within each, as well as the "Inventory Definitions" tool and its tab names and the "Raw Inventory" tool. The user can access any of the tools and/or assumptions on this screen simply by double-clicking on the appropriate name. By right-clicking over the window the user can expand or collapse all directories. Individual parts of the directory tree can be expanded or collapsed by clicking on the "+" or the "-" next to an item.

The user can access the Simulation Explorer and Results Explorer (if they are open at the time) by clicking the "Simulation Explorer" tab or the "Results Explorer" tab at the bottom of this window and can return to the "Project Explorer" window by clicking the "Project Explorer" tab.

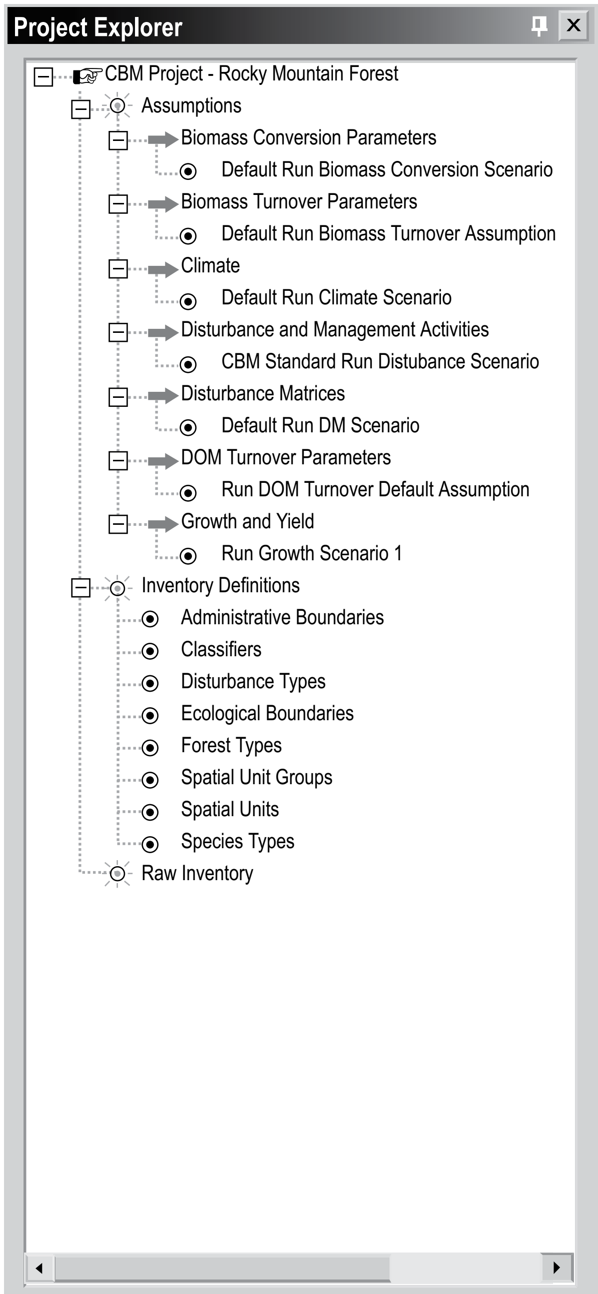


Figure 5-1. The "Project Explorer" window.
CBM = Carbon Budget Model,
DM = disturbance matrices,
DOM = dead organic matter.

5.2 Using the Simulation Explorer

The "Simulation Explorer" window (Figure 5-2) will automatically pop up whenever the user successfully imports data and creates a new project or opens an existing project. To open the "Simulation Explorer" window in other situations

1. **Click "View" on the main CBM-CFS3 window menu bar**
2. **Select "Simulation Explorer" from the drop list that appears**

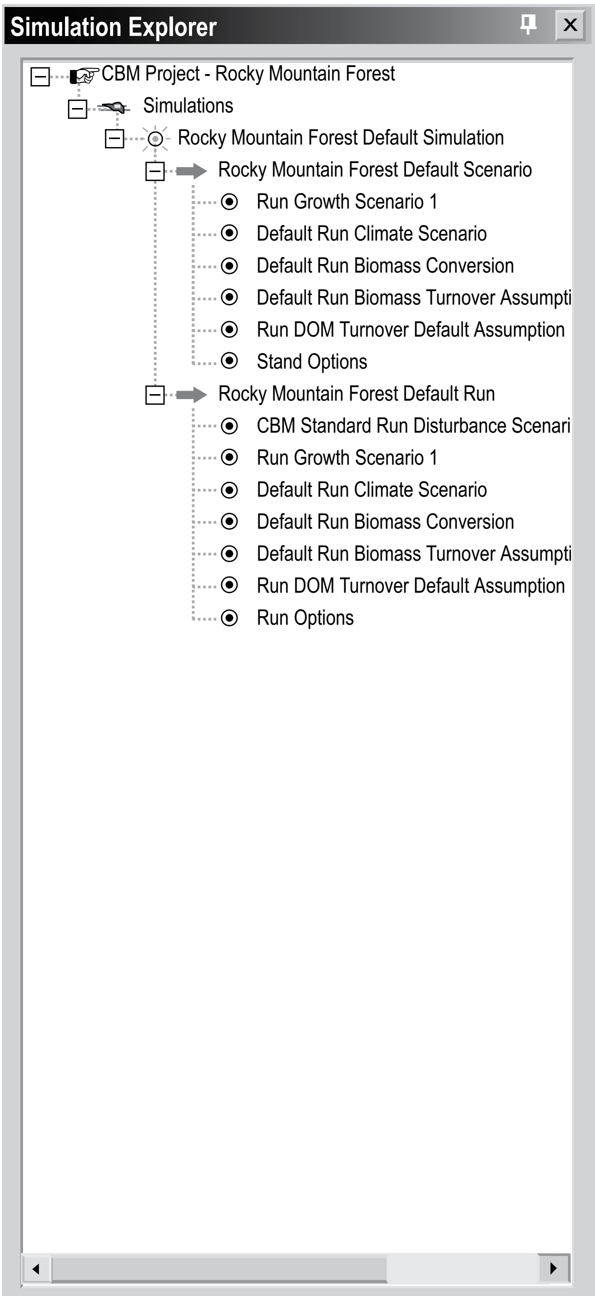


Figure 5-2. The "Simulation Explorer" window.

The "Simulation Explorer" window will pop up, displaying a directory tree of names of default and user-defined Simulation Assumptions, the existing stand initialization and run assumptions within each, and the other assumptions within each of these. The user can access any of the assumptions and their respective composer tools on this screen simply by double-clicking on an assumption name. By right-clicking over the window the user can expand or collapse all directories. Individual parts of the directory tree can be expanded or collapsed by clicking on the "+" or the "-" next to an item.

The user can access the Project Explorer or Results Explorer (if they are open at the time) by clicking the "Project Explorer" or "Results Explorer" tab at the bottom of this window and can return to the "Simulation Explorer" window by clicking the "Simulation Explorer" tab.

5.3 Using the Toolbox Properties Tool

The "Properties" window (Figure 5-3) can be used to quickly view and edit advanced properties, databases, executable files, or templates associated with an open project in the CBM-CFS3.

The user can display the "Properties" window by clicking the " " icon (for an alphabetical listing) or by clicking the " " icon (for a categorized list). If the user places the cursor over an icon, a box will pop up revealing the display type. To access the "Toolbox Properties" window

1. **Click "View" on the main CBM-CFS3 window menu bar**
2. **Select "Toolbox Properties" from the drop list that appears**

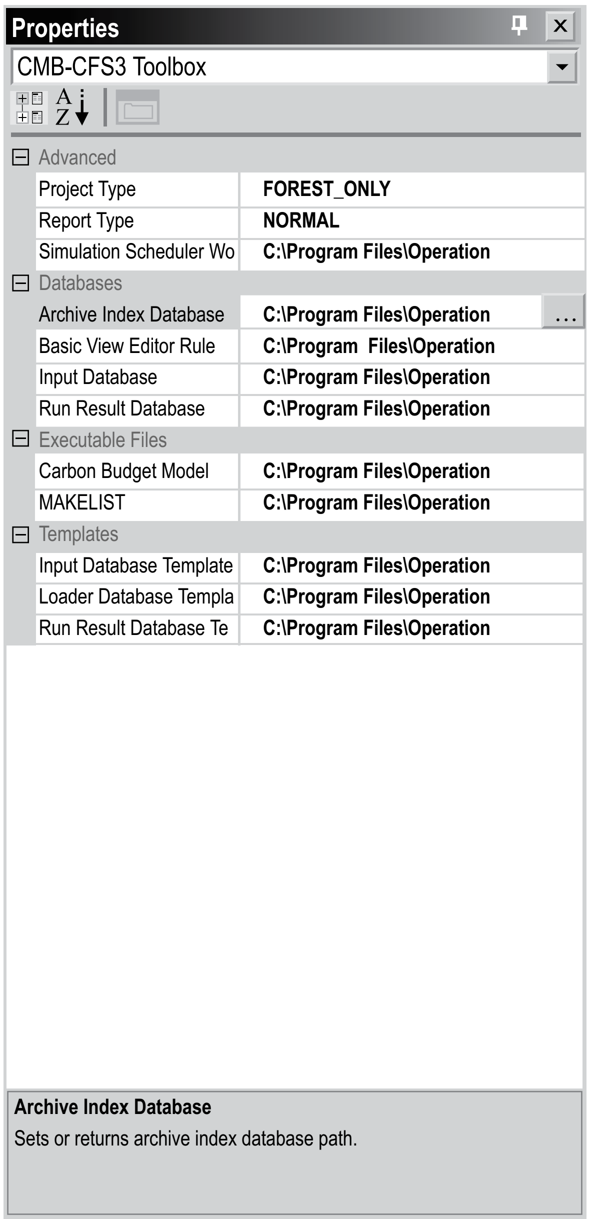


Figure 5-3. The "Properties" window.

The "Properties" window will pop up. Each of the directory sections displayed can be minimized or expanded by clicking on the "-" or "+" symbols in the directory beside the appropriate section. If the user clicks on any row in the window, a description of what that row contains will appear at the bottom of the window.

5.3.1 Advanced

The "Advanced" section of the "Properties" window allows users to view and/or choose a project type, a report type, and the location of the Simulation Scheduler Working Directory.

Project Type

Project type options for a new project are "Forest Only," (default) "Nonforest Only," and "Both Forest and Nonforest." Before running simulations, the CBM-CFS3 validates the project type according to the inventory records it encounters. It will reassign the project to an appropriate type if required. To manually change the project type

1. **Click on the "Project Type" drop list box (Figure 5-3)**
2. **Select an option from the drop list that appears**

Note: Selecting a Report Type

At this time, users can select only one report type, "Normal," to be generated during a simulation. To select a particular report option (when other options become available)

1. **Click on the "Report Type" drop list box**
2. **Select on an option from the drop list that appears**

Simulation Scheduler Working Directory

The CBM-CFS3 will automatically point to "C:\Program Files\Operational Scale CBM-CFS3\Temp" as the location for the Simulation Scheduler Working Directory. To change the location of this directory

1. **Click on the "Simulation Scheduler" cell**

The "…" button should appear.

2. **Click on the "…" button beside the cell indicating the location of the Simulation Scheduler Working Directory**

A "Browse for Folder" window (Figure 5-4) will pop up.

Figure 5-4. The "Browse for Folder" window permitting the user to select the location of the Simulation Scheduler Working Directory.

3. **Select the appropriate folder or click on the "New Folder" button to create a new folder**
4. **Click on the "OK" button to proceed**

   or

   Click on the "Cancel" button to terminate the process

5.3.2 Databases

The "Databases" section (Figure 5-3) displays a list of database file names linked to a project that is open in the CBM-CFS3: the "Archive Index Database," the "Basic View Editor Rule," the "Input Database," and the "Run Result Database." The path to each default database is shown in the cell next to the database name. The CBM-CFS3 will automatically point to the appropriate file names for all of these databases in the "C:\Program Files\Operational Scale CBM-CFS3\Admin\DBs\" folder as the user proceeds through the model from importing data or opening a project to simulation and/or viewing results.

To change or open any of these files

1. **Click on the row associated with the appropriate database or rule**
2. **Click on the "…" button**

An "Open File" window will pop up where the user can point to the appropriate directory, folder, and file. Once a file has been selected

3. **Click on the "Open" button**

The selected file path will be displayed in the chosen database or rule drop list box in the "Properties" window.

5.3.3 Executable Files

The "Executable Files" section (Figure 5-3) displays any executable files being used by the "Carbon Budget Model" or "MAKELIST". The CBM-CFS3 will automatically point to the appropriate file names for all of these executable files in the "C:\Program Files\Operational Scale CBM-CFS3\Admin\Executable Files\" folder as the user proceeds through the model from importing data or opening a project to simulation and/or viewing results.

To change either of these application paths

1. **Click on the row associated with the appropriate executable file**
2. **Click on the "…" button**

An "Open File" window will pop up where the user can point to the appropriate directory, folder, and file. Once a file is selected

3. **Click on the "Open" button**

The selected file path will then be displayed in the chosen drop list box in the "Properties" window.

5.3.4 Templates

The "Templates" section (Figure 5-3) displays any template files that are open in the CBM-CFS3 for the "Input Database Template," the "Loader Database Template," and the "Run Result Database Template." The CBM-CFS3 will automatically point to the appropriate template files in the "C:\Program Files\Operational Scale CBM-CFS3\Admin\DBs\" folder as the user proceeds through the model from importing data or opening a project to simulation and/or viewing results.

To change any of these template files

1. **Click on the row associated with the appropriate template**
2. **Click on the "…" button**

An "Open File" window will pop up where the user can point to the appropriate directory, folder, and template file. Once the file has been selected

3. **Click on the "Open" button**

The selected file path will then be displayed in the chosen template drop list box in the "Properties" window.

5.4 Message and Task List Windows

The "Message" window (Figure 5-5) and the "Task List" window (Figure 5-6) will automatically pop up whenever the user successfully imports, creates, or opens a project.

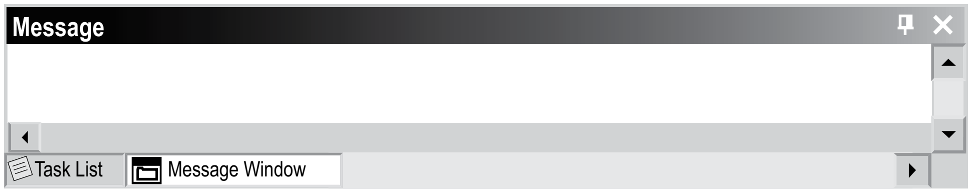


Figure 5-5. The "Message" window.

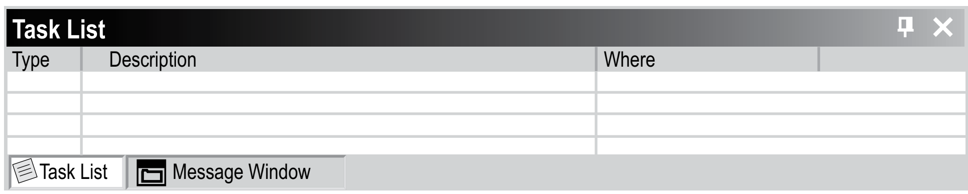


Figure 5-6. The "Task List" window.

To open the "Message" window in other situations

1. **Click "View" on the CBM-CFS3 main window menu bar**
2. **Select "Message Window" from the drop list that appears**

To open the "Task List" window in other situations

1. **Click "View" on the CBM-CFS3 main window menu bar**
2. **Select "Task List" from the drop list that appears**

The user can switch between the two windows when they are both open by clicking the appropriate tab located at the bottom of each window.

The "Message" window displays details on simulation processing by the CBM-CFS3 for a project (i.e., details about any errors encountered during processing). The "Task List" window displays a list of tasks required to complete a simulation for the project that is open. Tasks are described by type, description, and location in the model where users must go to complete the task. The "Message" and "Task List" windows can be closed by clicking the "X" in the top right-hand corner of each window.

5.5 CBM-CFS3 Project Summary

The "CBM-CFS3 Project Summary" window (Figure 5-7) contains a summary of the components for a project that is open in the CBM-CFS3, including age class definitions, inventory classifiers and classifier values, administrative and ecological boundaries, spatial units and spatial unit groups, inventory records, species types, yield curves, disturbance types, and disturbance matrices. To access the "CBM-CFS3 Project Summary" window

1. **Click "View" on the CBM-CFS3 main window menu bar**
2. **Select "Project Summary" from the drop list that appears**

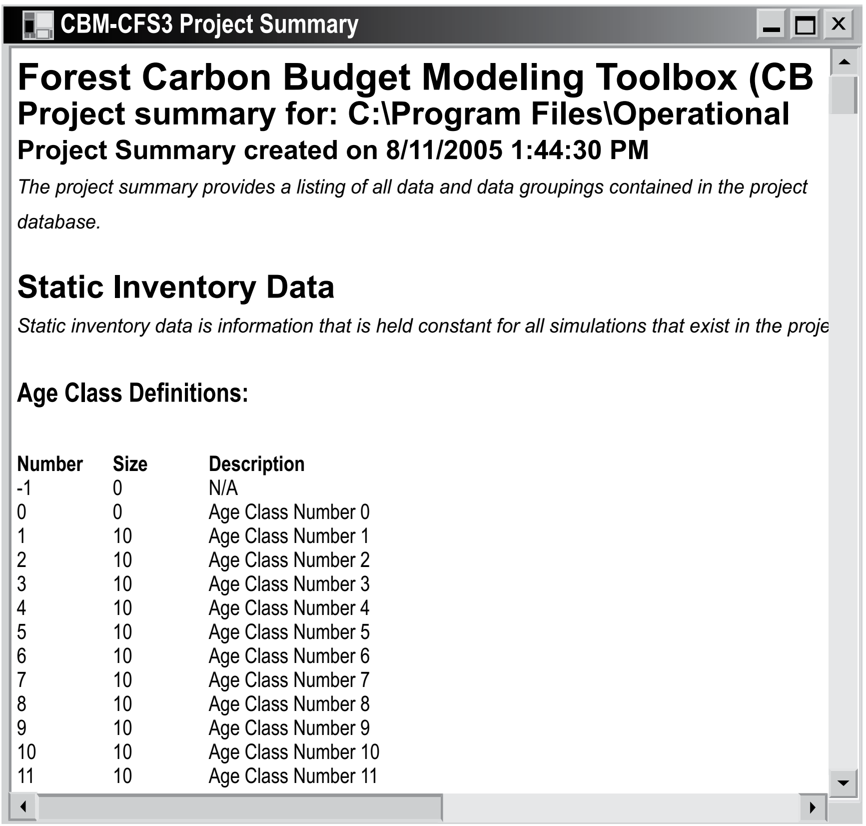


Figure 5-7. The "CBM-CFS3 Project Summary" window.

CHAPTER 6

DATA EDITING TOOLS

This chapter introduces the various data editing and modeling tools available in the CBM-CFS3, specifically the data editors for climate, disturbance events and management activities, disturbance matrices, growth and yield curves, inventory, transition rules, and default data. After the user has imported data for a project into the model, the data can be accessed and modified through these editors. Five of the editing tools — the Climate Data Editor, the Disturbance Events Editor, the Disturbance Matrix Editor, the Growth Curve Editor, and the Transition Rules Editor — are linked to specific assumption composer tools (Figure 6-1), so that specific assumptions can be created using the appropriate data.

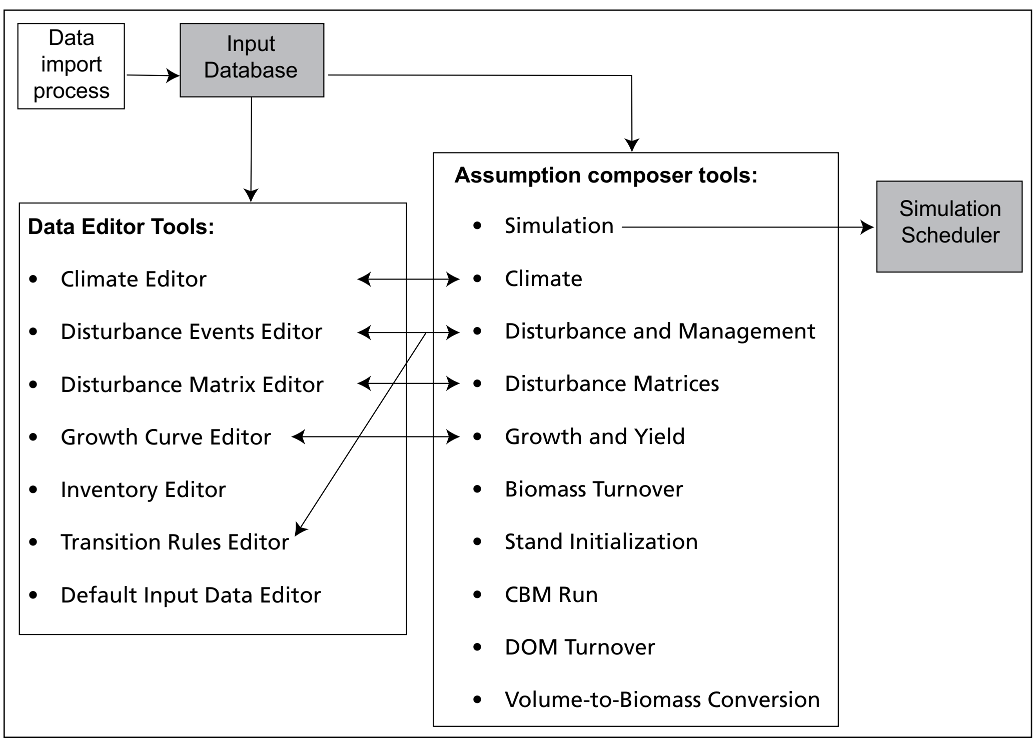


Figure 6-1. Links between the data editing tools and the assumption composer tools.

The default climate data for a project (which can be modified in the Climate Data Editor) are determined by the CBM-CFS3 according to the administrative and ecological boundaries selected by the user during data import. The default disturbance matrices used by the CBM-CFS3 (which can be modified in the Disturbance Matrix Editor) are based on the user's imported and mapped disturbance types.

6.1 Climate Editor

Climate data in the Climate Editor are or can be linked to Run Climate Assumptions in the assumption composer for Climate (Figure 6-2). The Climate Editor can be used to edit this default or user-defined climate data linked to various Run Climate Assumptions. The climate data available in this editor are mean annual temperature (°C) and mean annual precipitation (mm) for each time step.

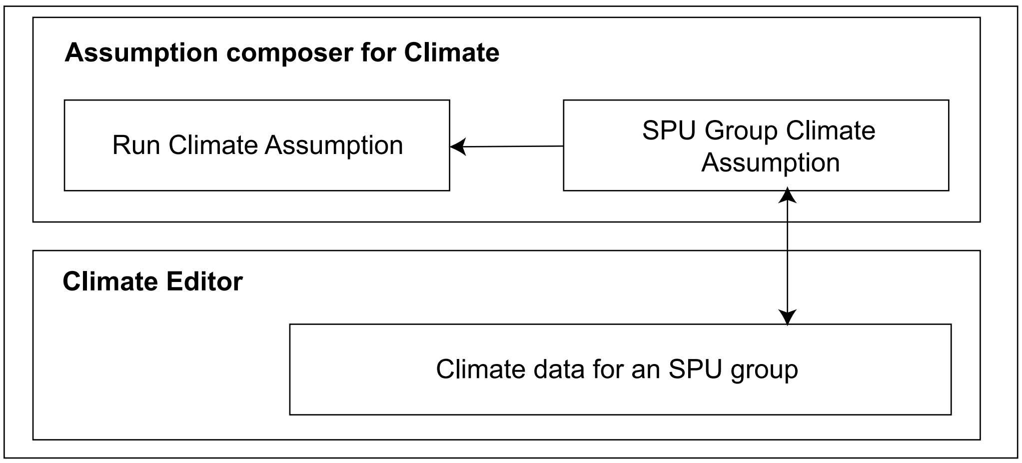


Figure 6-2. Link between the assumption composer for Climate and the Climate Editor.

Note: Mean annual temperature and mean annual precipitation

In the CBM-CFS3, mean annual temperature is used to model decay rates and can be edited. Research on proper integration of mean annual precipitation into the model is incomplete at this time; therefore, mean annual precipitation cannot be edited.

To access the "Climate Editor" window

1. **Click on "Tools" on the menu bar of the main CBM-CFS3 window**
2. **Select "Data Editors" from the drop list that appears**
3. **Select "Climate" from the side drop list that appears**

☞ *Tip: Alternative access to the "Climate Editor" window*

The "Climate Editor" window can also be accessed by clicking on the "Add/Edit Climate Data" button on the "SPU Group Climate Assumption" tab (Figure 7-11) on the "Climate" tab within the "Assumption Composers" window (see section 7.6.5, "Adding an SPU Group Climate Assumption").

The "Search for Climate Assumptions" window (Figure 6-3) will pop up.

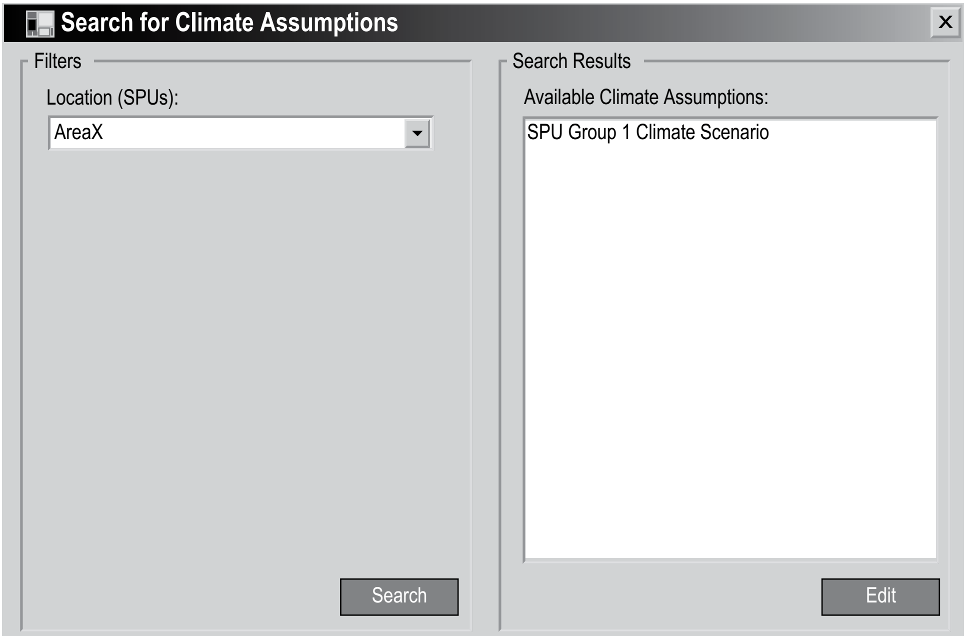


Figure 6-3. The "Search for Climate Assumptions" window.

To locate a particular Run Climate Assumption for editing

4. **If the imported data contain more than one SPU, click on the "Location (SPUs)" box and select an SPU from the drop list that appears**
5. **Click on the "Search" button**
6. **Click on the name of a Run Climate Assumption in the "Available Climate Assumptions" box**
7. **Click on the "Edit" button**

The "Climate Editor" window (Figure 6-4) will pop up, displaying a table with the following fields: "Annual Temperature (ºC)" (for the mean annual temperature), "Annual Precipitation (mm)" (for the mean annual precipitation), and "Time Step" (for the annual time step).

To edit data in the "Climate Editor" window

1. **Click on the "Edit" button**
2. **Change or add data**

Note: Unchanging climate data for simulation period

If the climate data do not change throughout the simulation period, only two rows (time steps) of data are required. The model will use these data for all subsequent time steps.

3. **Click on the "Save" button to save the changes**

   or

   Click on the "Cancel" button to terminate the editing process

To delete a row of data in the "Climate Editor" window

1. **Click on the gray cell at the beginning of a row in the table**
2. **Click on the "Delete" button**

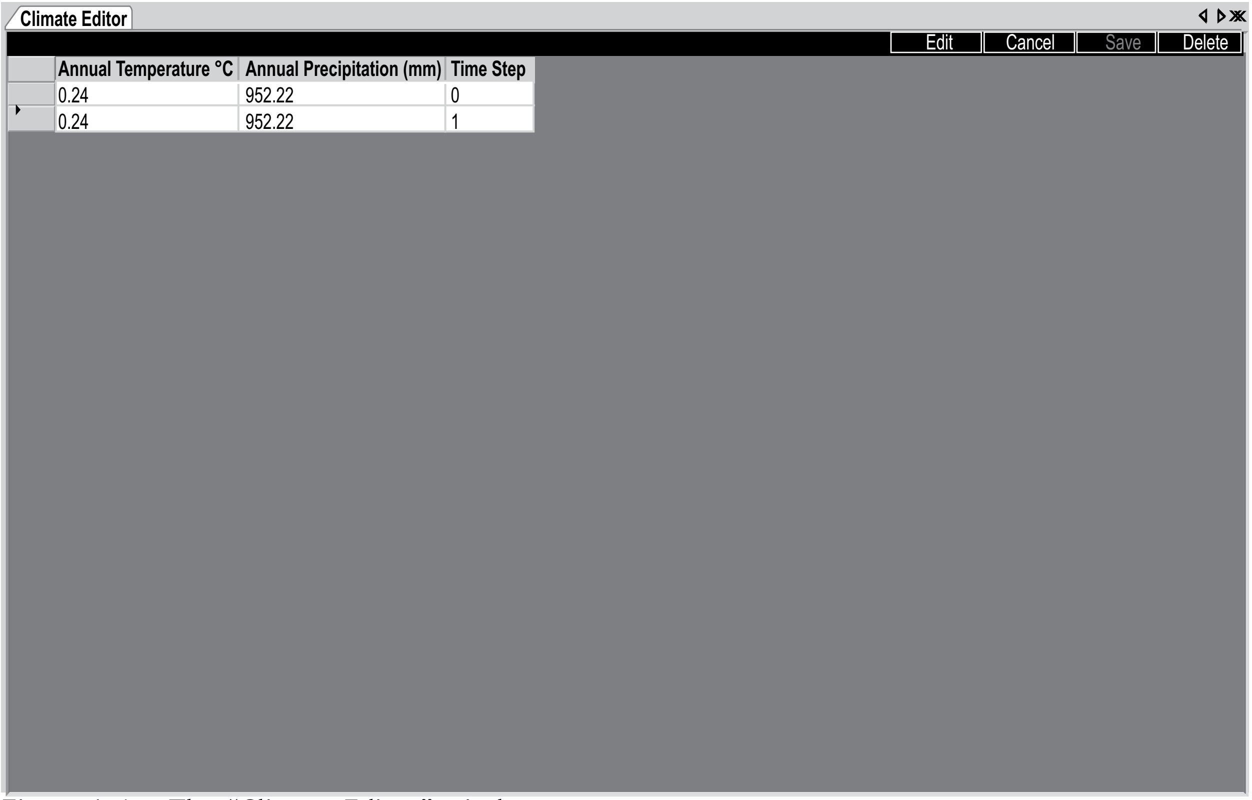


Figure 6-4. The "Climate Editor" window.

6.2 Disturbance Events Editor

The Disturbance Events Editor can be used to find, edit, create, or delete disturbance and/or management events and rules for any single or repeated disturbance or management activity that the user has imported or created. These disturbance events are or can be linked to Disturbance and Management Assumptions in the assumption composer for Disturbance and Management (Figure 6-5).

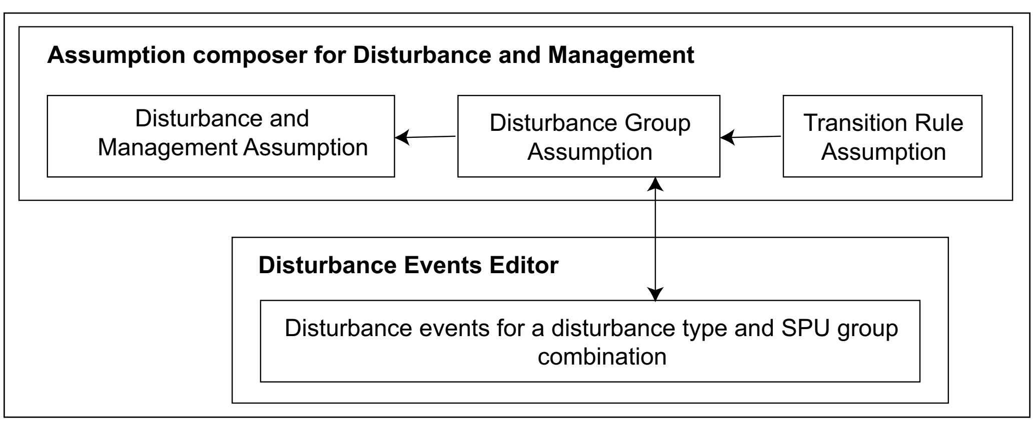


Figure 6-5. Link between the assumption composer for Disturbance and Management and the Disturbance Events Editor.

To access the "Disturbance Events Editor" window

1. **Click on "Tools" on the menu bar of the main CBM-CFS3 window**
2. **Select "Data Editors" from the drop list that appears**
3. **Select "Disturbance Events and Management Activities" from the side drop list that appears**

This will open the "Search for Disturbance Information" window (Figure 6-6). In this window, the user has the option of filtering by an SPU and/or disturbance type to retrieve specific user-defined or default Disturbance Group Assumptions (see section 7.9), which can be modified by editing or adding rules. To use the filters

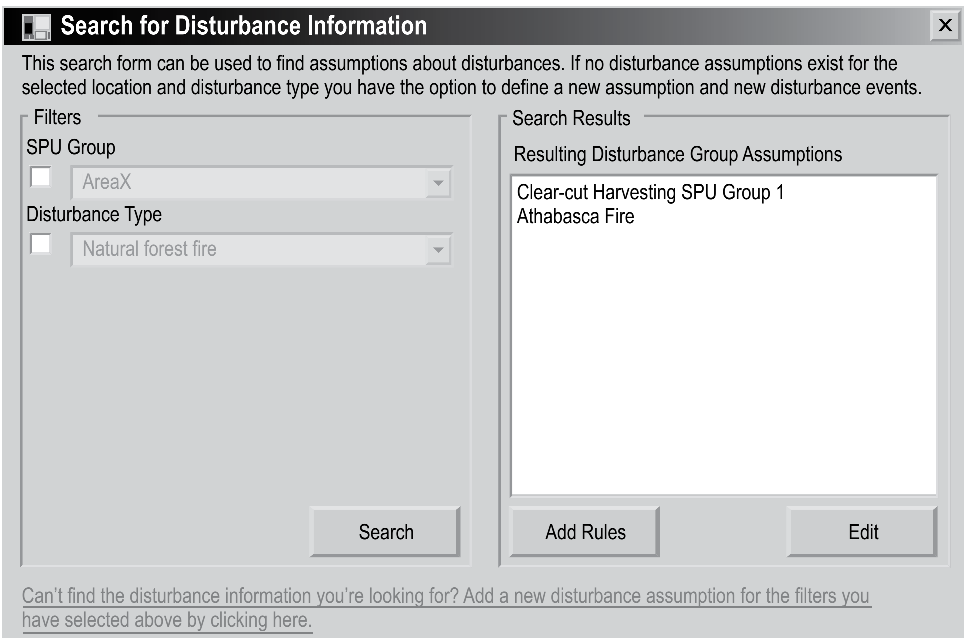


Figure 6-6. The "Search for Disturbance Information" window.

4. **Click on the "SPU Group" check box and select an SPU from the drop list that appears**
5. **Click on the "Disturbance Type" check box and select a disturbance type from the drop list that appears**
6. **Click on the "Search" button**

The Disturbance Group Assumptions identified by the filters will appear in the "Resulting Disturbance Group Assumptions" box.

Note: Adding a New Disturbance Group Assumption

To create a new Disturbance Group Assumption if none were retrieved

Click on the "Add a new disturbance assumption for the filters you have selected above by clicking here" link

The "Disturbance and Management" tab of the "Assumption Composers" window (Figure 7-17) will appear, where the user can create a new Disturbance Group Assumption (see section 7.9.5).

6.2.1 Viewing Disturbance Events

The impact of disturbance events is quantified by area, merchantable carbon, or proportion of records disturbed (set by the user in the Disturbance Events import file or in the Disturbance Events Editor) on the basis of existing disturbance events. The quantified impacts for the disturbance events are displayed in a graph and a table in the "Graph" view or are listed in a table in the "Summary" view (with each row representing a disturbance event) in the Disturbance Events Editor; in the latter display, disturbance event eligibility criteria and transition rule options for each of these criteria are displayed when an event in the table is selected.

To view the disturbance events for a Disturbance Group Assumption that is displayed in the "Resulting Disturbance Group Assumptions" box in the "Search for Disturbance Information" window (Figure 6-6)

1. **Click on a Disturbance Group Assumption name in the "Resulting Disturbance Group Assumptions" box**
2. **Click on the "Edit" button**

The "Disturbance Events Editor" window will pop up, showing the "Graph" view (Figure 6-7). Placing the cursor over any point on the graph will highlight the associated value in the table and vice versa. The user may move between the "Graph" and "Summary" views by clicking on the appropriate radio button.

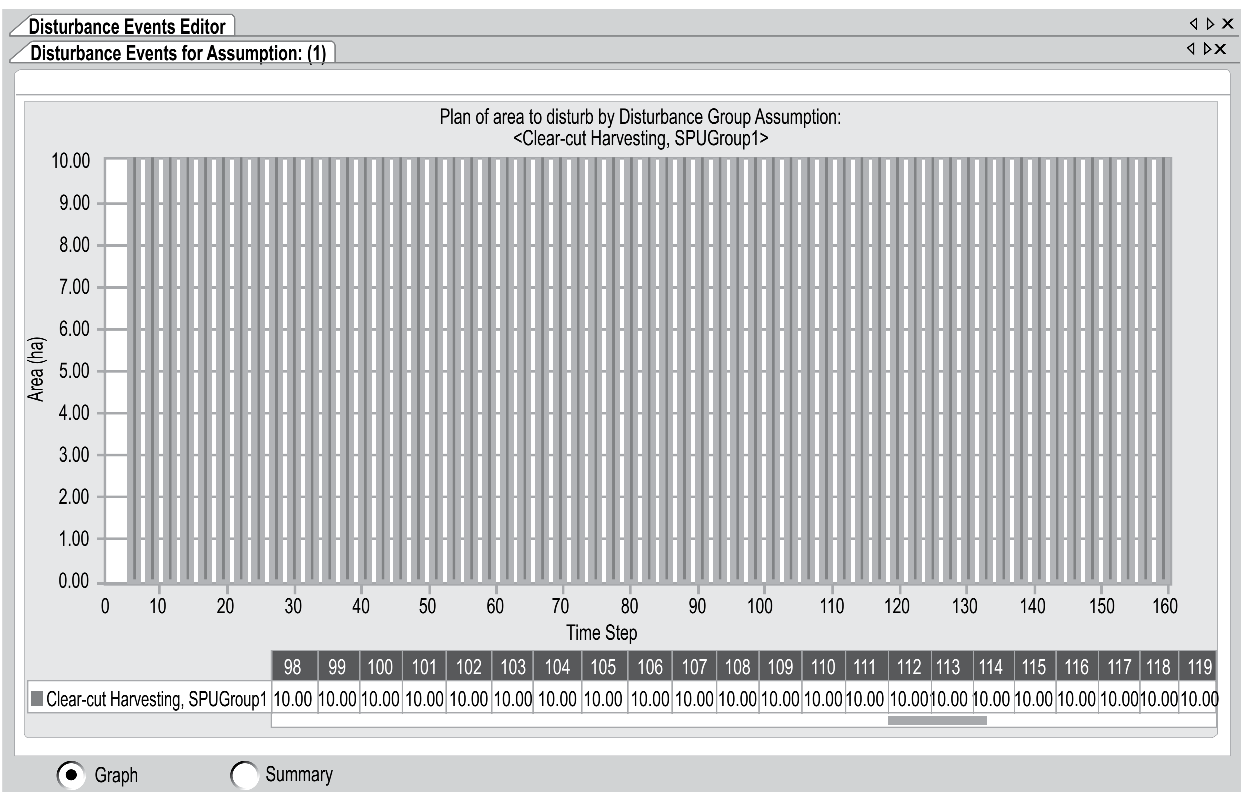


Figure 6-7. The "Disturbance Events Editor" window with the "Graph" view selected.

Note: Modifying graphs and tables

The way in which both the graph and the table is displayed can be modified. For instructions on how to modify the display of a graph or a table, see Chapter 9.

6.2.2 Editing and Deleting Disturbance Events

The "Summary" view in the "Disturbance Events Editor" (Figure 6-8) is used to edit or delete disturbance event rules for a Disturbance Group Assumption.

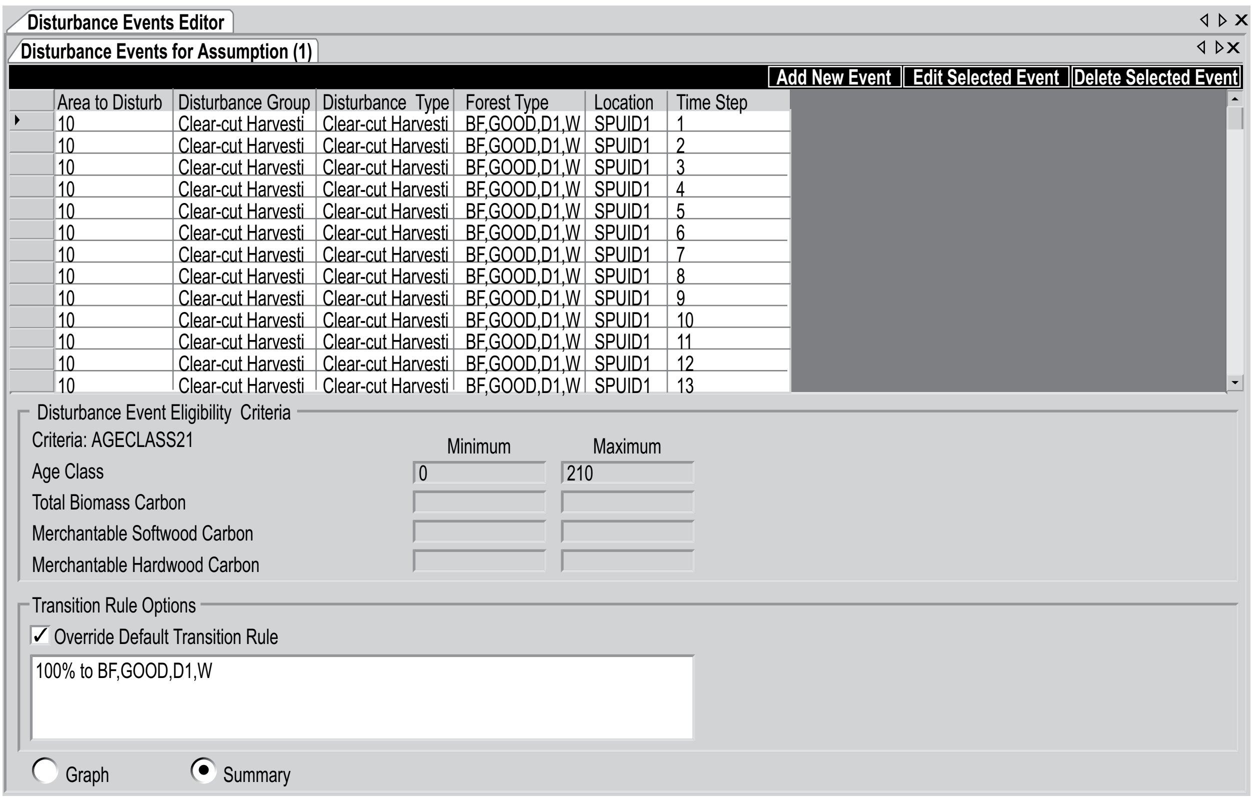


Figure 6-8. The "Disturbance Events Editor" window with the "Summary" view selected.

To access the "Summary" view

> **Click on a Disturbance Group Assumption name in the "Resulting Disturbance Group Assumptions" box**
>
> **Click on the "Edit" button**

The "Disturbance Events Editor" window will pop up, showing the "Graph" view (Figure 6-7).

> **Click on the "Summary" radio button**

The "Summary" view (Figure 6-8) will appear, containing a table in which each row represents a disturbance event; this table is linked to disturbance event eligibility criteria and transition rule options.

Editing Disturbance Events

To edit a disturbance event

In the table shown in the "Summary" view, click on the gray cell at the beginning of the row to be edited

The "Disturbance Event Eligibility Criteria" box will display eligibility limits in the "Minimum" and "Maximum" boxes for each of the criteria for the event. The "Transition Rule Options" box will display any existing transition rules (if none, the forest type will convert back to the same forest type following disturbance) and whether the user's default transition rules have been overridden with different rules for that event (a check mark in the "Override Default Transition Rules" check box indicates that the default rules have been overridden).

Note: Removing the default transition rule override

If the "Override Default Transition Rule" box is checked for an event, the user has the option of reverting to the default transition rules. To do this, click on the "Override Default Transition Rule" check box so that no check mark is displayed.

Click on the "Edit Selected Event" button

The "Individual Disturbance Event Editor" window (Figure 6-9) will pop up. This window displays information for the chosen disturbance event in the "Disturbance Event Details" and "Transitions Following the Disturbance" boxes. Disturbance event details that can be edited are found in the "Target Forest Type" table (Figures 6-9 and 6-10) and are displayed on two tabs: the "Disturbance Settings Tab" (Figure 6-9) and the "Disturbance Event Eligibility Criteria" tab (Figure 6-10). Descriptions for all of the fields in the "Individual Disturbance Event Editor" are presented in Table 6-1.

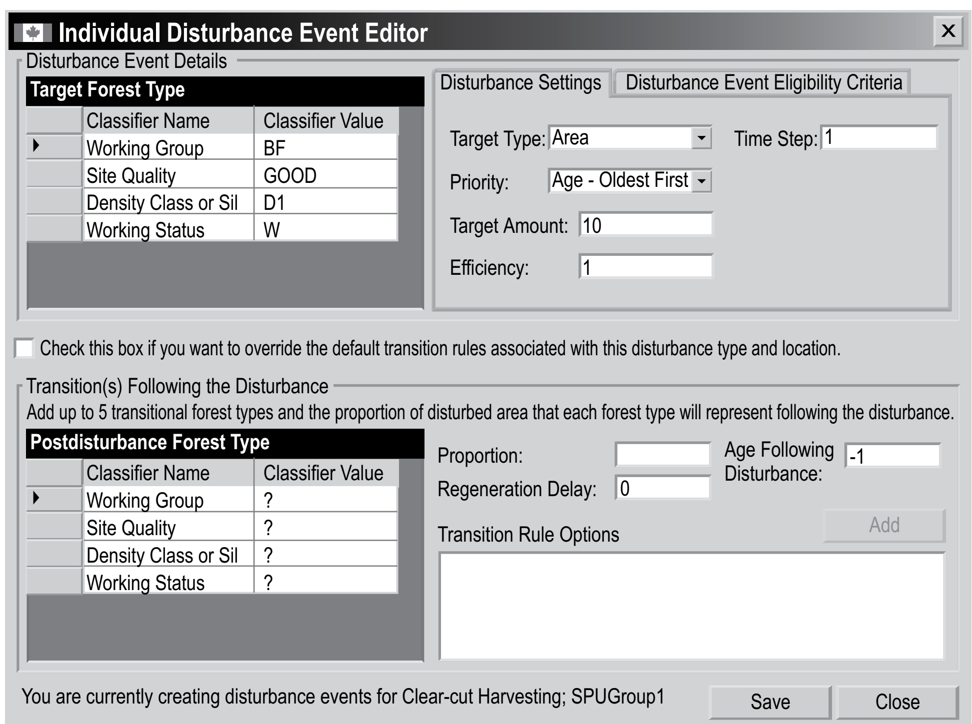


Figure 6-9. The "Individual Disturbance Event Editor" window with the "Disturbance Settings" tab selected.

Table 6-1. Field descriptions for the "Disturbance Settings" and "Disturbance Event Eligibility Criteria" tabs in the "Individual Disturbance Event Editor" window (Figures 6-9 and 6-10) and the "Disturbance Rules Generator" window (Figures 6-11 and 6-12)

Field name	Description
Target Forest Type	Forest type targeted by a disturbance event, as defined by classifiers and classifier values
Target Type	The type of impact a disturbance will have on a Target Forest Type. Options include "Area", "Merchantable Carbon", or the "Proportion of records"
Priority	Defines which inventory records to select first for the disturbance event. Options include "None", "Highest Merchantable Volume", "Age – Oldest First", and "Time Since Last Disturbance"
Target Amount	Amount of area, merchantable carbon, or proportion to disturb
Efficiency	The maximum proportion a record can be disturbed
Time Step	Planning year when the disturbance event can begin
Start Step	Planning year when the disturbance event can begin
Interval	Number of years between one disturbance event and the next of its kind
Iterations	Number of times to repeat the disturbance event
Softwood Age	Age of softwood component eligible to be disturbed
Hardwood Age	Age of hardwood component eligible to be disturbed
Total Biomass Carbon	Range of amount of biomass carbon required in a forest type for a disturbance to occur
Merchantable Softwood Carbon	Range of amount of carbon required in merchantable softwoods for a given forest type for a disturbance to occur
Merchantable Hardwood Carbon	Range of amount of carbon required in merchantable hardwoods for a given forest type for a disturbance to occur
Postdisturbance Forest Type	Resulting forest type following a disturbance event; defined by classifiers and classifier values
Proportion	Percentage of a predisturbance forest type that converts to the selected transition forest type; enter 1 for 100%, 0.5 for 50%, etc.
Regeneration Delay	Delay in forest regeneration following a disturbance event, expressed in years
Age Following Disturbance	Stand age of selected forest type following the disturbance event

To edit the classifier values in the "Target Forest Type" table (Figure 6-9)

1. **Click on any of the cells in the "Classifier Value" column of the "Target Forest Type" table and select an option from the drop list that appears**
2. **Click on the "Save" button to save the event**

   or

   Click on the "Close" button to cancel any edits and leave the "Individual Disturbance Event Editor"

   or

   Proceed with further edits

To edit information on the "Disturbance Settings" tab

1. **Click on the "Disturbance Settings" tab**
2. **Click on the "Target Type" box and select an item from the drop list that appears**
3. **Click on the "Priority" box and select an item from the drop list that appears**

Note: Selection of "Priority" option and "Target Amount" units if the "Target Type" is a proportion

If the user selects "Proportion of records" in the "Target Type" box, the choice from the drop list for the "Priority" box must be "None." This will ensure that a proportion of each record containing the classifiers for a target forest type identified by the user will be disturbed. The units entered for the proportion of records to disturb in the "Target Amounts" box should be a proportion (0 to 1).

4. **Click on the "Target Amount" box and enter an amount**
5. **Click on the "Efficiency" box and enter a number (1 for 100%, 0.5 for 50%, etc.)**
6. **Click on the "Time Step" box and enter a number**

Note: Entering a time step

The time step should be the year in which the event occurs. For example, if "50" is entered as the time step, the disturbance event will occur in year 50 of the simulation.

7. **Click on the "Save" button to save the event**

   or

   Click on the "Close" button to cancel any edits and leave the "Individual Disturbance Event Editor"

   or

   Proceed with further edits

To edit information on the "Disturbance Event Eligibility Criteria" tab

1. **Click on the "Disturbance Event Eligibility Criteria" tab (Figure 6-10)**

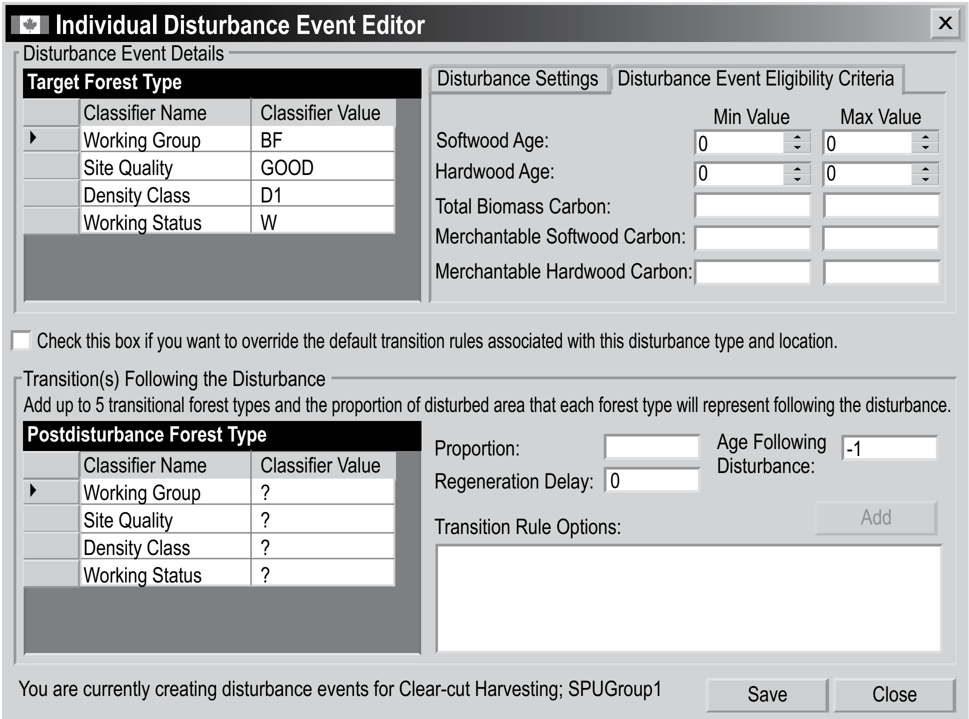


Figure 6-10. The "Individual Disturbance Event Editor" window with the "Disturbance Event Eligibility Criteria" tab selected.

2. **Click on the "Min Value" box and/or the "Max Value" box next to "Softwood Age" and then click on the arrow buttons to select appropriate minimum and maximum ages**
3. **Click on the "Min Value" box and/or the "Max Value" box next to "Hardwood Age" and then click on the arrow buttons to select appropriate minimum and maximum ages**
4. **Click on the "Min Value" box and/or the "Max Value" box next to "Total Biomass Carbon" and then type in an amount**
5. **Click on the "Min Value" box and/or the "Max Value" box next to "Merchantable Softwood Carbon" and then type in an amount**
6. **Click on the "Min Value" box and/or the "Max Value" box next to "Merchantable Hardwood Carbon" and type in an amount**
7. **Click on the "Save" button to save the event**

   or

   Click on the "Close" button to cancel any edits and leave the "Individual Disturbance Event Editor"

   or

   Proceed with further edits

Once the edits on the "Disturbance Event Eligibility Criteria" tab are complete, the user can create or delete existing transition rules in the "Transition(s) Following the Disturbance" box (Figure 6-9 and 6-10). If the "Click this box if you want to override the default transition rules associated with this disturbance type and location" box contains a check mark, any transition rules in the "Transition(s) Following the Disturbance" box will override those in the Transition Rules Editor for the selected target forest type. To create transition rules that will override the default rules

1. **Click on the "Click this box if you want to override the default transition rules associated with this disturbance type and location" box, so that a check mark appears**

Next, the user must select the forest type to which the disturbed forest type will convert following the disturbance.

2. **Click on any of the cells in the "Classifier Value" column associated with a particular classifier in the "Classifier Name" column of the "Postdisturbance Forest Type" table, and select a value from the drop list that appears**
3. **Click on the "Proportion" box and enter a number**

Note: Entering a proportion

If only one transition forest type is created for the disturbance event, the proportion is 100% and the value entered must be "1." If more than one transition forest type is created for the disturbance event, the proportions entered must sum to 1.

4. **Click on the "Regeneration Delay" box and enter a number**
5. **Click on the "Age following Disturbance" box and enter a number**
6. **Click on the "Add" button**

The new transition rule will appear in the "Transition Rule Options" box. To delete a transition rule that appears in this box, click on the name of the rule in the box and press the "Delete" key on the keyboard.

Once all edits to a disturbance event are complete

7. **Click on the "Save" button to save the event**

   or

   Click the "Close" button to cancel any edits and leave the "Individual Disturbance Event Editor"

After clicking on the "Save" button

8. **Click on the "Close" button to close this window**

Deleting Disturbance Events

To delete individual disturbance events in the table shown in the "Summary" view of the "Disturbance Events Editor" window (Figure 6-8)

1. **Click on the gray cell at the beginning of a row in the table**
2. **Click on the "Delete Selected Event" button**

A "Delete Disturbance Events" window will pop up asking the user to confirm deletion of the selected event.

3. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the deletion process

If the user clicks on the "Yes" button, the disturbance event will be deleted from the table.

6.2.3 Adding Single Disturbance Events

To add multiple disturbance events to a Disturbance Group Assumption, go to section 6.2.4. To add single disturbance events to a Disturbance Group Assumption displayed in the "Resulting Disturbance Group Assumptions" box in the "Search for Disturbance Information" window (Figure 6-6)

Click on the name of a Disturbance Group Assumption in the "Resulting Disturbance Group Assumptions" box

Click on the "Edit" button

The "Disturbance Events Editor" window will pop up, showing the "Graph" view (Figure 6-7).

Click on the "Summary" radio button

The "Summary" view (Figure 6-8) contains a table of existing disturbance event rules as well as disturbance event eligibility criteria and transition rule options. To add a single disturbance event

Click on the "Add New Event" button

The "Individual Disturbance Event Editor" window (Figure 6-9) will pop up. The procedures for entering rules for a new disturbance event are the same as those described in section 6.2.2 (for editing and deleting disturbance events), starting at step 1.

6.2.4 Adding Multiple Disturbance Events

To add multiple disturbance events to a Disturbance Group Assumption displayed in the "Resulting Disturbance Group Assumptions" box in the "Search for Disturbance Information" window (Figure 6-6)

Click on the name of a Disturbance Group Assumption in the "Resulting Disturbance Group Assumptions" box

Click on the "Add Rules" button

The "Disturbance Rules Generator"' window (Figure 6-11) will pop up. This window displays fields in the "Disturbance Rule Details" and "Transition(s) Following the Disturbance" boxes where disturbance event rules can be entered. Disturbance event details that can be entered are found in the "Target Forest Type" table (Figures 6-11 and 6-12) and are displayed on two tabs: the "Disturbance Settings" tab (Figure 6-11) and the "Disturbance Event Eligibility Criteria" tab (Figure 6-12). Descriptions for all of the fields in the "Disturbance Rules Generator" window are presented in Table 6-1. To add disturbance event rules

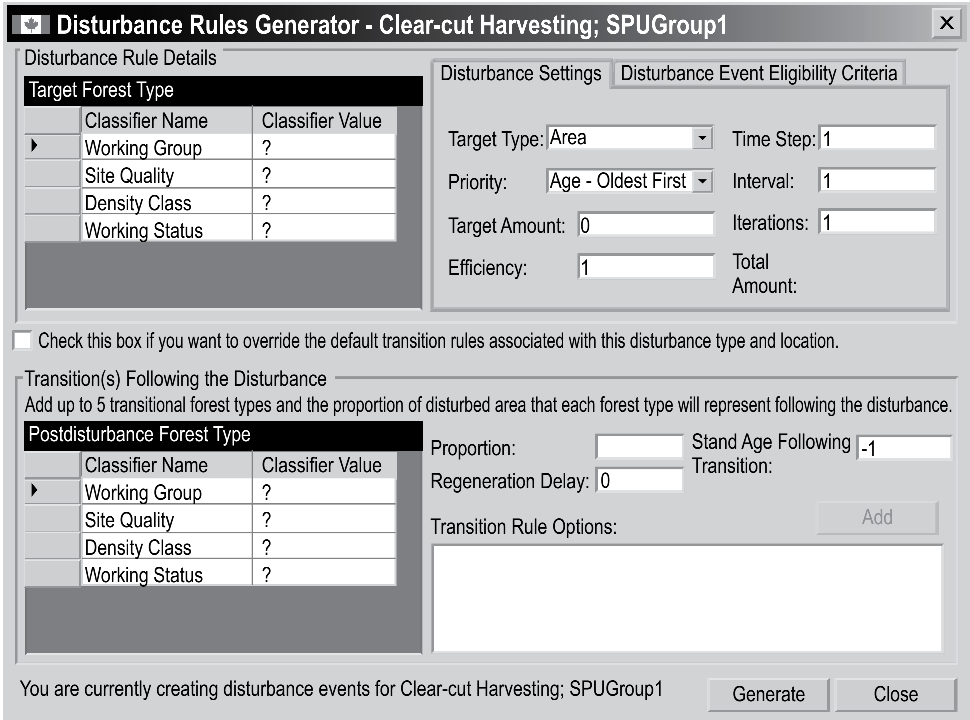


Figure 6-11. The "Disturbance Rules Generator" window with the "Disturbance Settings" tab selected.

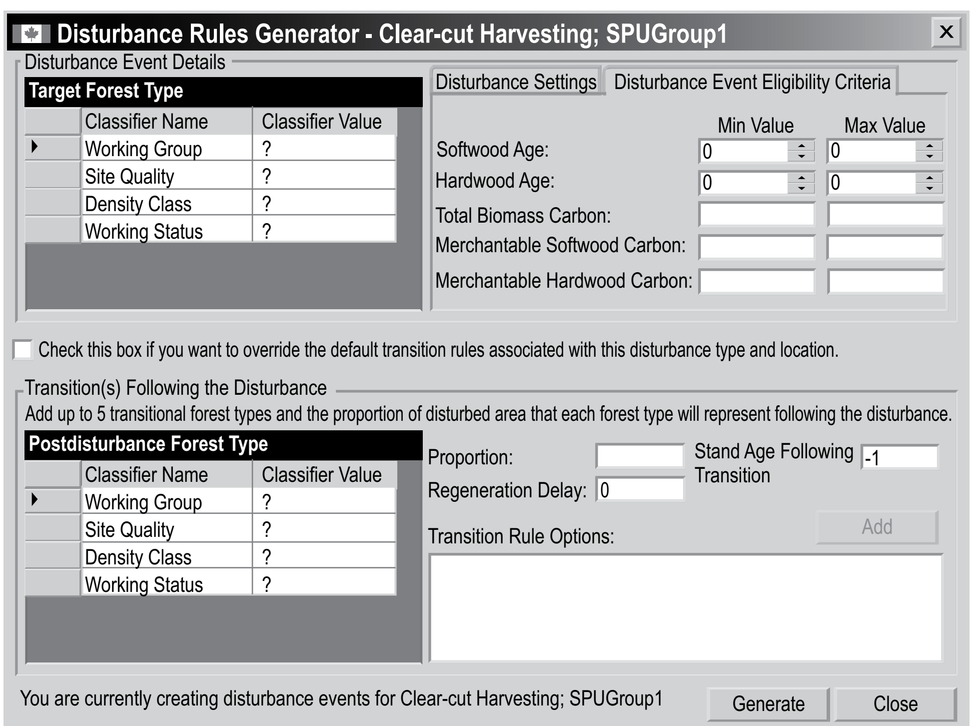


Figure 6-12. The "Disturbance Rules Generator" window with the "Disturbance Event Eligibility Criteria" tab selected.

1. **Click on any of the cells in the "Classifier Value" column of the "Target Forest Type" table, and select an option from the drop list that appears**
2. **Click on the "Disturbance Settings" tab**
3. **Click on the "Target Type" box and select an item from the drop list that appears**
4. **Click on the "Priority" box and select an item from the drop list that appears**
5. **Click on the "Target Amount" box and enter an amount**
6. **Click on the "Efficiency" box and enter a number (1 for 100%, 0.5 for 50%, etc.)**
7. **Click on the "Start Step" box and enter a number**

Note: Entering a start step

The starting time step should be the year in which the event occurs. For example, if "50" is entered as the start step, the disturbance event will occur in year 50 of the simulation.

8. **Click on the "Interval" box and enter in a number**
9. **Click on the "Iterations" box and enter a number**
10. **Click on the "Disturbance Event Eligibility Criteria" tab (Figure 6-12)**
11. **Click on the "Min Value" box and/or "Max Value" box beside "Softwood Age" and then click the arrow buttons to select appropriate minimum and maximum ages (optional)**
12. **Click on the "Min Value" box and/or the "Max Value" box beside "Hardwood Age" and then click the arrow buttons to select appropriate minimum and maximum ages (optional)**
13. **Click on the "Min Value" box and/or the "Max Value" box beside "Total Biomass Carbon" and then enter an amount (optional)**
14. **Click on the "Min Value" box and/or the "Max Value" box beside "Merchantable Softwood Carbon" and then enter an amount (optional)**
15. **Click on the "Min Value" box and/or the "Max Value" box beside "Merchantable Hardwood Carbon" and then enter an amount (optional)**

Once information has been entered on the "Disturbance Event Eligibility Criteria" tab, the user can create transition rules in the "Transition(s) Following the Disturbance" box (Figure 6-11). If the "Click this box if you want to override the default transition rules associated with this disturbance type and location" box contains a check mark, any transition rules in the "Transition(s) Following the Disturbance" box will override those in the Transition Rules Editor for the selected target forest type. To create transition rules that will override the default rules

1. **Click on the "Check this box if you want to override the default transition rules associated with this disturbance type and location" box, so that a check mark appears**

Next, the user must select the forest type to which the disturbed forest type will be converted following the disturbance.

2. **Click on any of the cells in the "Classifier Value" column associated with a particular classifier in the "Classifier Name" column of the "Postdisturbance Forest Type" table, and select a value from the drop list that appears**
3. **Click on the "Proportion" box and enter a number**

Note: Entering the proportion

If only one transition forest type is created for the disturbance event, the proportion is 100% and the value entered must be "1." If more than one transition forest type is created for the disturbance event, the proportions entered must sum to 1.

4. **Click on the "Regeneration Delay" box and enter a number**
5. **Click on the "Stand Age following Transition" box and type in a number**
6. **Click on the "Add" button**
7. **Repeat steps 2 to 6 to add more transition forest types**

The new transition rule(s) will appear in the "Transition Rule Options" box. To delete a transition rule that appears in this box, click on the name of the rule in the box and press the "Delete" key on the keyboard.

Once all transition rules for the disturbance event have been entered

8. **Click on the "Generate" button to save the rules**
9. **Click on the "Close" button to close this window**

6.3 Disturbance Matrix Editor

The Disturbance Matrix Editor can be used to view, add, copy, edit, or delete default or user-defined disturbance matrices in the CBM-CFS3. A disturbance matrix is a look-up table describing the flow of carbon among various pools (Figure 1-1) following a disturbance or management event. The user can search for disturbance matrices in the Disturbance Matrix Editor in either Project Mode or Default Mode. Project Mode disturbance matrices are matrices that have been applied to the user's imported project data. They are linked to run disturbance matrix assumptions in the assumption composer for Disturbance Matrices (Figure 6-13). Default Mode disturbance matrices are all of the matrices that could be applied to the user's project data.

The user can view and edit disturbance matrices in either mode. Any disturbance matrix can be deleted in Project Mode; however, only user-created disturbance matrices can be deleted in Default Mode. The user may also create disturbance matrices in Default Mode.

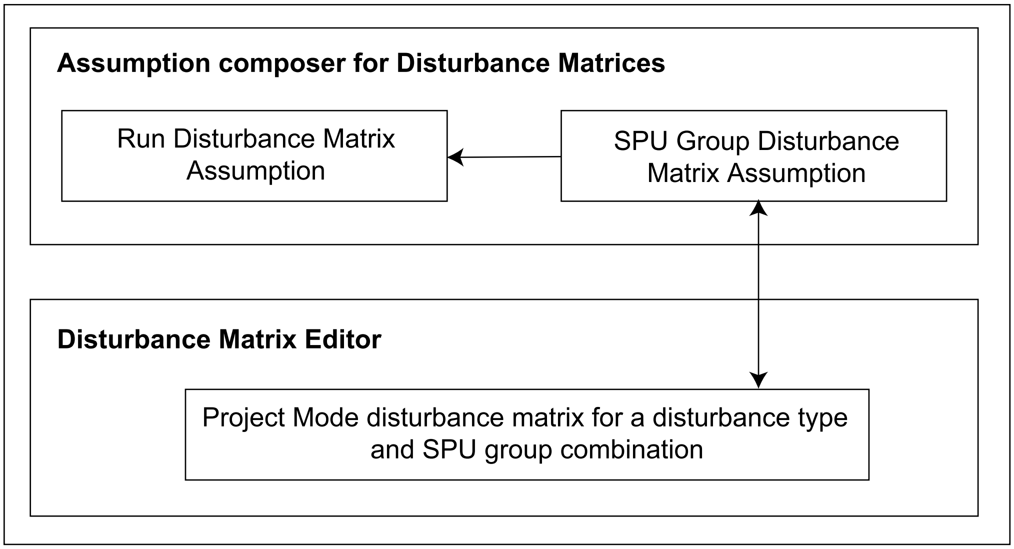


Figure 6-13. Link between the assumption composer for Disturbance Matrices and the Disturbance Matrix Editor.

To access the "Disturbance Matrix Editor" window

> **Click on "Tools" on the menu bar of the main CBM-CFS3 window**
> **Select "Data Editors" from the drop list that appears**
> **Select "Disturbance Matrices" from the side drop list that appears**

The "Search for Disturbance Matrices" window (Figure 6-14) will pop up.

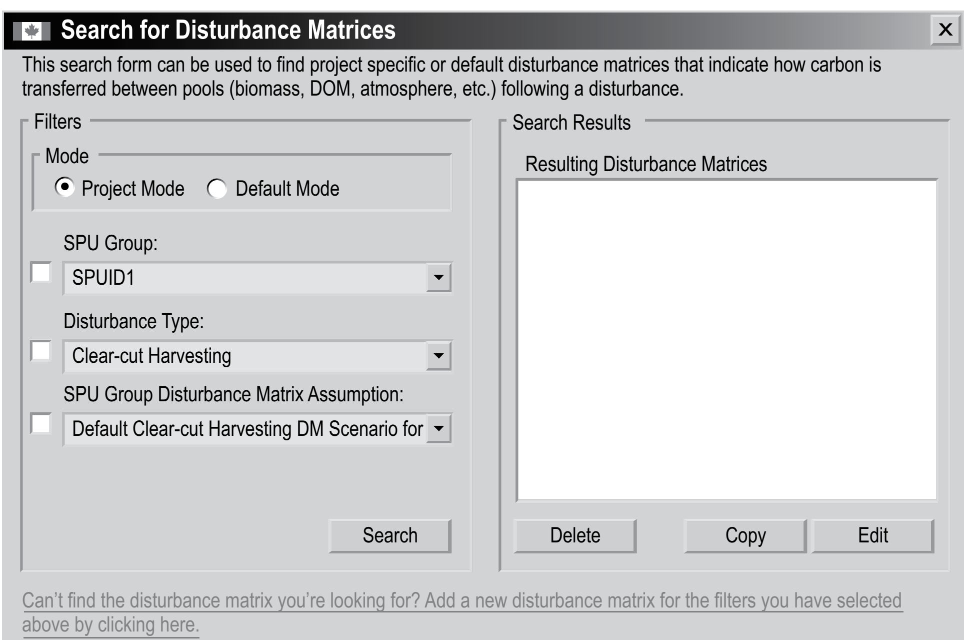


Figure 6-14. The "Search for Disturbance Matrices" window with the "Project Mode" selected.

Click on the "Project Mode" radio button to find disturbance matrices linked to a project that is open in the CBM-CFS3

or

Click on the "Default Mode" radio button to find additional disturbances matrices not linked to the open project

6.3.1 Project Mode

In the Project Mode of the "Search for Disturbance Matrices" window (Figure 6-14), the user can search for, edit, copy, or delete existing disturbance matrices or add new disturbance matrices to the project.

Searching for a Disturbance Matrix

To search for a disturbance matrix by SPU Group and/or Disturbance Type and/or SPU Group Disturbance Matrix Assumption

1. **Click on the "SPUGroup" check box, click on the associated drop list box, and select an option from the list that appears**

   and/or

   Click on the "Disturbance Type" check box, click on the associated drop list box, and select an option from the drop list that appears

   and/or

   Click on the "SPU Group Disturbance Matrix Assumption" check box, click on the associated drop list box, and select an option from the list that appears
2. **Click on the "Search" button**

Any disturbance matrices found will be displayed in the "Resulting Disturbance Matrices" box. The user then has the option of editing or copying these disturbance matrices.

Editing a Disturbance Matrix

To edit a disturbance matrix displayed in the "Resulting Disturbance Matrices" box in the "Search for Disturbance Matrices" window

1. **Click on the name of the disturbance matrix in the "Resulting Disturbance Matrices" box**
2. **Click on the "Edit" button**

The "Disturbance Matrix Editor" window will pop up. This window can display two different views: "List View" (Figure 6-15) and "Grid View" (Figure 6-16).

The "List View" will be displayed automatically when the user first opens the "Disturbance Matrix Editor" window. The user can select a view by clicking on the corresponding radio button.

In the "List View," the forest carbon pools are displayed in the "From" box and the carbon pools linked to each pool are displayed in the "To" box. The percentage of carbon transferred between these pools appears in the "Value(*100%)" box. The user can click on a carbon pool in the "From" box to view the associated carbon pool(s) in the "To" box and the transfer rates in the "Value(*100%)" box. Descriptions for all of the carbon pools accessible in this window are presented in Table 6-2.

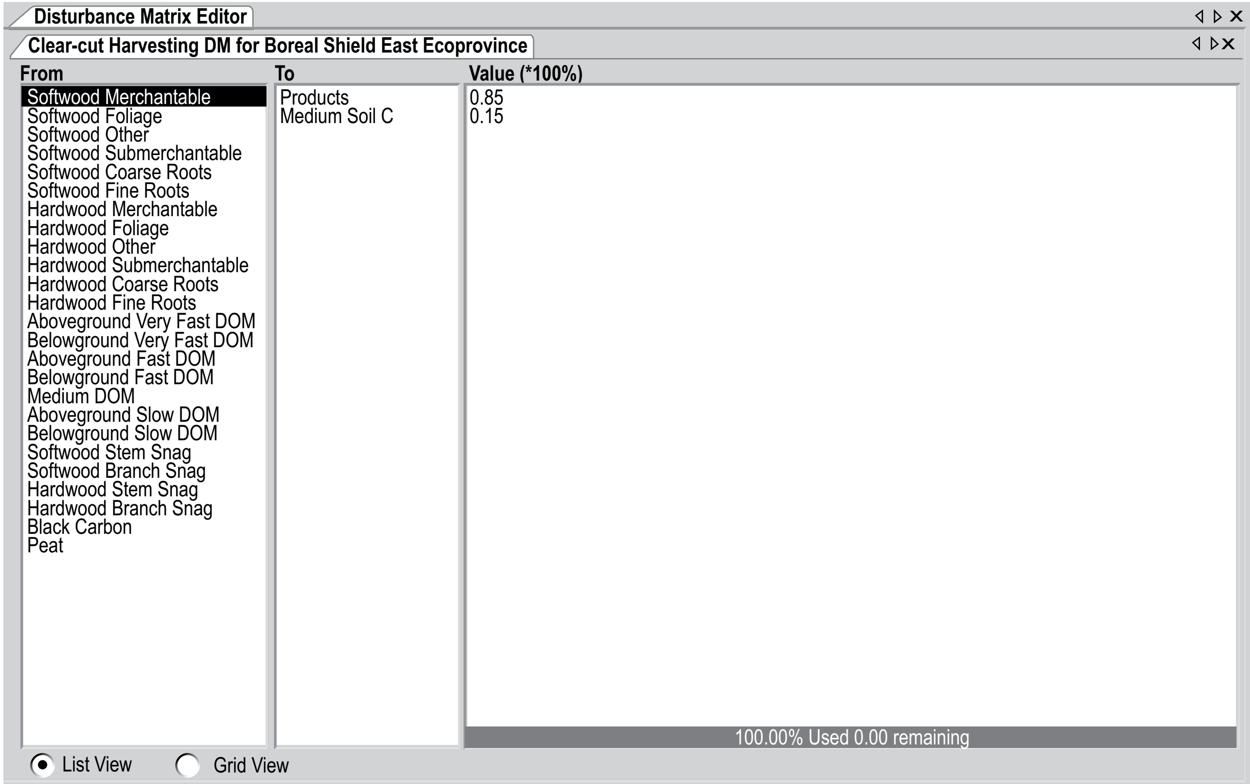


Figure 6-15. The "Disturbance Matrix Editor" window with the "List View" selected.

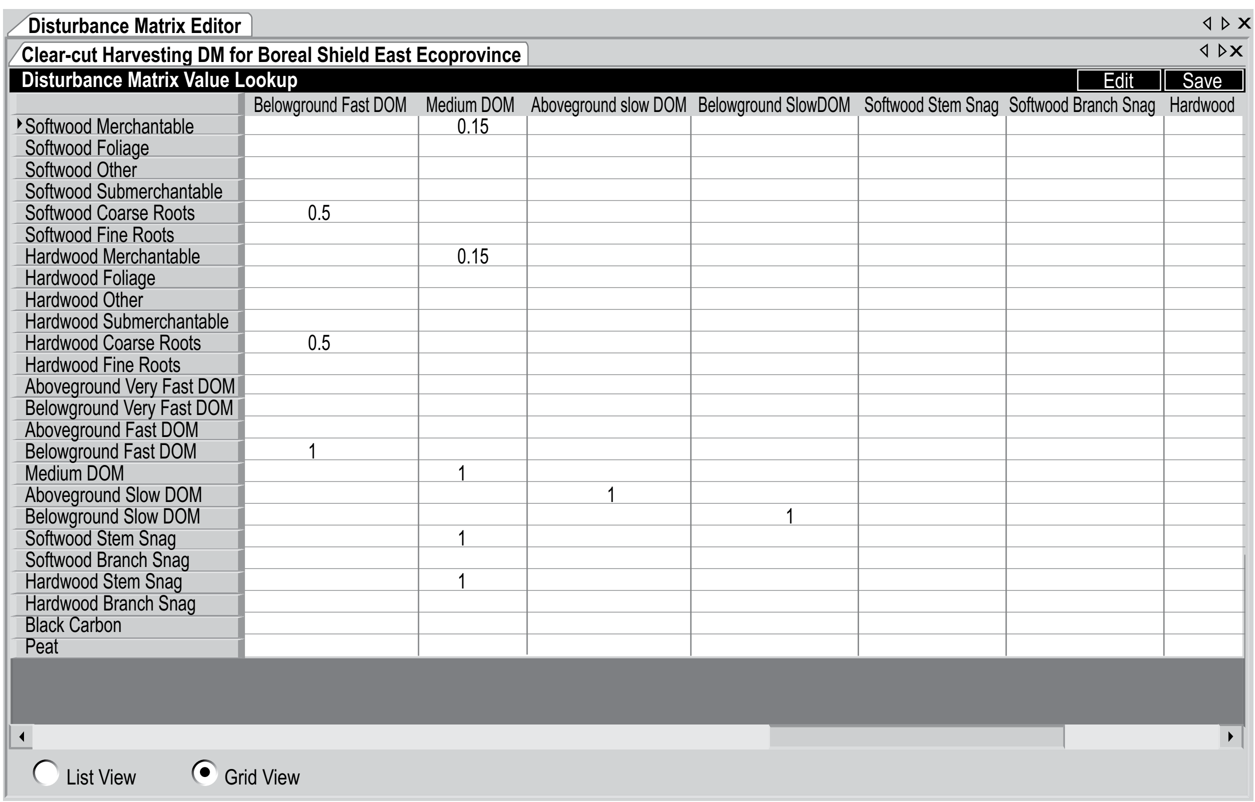


Figure 6-16. The "Disturbance Matrix Editor" window with the "Grid View" selected.

Table 6-2. Description of carbon pools in the "Disturbance Matrix Editor" window (Figures 6-15 and 6-16)

Carbon pool name	Description
Softwood Merchantable	Carbon in merchantable softwood stemwood
Softwood Foliage	Carbon in softwood foliage
Softwood Other	Carbon in softwood sapling stemwood, merchantable stem bark, branches, tops, and stumps
Softwood Submerchantable	By default not currently used; available as an alternate pool for use in scientific investigation of turnover rates
Softwood Coarse Roots	Carbon in softwood coarse roots
Softwood Fine Roots	Carbon in softwood fine roots
Hardwood Merchantable	Carbon in merchantable hardwood stemwood
Hardwood Foliage	Carbon in hardwood foliage
Hardwood Other	Carbon in hardwood sapling stemwood, merchantable stem bark, branches, tops, and stumps
Hardwood Submerchantable	By default not currently used; available as an alternate pool for use in scientific investigation of turnover rates
Hardwood Coarse Roots	Carbon in hardwood coarse roots
Hardwood Fine Roots	Carbon in hardwood fine roots
Aboveground Very Fast DOM	Carbon in DOM with input from foliage biomass and fine roots in the forest floor; very fast turnover rate
Belowground Very Fast DOM	Carbon in DOM with input from fine root biomass in the mineral soil; very fast turnover rate
Aboveground Fast DOM	Carbon in DOM with input from branches, tops, stumps, and submerchantable trees; fast turnover rate
Belowground Fast DOM	Carbon in DOM with input from coarse roots; fast turnover rate
Medium DOM	Carbon in DOM with input from merchantable stemwood and/or stem snags; medium turnover rate
Aboveground Slow DOM	Carbon in DOM with input from very fast, fast, and medium aboveground DOM pools; slow turnover rate
Belowground Slow DOM	Carbon in DOM with input from very fast, fast, and medium belowground DOM pools; slow turnover rate
Softwood Stem Snag	Carbon in merchantable stemwood proportion of softwood snags
Softwood Branch Snag	Carbon in all softwood snags excluding the merchantable stemwood proportion
Hardwood Stem Snag	Carbon in merchantable stemwood proportion of hardwood snags
Hardwood Branch Snag	Carbon in all hardwood snags excluding merchantable stemwood proportion
Black Carbon	Stable carbon from incomplete combustion after fire; currently not included in calculations
Peat	Carbon in peat; currently not included in calculations
Products	Carbon directed to forest products
CO_2	Carbon emitted as carbon dioxide
CH_4	Carbon emitted as methane
CO	Carbon emitted as carbon monoxide

DOM = dead organic matter.

To edit the rate of transfer from one carbon pool to another

1. **Click on the name of a carbon pool in the "From" box**
2. **Click, pause, and click again on the value in the "Value(*100%)" box associated with a carbon pool in the "To" box**
3. **Change the value to the desired proportion**

☞ *Tip: Adjusting the sum of values in the "Value (*100)" box*

The values listed in the "Value(*100)" box must sum to 1, but after existing transfer rates have been edited or new ones entered, the sum of the values may be greater or less than 1. If so, a bar at the bottom of the box, which normally displays in green, will display in red if the sum of values is greater than 1 or in blue if the sum of values is less than 1 and will state the sum. For example, the box may state "150.00% Used: -0.50 remaining." To correct a shortage or excess in values

Click on another value in the "Value(*100)" box and change the value so that the values in the box sum to 1

or

Right-click over a value to which the shortage should be added or from which the excess should be removed

Click on the "Add remaining value to 'carbon pool name'" box or the "Remove extra value from 'carbon pool name'" box that appears

To link a carbon pool in the "From" box to a new carbon pool in the "To" box

1. **Click on a carbon pool name in the "From" box**
2. **Place the cursor over the "To" box and right-click**

An "Add Pool" box will appear.

3. **Place the cursor over the "Add Pool" box**

A menu of carbon pools will appear.

4. **Click on the name of a carbon pool** on the menu displayed
5. **Click, pause, and click again on the zero value in the "Value(*100%)" box and type in the appropriate transfer rate**

If the sum of the values in the "Value(*100)" box is greater or less than 1, refer to the tip box "Adjusting the sum of values in the 'Values(*100)' box."

To delete a carbon pool in the "To" box

1. **Right-click on the name of the carbon pool in the "To" box**
2. **Click on the "Remove 'pool name'" box that pops up**

If the sum of the values in the "Value(*100)" box is greater or less than 1, refer to the tip box "Adjusting the sum of values in the 'Values (*100)' box."

The "Grid View" displays the same data as the "List View," but in the form of a horizontally scrollable table (Figure 6-16). Carbon pools listed in the "From" box in the "List View" are displayed in the first column of the "Grid View" table, and carbon pools listed in the "To" box in the "List View" are displayed as column headers in the "Grid

View" table. The transfer rates between specific pools appear as the points of intersection within the table. To edit any of the carbon transfer rates in the "Grid View"

1. **Click on the "Edit" button**
2. **Change transfer rate(s) in the table**
3. **Click on the "Save" button**

Copying a Disturbance Matrix

An existing disturbance matrix can be copied in the Project Mode of the "Search for Disturbance Matrices" window (Figure 6-14). To proceed

1. **In the "Resulting Disturbance Matrices" box, click on the name of the disturbance matrix to be copied**
2. **Click on the "Copy" button**

The "Copy Disturbance Matrix" window (Figure 6-17) will pop up.

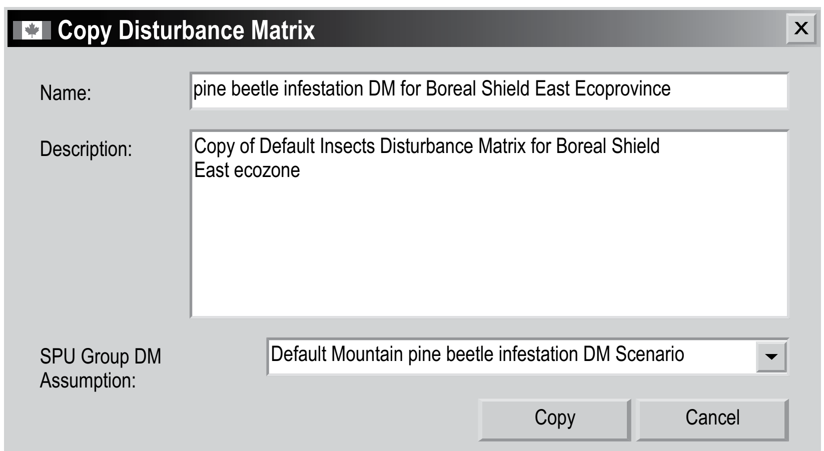


Figure 6-17. The "Copy Disturbance Matrix" window.

3. **Type a new name for the matrix in the "Name" box**
4. **Type a new description in the "Description" box**

If the new disturbance matrix is to be applied in simulation runs, it must be connected to an SPU Group Disturbance Matrix Assumption forming part of a Run Disturbance Matrix Assumption. To make this connection

5. **Click on the "SPU Group DM Assumption" box and select an option from the list that appears**
6. **Click on the "Copy" button to proceed**

   or

   Click on the "Cancel" button to terminate the process

If the user clicks on the "Copy" button, a smaller "Copy Disturbance Matrix" window will pop up stating, "A selected disturbance matrix is copied"

7. **Click on the "OK" button**

The copy of the disturbance matrix will appear in the "Resulting Disturbance Matrices" box in the "Search for Disturbance Matrices" window.

Deleting a Disturbance Matrix

To delete a disturbance matrix that is linked to a project in the Project Mode of the "Search for Disturbance Matrices" window (Figure 6-14)

1. **Click on the name of the disturbance matrix in the "Resulting Disturbance Matrices" box**
2. **Click on the "Delete" button**

A "Delete Record" window will pop up asking the user to confirm deletion of the selected disturbance matrix.

3. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the deletion

If the user clicks on the "Yes" button, the selected disturbance matrix will be deleted.

Adding a Disturbance Matrix

To create a new disturbance matrix if a desired disturbance matrix cannot be found in the "Resulting Disturbance Matrices" box

1. **In the "Search for Disturbance Matrices" window, click on the "Add a new disturbance matrix for the filters you have selected above by clicking here" link**

The "Add Disturbance Matrix" window (Figure 6-18) will pop up. To link the new disturbance matrix to an SPU Group

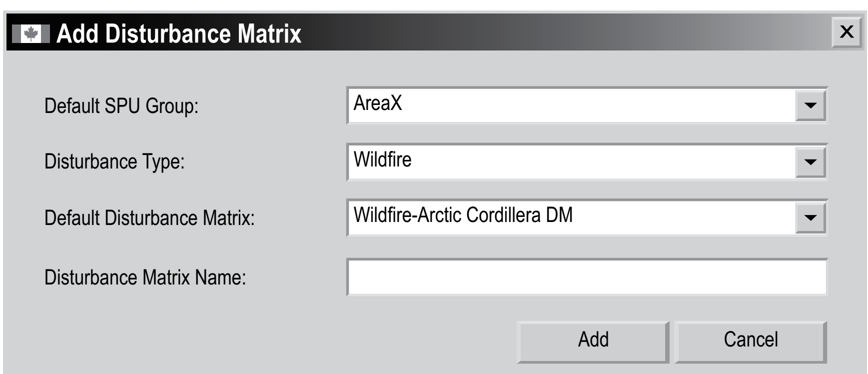


Figure 6-18. The "Add Disturbance Matrix" window.

2. **Click on the "Default SPUGroup" box and select an option from the drop list that appears**

Next, to associate the new disturbance matrix with a disturbance type

3. **Click on the "Disturbance Type" box and select an option from the drop list that appears**

Then, to select a default disturbance matrix to apply to the new disturbance matrix

4. **Click on the "Default Disturbance Matrix" box and select an option from the drop list that appears**
5. **Click on the "Disturbance Matrix Name" box and type in a name for the new disturbance matrix**
6. **Click on the "Add" button to proceed**

   or

   Click on the "Cancel" button to cancel the process

If the user clicks on the "Add" button, a "Disturbance Matrix Added" window will pop up

7. **Click on the "OK" button**

This new disturbance matrix will be displayed in the "Resulting Disturbance Matrices" box in the "Search for Disturbance Matrices" window. The user can now edit the new Disturbance Matrix if desired.

6.3.2 Default Mode

In the Default Mode of the "Search for Disturbance Matrices" window (Figure 6-19), the user can search for, edit, or copy a disturbance matrix, delete a user-created disturbance matrix, or add a new disturbance matrix.

Disturbances matrices accessible in the Default Mode will not be applied to a project unless they are mapped to the user's disturbances during the file import process or are added in Project Mode (see section 6.3.1).

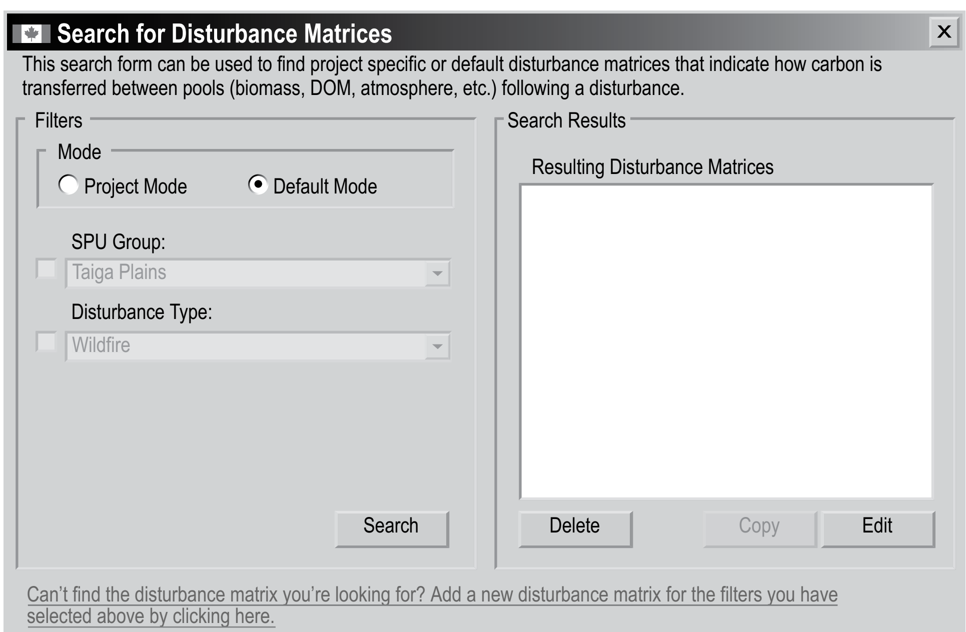


Figure 6-19. The "Search for Disturbance Matrices" window with "Default Mode" selected.

Searching for a Disturbance Matrix

To search for a disturbance matrix by SPU Group and/or Disturbance Type

1. **Click on the "SPUGroup" check box, click on the associated drop list box, and select an option from the list that appears**

   and/or

   Click on the "Disturbance Type" check box, click on the associated drop list box, and select an option from the drop list that appears
2. **Click on the "Search" button**

Any disturbance matrices found will be displayed in the "Resulting Disturbance Matrices" box. The user then has the option of editing or copying these disturbance matrices. Procedures for editing, copying, and adding a disturbance matrix are the same as those described in section 6.3.1.

6.4 Growth Curve Editor

The Growth Curve Editor can be used to find, view the details of, edit, and assign growth and yield curves imported into the CBM-CFS3. Users can also use this tool to create new curves and assign them to forest types and spatial units. Growth and yield curves in the Growth Curve Editor are, or can be, linked to Run Growth Assumptions in the assumption composer for Growth and Yield (Figure 6-20).

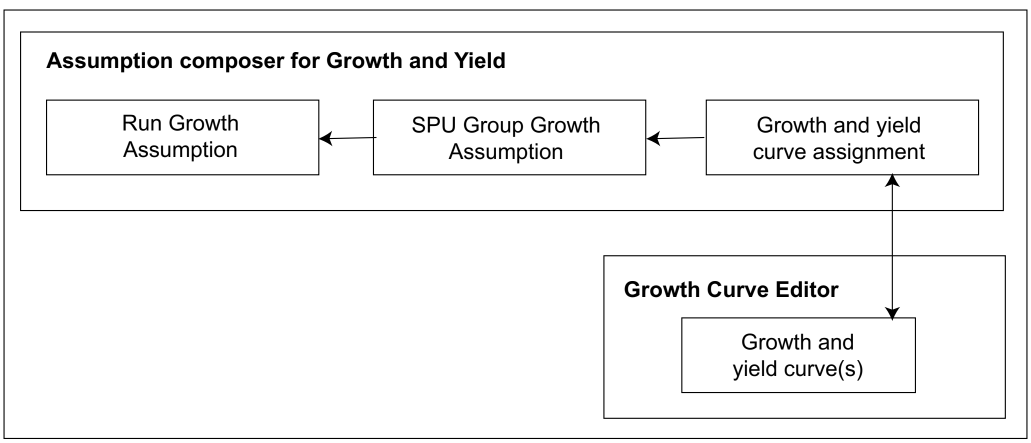


Figure 6-20. Link between the assumption composer for Growth and Yield and the Growth Curve Editor.

To access the Growth Curve Editor

Click on "Tools" on the menu bar of the main CBM-CFS3 window

Select "Data Editors" from the drop list that appears

Select "Growth Curve" from the side drop list that appears

The "Search for Growth and Yield Information" window (Figure 6-21) will pop up. In this window, the user can search for and edit existing growth and yield curves or add a new growth and yield curve.

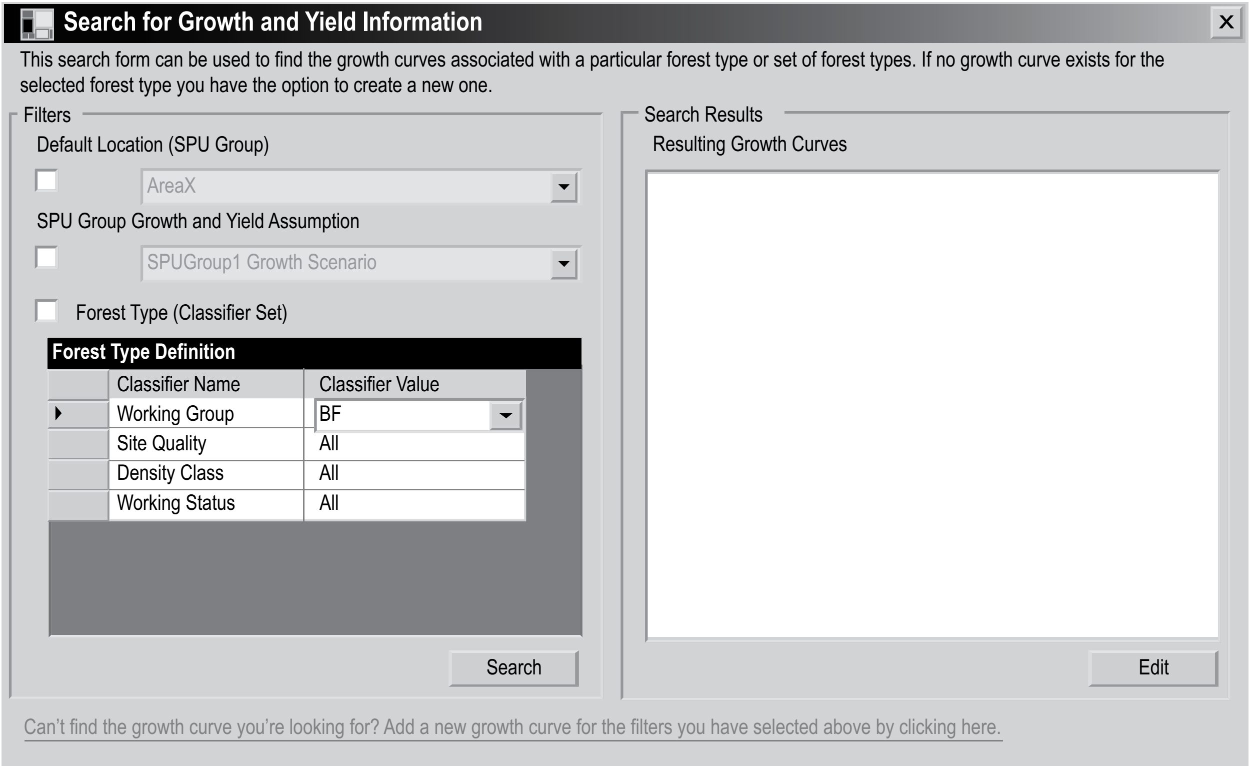


Figure 6-21. The "Search for Growth and Yield Information" window.

6.4.1 Searching for a Growth and Yield Curve

To locate a growth and yield curve, the user can filter the search by Default Location (SPU Group) and/or SPU Group Growth and Yield Assumption and/or Forest Type (Classifier Set). To do this

1. **Click on the "Default Location (SPU Group)" check box and select an option from the drop list that appears**

   and/or

   Click on the "SPU Group Growth and Yield Assumption" check box and select an option from the drop list that appears

   and/or

   Click on the "Forest Type (Classifier Set)" check box, click on any of the cells and select an appropriate value in the "Classifier Value" column of the "Forest Type Definition" table
2. **Click on the "Search" button**

Any growth and yield curve(s) found will be displayed in the "Resulting Growth Curves" box. The user has the option of viewing and editing these growth and yield curves.

6.4.2 Editing and Viewing a Growth and Yield Curve

Once a desired growth and yield curve is displayed in the "Resulting Growth Curves" box, it can be edited. To proceed

1. **Click on the name of the curve in the "Resulting Growth Curves" box**
2. **Click on the "Edit" button**

The "Growth Curve Editor" window (Figure 6-22) will pop up. This window can display information for a growth and yield curve in three ways: a Merchantable Volume Graph, a Biomass Carbon Graph, and a Growth Curve Details display. Growth and yield curves for merchantable volume or biomass carbon by age are displayed in a graph accompanied by a table of the data. The "Growth Curve Details" display (Figure 6-22) shows a merchantable volume growth and yield curve for each species component by age. The "Growth Curve Details" display is used for editing data, whereas the graph displays are used for viewing data. The "Growth Curve Details" display also contains modifiable information about assumption relationships for the growth and yield curve, including the growth assumption(s) with which the curve is associated (if any) and the biomass conversion assumption to be associated with the curve when the Biomass Carbon Graph is displayed. Growth and yield curves can be linked to an SPU Group Growth Assumption in the Run Growth Assumption Composer (see section 7.10).

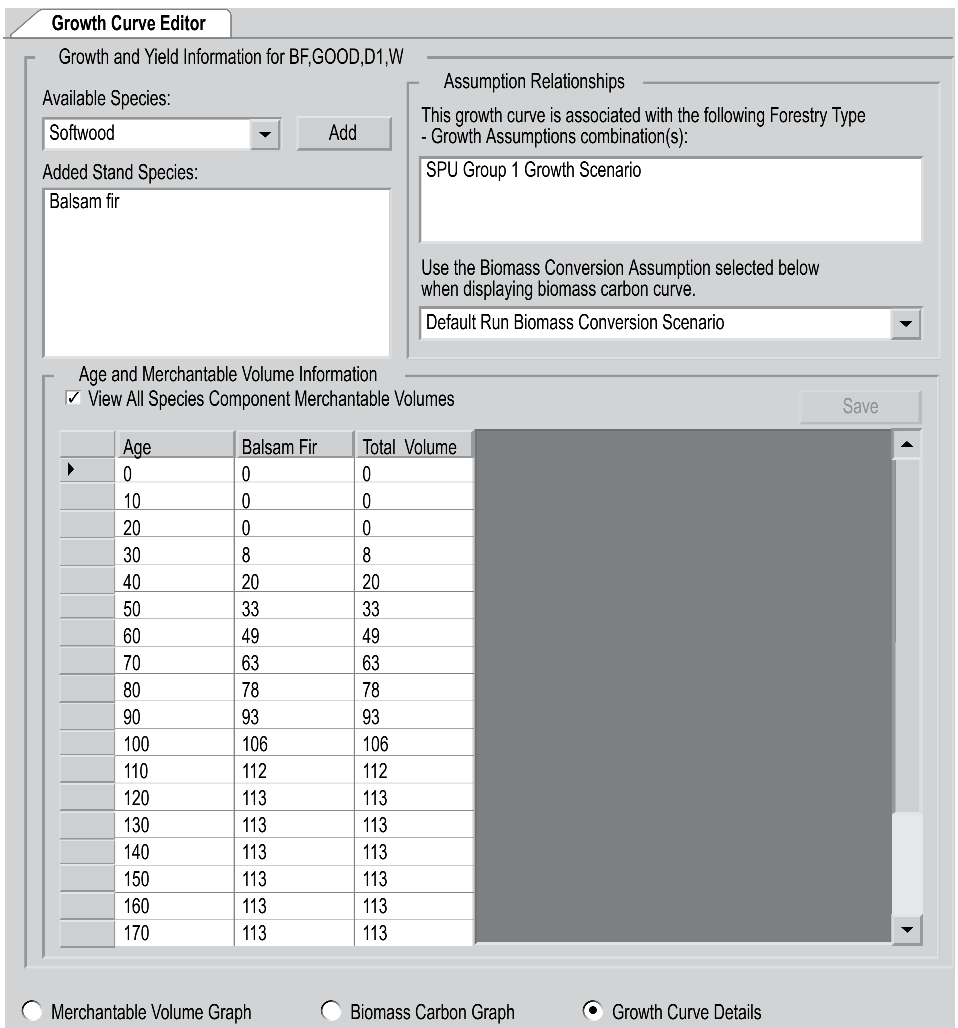


Figure 6-22. The "Growth Curve Editor" window with the "Growth Curve Details" display selected.

Editing a Growth and Yield Curve

To edit a growth and yield curve in the "Growth Curve Editor" window

1. **Click on the "Growth Curve Details" radio button**

To add a new species to the growth and yield curve

2. **Click on the "Available Species" box and select an option from the drop list that appears**
3. **Click on the "Add" button**

The name of the selected species will appear in the "Added Stand Species" box.

☞ *Tip: Deleting a species*

To remove an unwanted species from the "Added Stand Species" box

Click on the species name in the "Added Stand Species" box and press the "Delete" key on the computer keyboard

A "Delete Growth Curve Species" window will pop up asking the user to confirm deletion of the selected species.

Click on the "Yes" button to proceed

or

Click on the "Cancel" button to cancel the deletion

An age–merchantable volume table must be completed for each species appearing in the "Added Stand Species" box. To do this or to edit an existing set of age–volume pairs

4. **Click on the species name in the "Added Stand Species" box**
5. **Enter a value for merchantable volume in the "'species name' Volume" column corresponding to each age in the "Age" column**
6. **Click on the "Save" button**

☞ *Tip: Viewing all age–volume pairs for all species*

To view all of the age–volume pairs for all species associated with a growth and yield curve and the total volume in the "Age and Merchantable Volume Information" table

Click on the "View All Species Component Merchantable Volumes" check box, so that a check mark appears

---

To determine the Biomass Conversion Assumption to be used for the Biomass Carbon Graph

7. **Click on the "Use the Biomass Conversion Assumption selected below when displaying biomass carbon curve" box and select an assumption from the drop list that appears**

Viewing a Graph for a Growth and Yield Curve

To view the "Merchantable Volume Graph" (Figure 6-23) or the "Biomass Carbon Graph" (Figure 6-24)

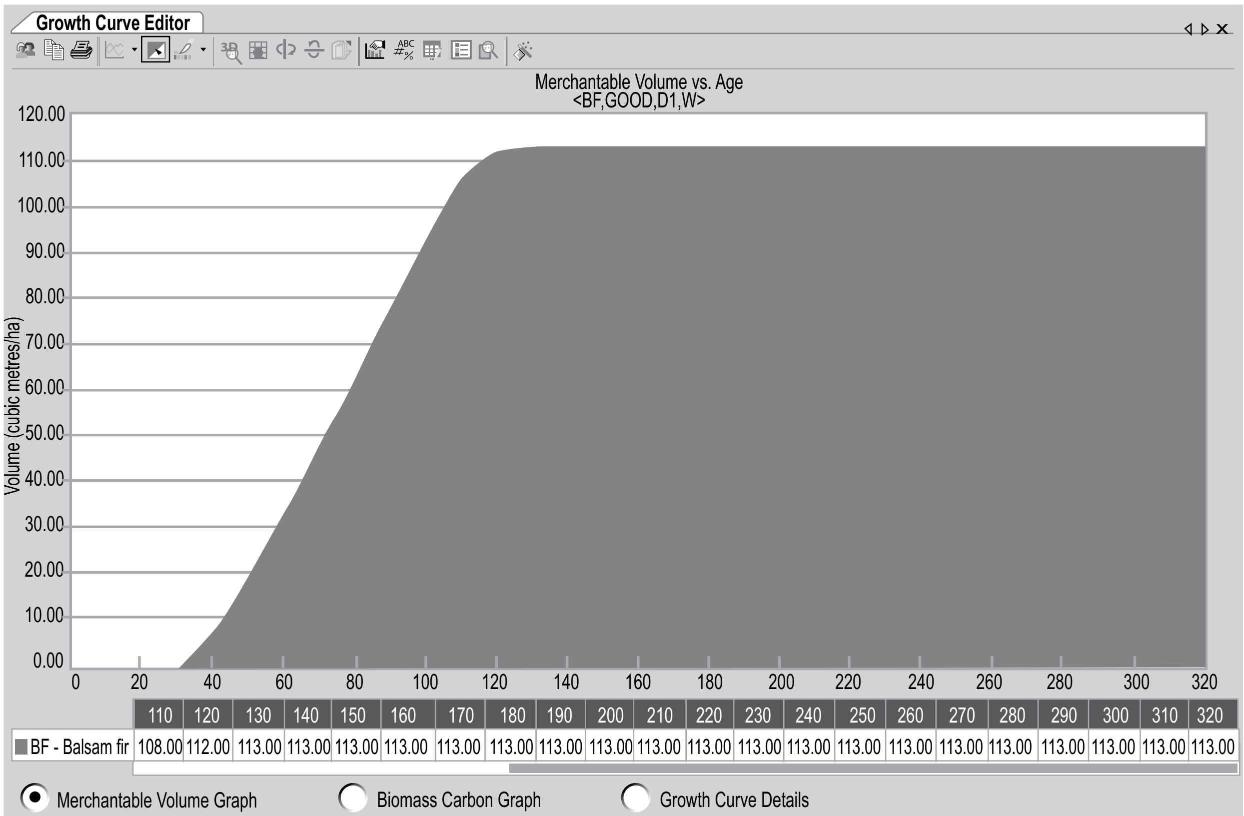
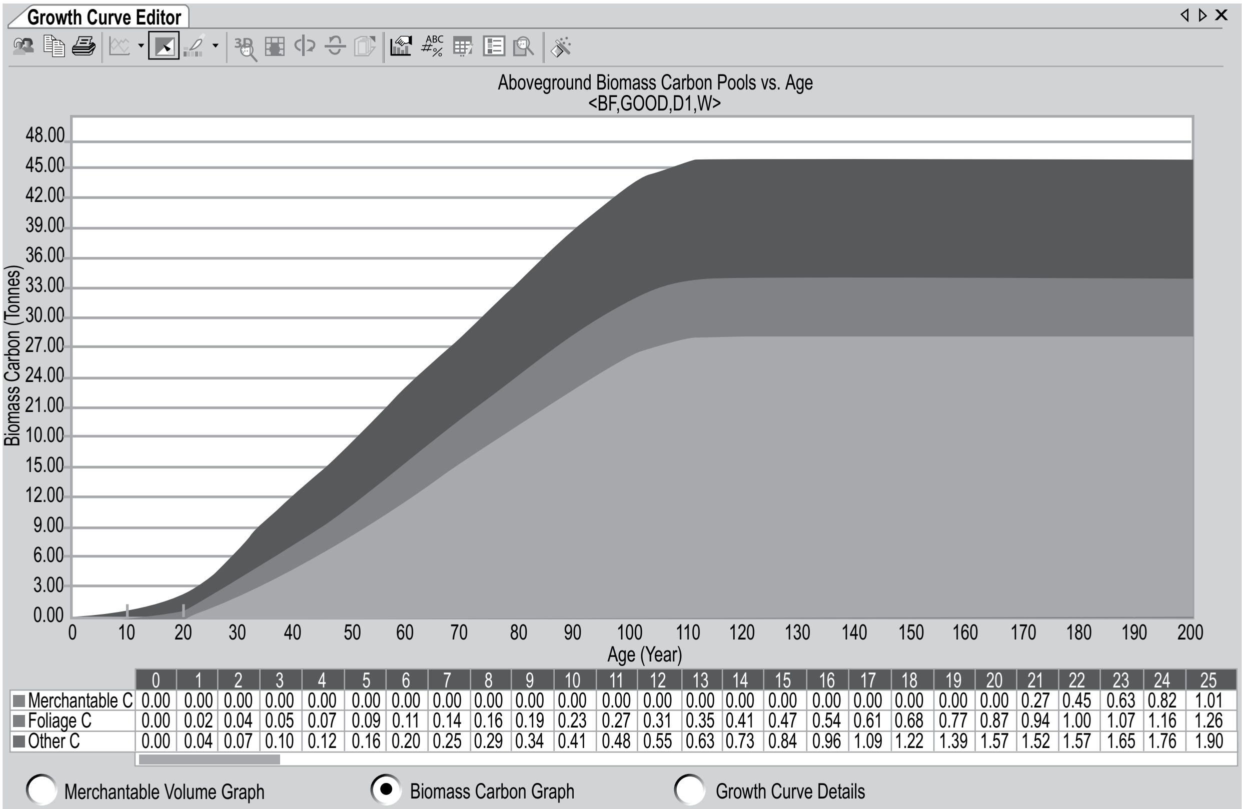


Figure 6-23. The "Growth Curve Editor" window with the "Merchantable Volume Graph" display selected.

> **Click on the "Merchantable Volume Graph" radio button or the "Biomass Carbon Graph" radio button**

The "Growth Curve Editor" window will display the selected graph. The "Merchantable Volume Graph" displays the amounts of merchantable volume by age, and the "Biomass Carbon Graph" displays the amount of biomass carbon by age. Summary tables of the amounts by age are displayed below each graph. Placing the cursor over any point on a graph will highlight the associated value in the table and vice versa. The way in which both the graph and the table is displayed can be modified (see Chapter 9); however, the data represented in each can be modified only by adding (see section 6.4.3) or editing (see this section, above) the growth and yield curves in the "Growth Curve Details" display.



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Merchantable C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.45	0.63	0.82	1.01
Foliage C	0.00	0.02	0.04	0.05	0.07	0.09	0.11	0.14	0.16	0.19	0.23	0.27	0.31	0.35	0.41	0.47	0.54	0.61	0.68	0.77	0.87	0.94	1.00	1.07	1.16	1.26
Other C	0.00	0.04	0.07	0.10	0.12	0.16	0.20	0.25	0.29	0.34	0.41	0.48	0.55	0.63	0.73	0.84	0.96	1.09	1.22	1.39	1.57	1.52	1.57	1.65	1.76	1.90

Figure 6-24. The "Growth Curve Editor" window with the "Biomass Carbon Graph" display selected.

6.4.3 Adding a Growth and Yield Curve

To create a new growth and yield curve if a desired growth and yield curve cannot be found by the process described in section 6.4.1

1. **In the "Search for Growth and Yield Information" window (Figure 6-21), click on the "Default Location (SPU Group)" check box, click on the associated drop list box, and select an option from the list that appears**

   and/or

   Click on the "SPU Group Growth and Yield Assumption" check box, click on the associated drop list box, and select an option from the drop list that appears

   and/or

   Click on the "Forest Type (Classifier Set)" check box, click on any of the cells, and select an appropriate value in the "Classifier Value" column of the "Forest Type Definition" table
2. **Click on the "Add a new growth curve for the filters you have selected above by clicking here" link**

An "Add Growth Curve" window will pop up, stating that a growth and yield curve has been created.

3. **Click on the "OK" button**

The "Growth Curve Editor" window (Figure 6-22) will pop up. The user must begin by identifying the species component of the growth and yield curve that is being created.

4. **Click on the "Available Species" box and select a species name from the drop list that appears**
5. **Click on the "Add" button**

The name of the selected species will appear in the "Added Stand Species" box.

6. **Click on the species name in the "Added Stand Species" box**

☞ *Tip: Removing an unwanted species*

To remove an unwanted species from the "Added Stand Species" box

Click on the species name in the "Added Stand Species" box and press the "Delete" key on the computer keyboard

In the "Age and Merchantable Volume Information" table

7. **Enter a value for merchantable volume in the "'species name' Volume" column corresponding to each age in the "Age" column**
8. **Click on the "Save" button**
9. **Repeat steps 4 to 8 to add more species components to the growth and yield curve**

☞ *Tip: Viewing all age–volume pairs for all species and total volume*

To view all of the age–volume pairs for all species associated with a growth and yield curve and the total volume in the "Age and Merchantable Volume Information" table

Click on the "View All Species Component Merchantable Volumes" check box, so that a check mark appears

To specify which Biomass Conversion Assumption is to be used for the Biomass Carbon Graph

10. **Click on the "Use the Biomass Conversion Assumption selected below when displaying biomass carbon curve" box and select an assumption from the drop list that appears**

The user should associate this curve with a Run Growth Assumption in the Run Growth Assumption Composer (see section 7.10).

6.5 Inventory Editor

The Inventory Editor can be used to view or edit the inventory of a project that has been opened in the CBM-CFS3.

To access the Inventory Editor window

1. **Click on "Tools" on the menu bar of the main CBM-CFS3 window**

2. **Select "Data Editors" from the drop list that appears**
3. **Select "Inventory" from the side drop list that appears**

The "Inventory Editor" window (Figure 6-25) will pop up. Inventory information in this window can be displayed as a graph of the area by age class with the "Graph" view (Figure 6-25) or as a summary table of the inventory with the "Summary" view (Figure 6-26).

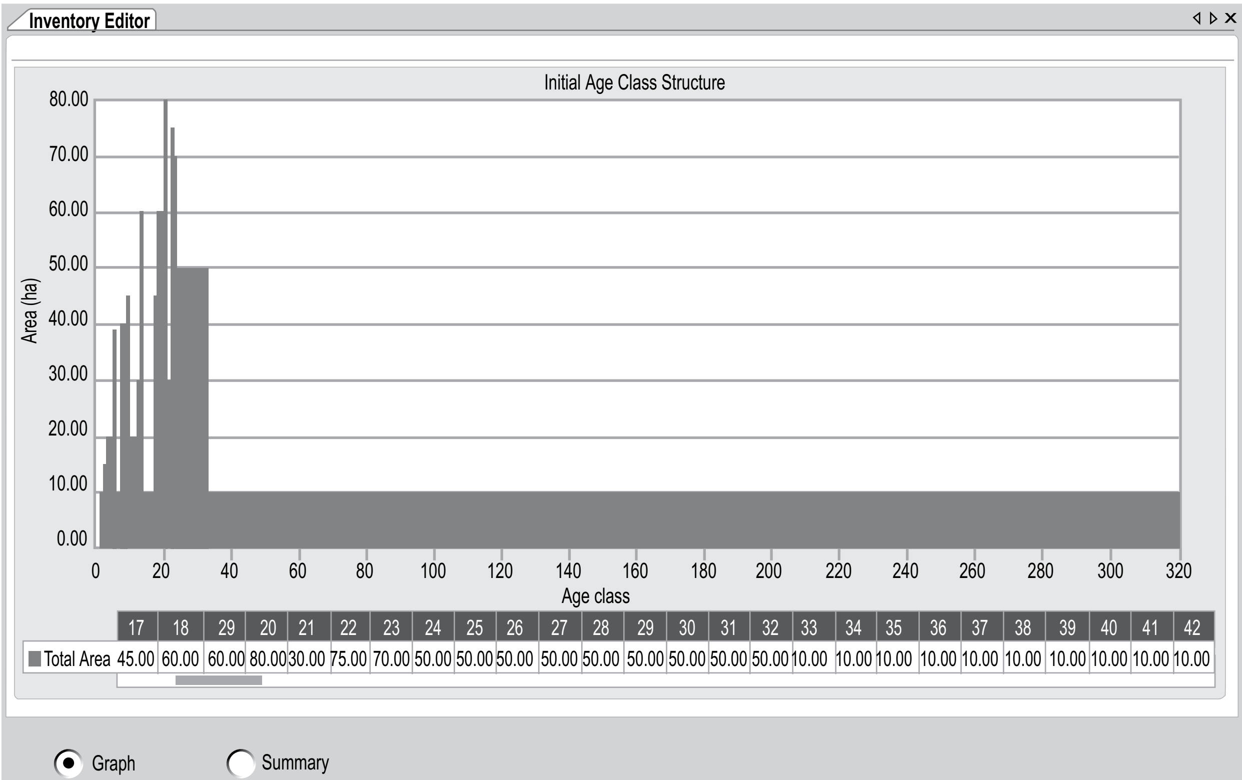


Figure 6-25. The "Inventory Editor" window with the "Graph" view selected.

6.5.1 Graph View

The "Graph" view (Figure 6-25) displays a graph and data table of the area by age class based on the inventory that has been opened in the CBM-CFS3. To access the "Graph" view in the "Inventory Editor" window

Click on the "Graph" radio button

The graph and data table of the amount of area by age class will be displayed. Placing the cursor over any point on the graph will highlight the associated value in the table and vice versa. The way in which both the graph and the table is displayed can be modified (see Chapter 9); however, the data represented in each can be modified only by editing or changing the inventory in the "Summary" view.

6.5.2 Summary View

In the "Summary" view, the user can view, edit, or load an inventory. To access the "Summary" view (Figure 6-26) in the "Inventory Editor" window

Click on the "Summary" radio button

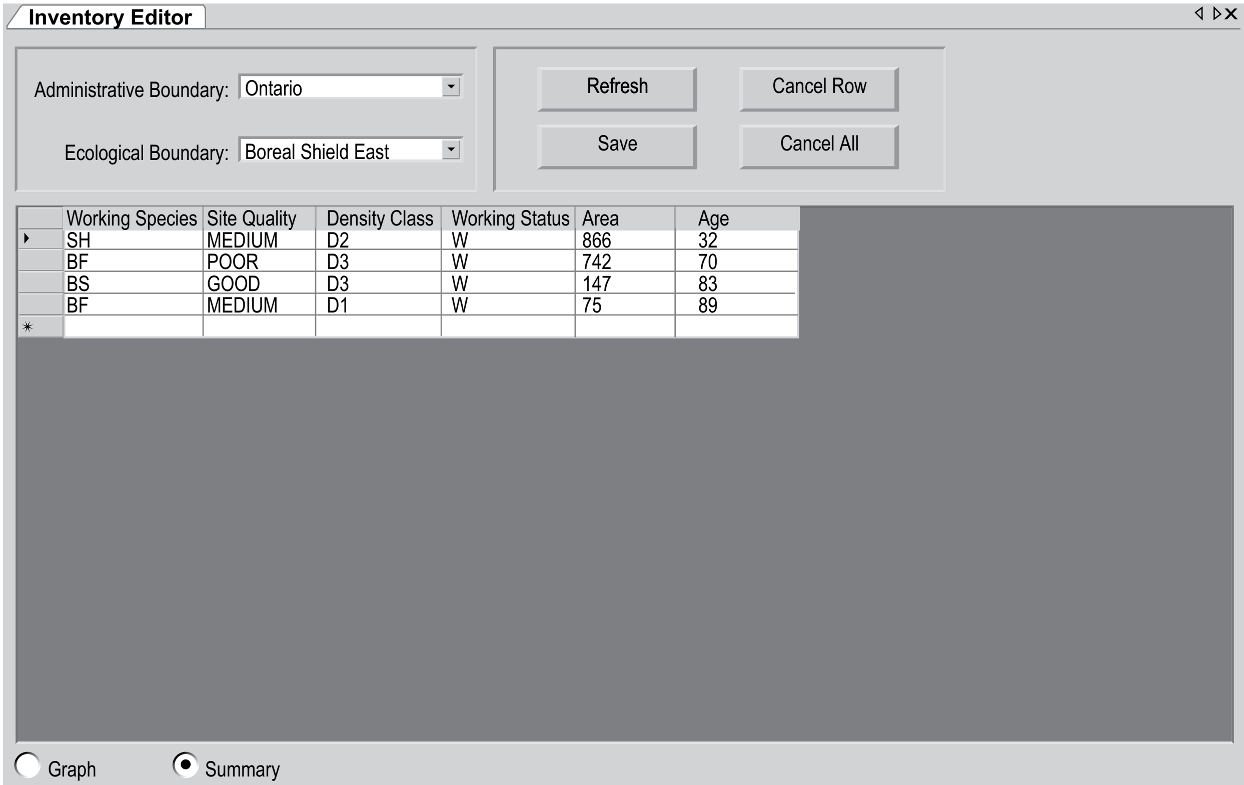


Figure 6-26. The "Inventory Editor" window with the "Summary" view selected.

Viewing Inventory Data

If the inventory data for a project is linked to only one administrative boundary and one ecological boundary, all of the data will be automatically displayed in the table in the "Summary" view of the "Inventory Editor" window.

If the inventory data for the project is linked to multiple administrative and/or ecological boundaries, the user can view the data for each combination. To proceed

1. **Click on the "Administrative Boundary" box and select an administrative boundary name from the drop list that appears**
2. **Click on the "Ecological Boundary" box and select an ecological boundary name from the drop list that appears**

The table will display the project data for the boundaries selected, and the user can edit the inventory data if desired.

Editing Inventory Data

To edit the inventory data for the project currently open in the CBM-CFS3 or data that have been loaded into the editor

1. **Click on the "Refresh" button**
2. **Edit the data in the inventory table**

☞ *Tip: Deleting a row of data*

To remove a row of data

Click on the gray cell next to the row containing the data

Click on the "Cancel Row" button

3. **Click on the "Save" button**

   or

   Click on the "Cancel All" button to undo any edits

If the user clicks on the "Save" button, an "Inventory Editor" window will pop up asking the user to confirm the edits

4. **Click on the "Yes" button to continue**

   or

   Click on the "No" button to cancel the edits

6.6 Transition Rules Editor

The Transition Rules Editor can be used to search for, edit, or add transition rules for any disturbances imported or created for a project. Transition rules describe the forest type(s) to which a particular forest type will convert at a particular age following a particular disturbance event. Transition rules in the Transition Rules Editor can be linked to specific assumptions in the assumption composer for Disturbance and Management (see Figure 6-27).

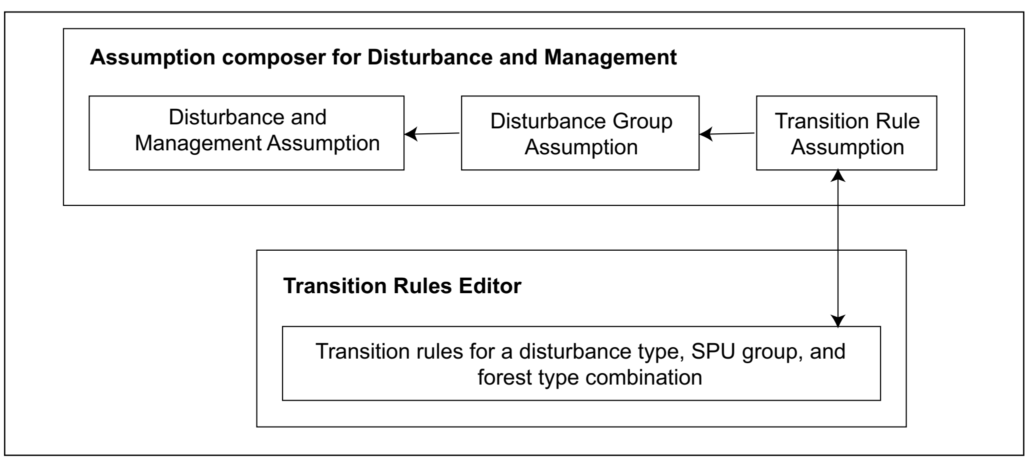


Figure 6-27. Links between the assumption composer for Disturbance and Management and the "Transition Rules Editor".

To access the "Transition Rules Editor" window

1. **Click on "Tools" on the menu bar of the main CBM-CFS3 window**
2. **Select "Data Editors" from the drop list that appears**
3. **Select "Transition Rules" from the side drop list that appears**

The "Search for Transition Rule Assumptions" window (Figure 6-28) will pop up. In this window, the user must search for existing Transition Rule Assumptions in the project database that is open. The user can then edit any transition rules within the Transition Rule Assumptions that are found or can add new transition rules. In addition, a new transition rule can be added through this window if a desired Transition Rule Assumption cannot be found through a search.

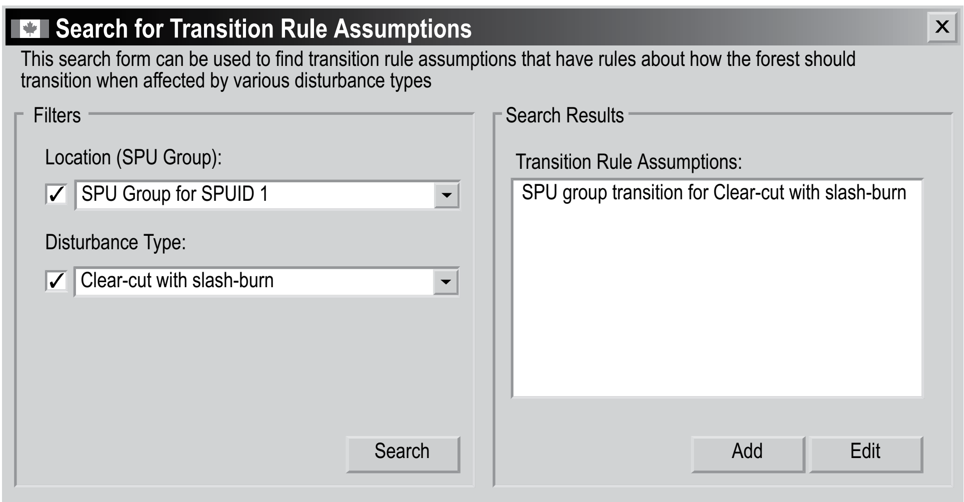


Figure 6-28. The "Search for Transition Rule Assumptions" window.

6.6.1 Searching for Transition Rule Assumptions

To locate a Transition Rule Assumption, users can filter their search by Location (SPU Group) and/or Disturbance Type. To proceed

1. **Click on the "Location (SPU Group)" check box, click on the associated drop list box, and select an option from the list that appears,**

   and/or

   Click on the "Disturbance Type" check box, click on the associated drop list box, and select an option from the drop list that appears
2. **Click on the "Search" button**

Any Transition Rule Assumptions found will be displayed in the "Transition Rule Assumptions" box. The user has the option of viewing and editing transition rules associated with the Transition Rule Assumption that was found or of adding a new Transition Rule Assumption.

6.6.2 Viewing and Editing Transition Rules

To view or edit an appropriate Transition Rule Assumption that has been found and displayed in the "Transition Rule Assumptions" box in the "Search for Transition Rule Assumptions" window (Figure 6-28)

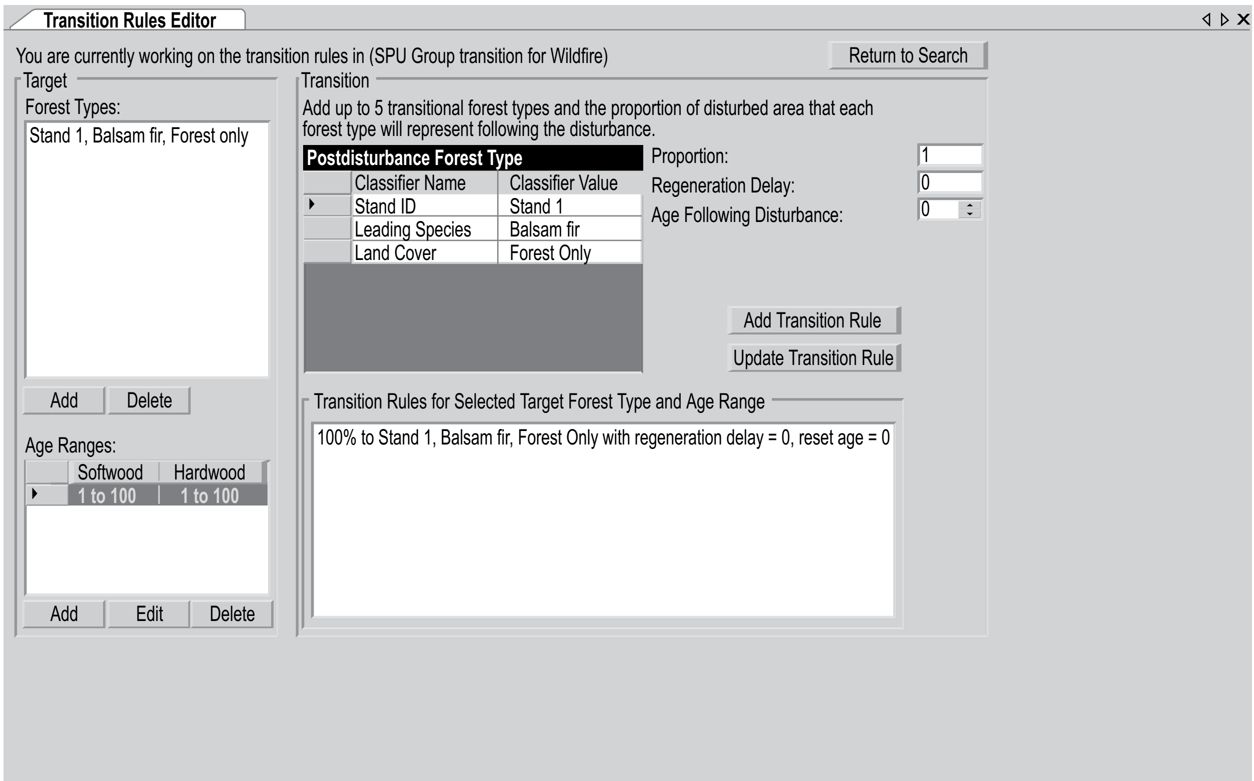


Figure 6-29. The "Transition Rules Editor" window.

1. **Click on the name of the transition rule assumption in the "Transition Rule Assumptions" box**
2. **Click on the "Edit" button**

The "Transition Rules Editor" window (Figure 6-29) will pop up. This window displays any existing transition rules for the selected Transition Rule Assumption (the name of which is displayed at the top of the window). A transition rule is composed of one or more forest types, each with its own hardwood and/or softwood component age ranges (affected by the disturbance), and the post-disturbance forest type(s) (the forest type[s] to which the original forest type[s] will convert following the disturbance, the age after disturbance, the proportion undergoing transition, and the regeneration delay). Users can add or delete forest types, and add, edit, or delete age ranges and the postdisturbance forest type for each forest type added to the Transition Rule Assumption. To return to the "Search for Transition Rule Assumptions" window, click on the "Return to Search" button.

Adding Forest Types

The user can add one or more forest types to the "Forest Types" box in the "Transition Rules Editor" window. Forest types that appear in this box should be eligible to be affected by the disturbance type associated with the chosen Transition Rule Assumption (the name of which is displayed at the top of the window). To add forest types to this box

1. **Click on the "Add" button below the "Forest Types" box**

The "Add/Edit Target Transition Information" window will pop up (Figure 6-30).

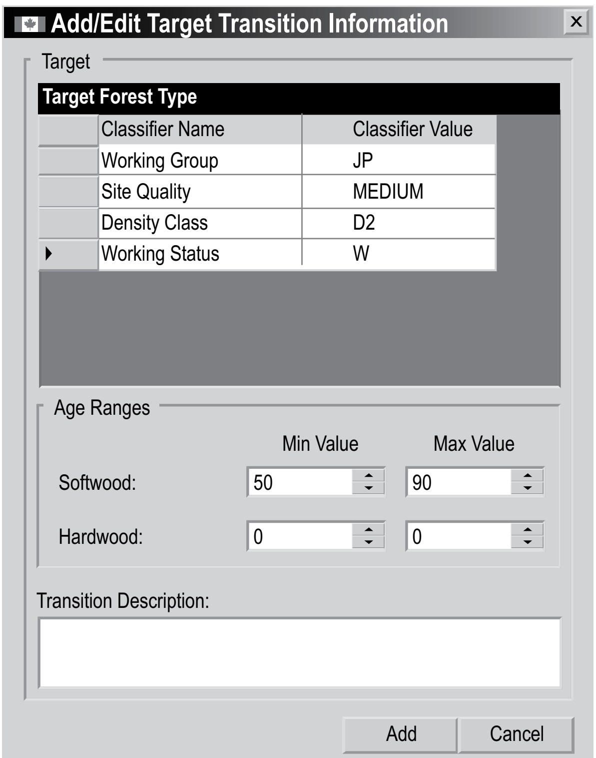


Figure 6-30. The "Add/Edit Target Transition Information" window.

To select the specific forest type

2. **Click on a cell in the "Classifier Value" column and select an option from the drop list that appears for each "Classifier Name" in the "Target Forest Type" table**

Next, the user must define the age range within the selected forest type that can be affected by the disturbance associated with the Transition Rule Assumption. To proceed

3. **Click on the arrows in the "Min Value" and "Max Value" boxes for softwood and hardwood to select minimum and maximum eligible ages (optional)**
4. **Type a description in the "Description" box (optional)**
5. **Click on the "Add" button to proceed**

   or

   Click on the "Cancel" button to cancel the addition

If the user clicks on the "Add" button, the "Add/Edit Target Transition Information" window will close. The new forest type will appear in the "Forest Types" box, and the age ranges will appear in the "Age Ranges" box in the "Transition Rules Editor" window.

Deleting Forest Types

To delete forest types appearing in the "Forest Types" box in the "Transition Rules Editor" window that are not affected by the disturbance type associated with the chosen Transition Rule Assumption (the name of which is displayed at the top of the window)

1. **Click on the name of a forest type in the "Forest Types" box**
2. **Click on the "Delete" button under the "Forest Types" box**

A "Delete Record" window will pop up asking the user to confirm deletion of the forest type.

3. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the deletion

If the user clicks the "Yes" button, the selected forest type, along with its associated age class ranges and transition rules, will be removed from the "Transition Rules Editor" window.

Adding Age Ranges

Each forest type in the "Forest Types" box in the "Transition Rules Editor" window must be associated with an age range representing the period of time that the forest type is eligible for the disturbance type associated with the chosen Transition Rule Assumption (the name of which is displayed at the top of the window) (Figure 6-29).

To add an age range (if such was not added when the forest type was added or if additional age ranges are required)

1. **Click on a forest type in the "Forest Types" box**
2. **Click on the "Add" button below the "Age Ranges" table**

The "Add/Edit Target Transition Information" window will pop up (Figure 6-30).

Note: Editing Forest Type

Although forest type and a transition description are displayed along with age range information in the "Add/Edit Target Transition Information" window, these fields cannot be edited until the "Forest Types" table is enabled. To edit a forest type, the user must click on the "Add" button under the "Forest Types" table in the "Transition Rules Editor" window. The "Add/Edit Target Transition Information" window will pop up with forest type enabled.

In the "Age Ranges" box, the user can enter age ranges for both softwood and hardwood components of forest types. "Min Value" is the lowest age of the selected forest type eligible for the disturbance associated with the selected Transition Rule Assumption, and "Max Value" is the highest age of the selected forest type eligible for the disturbance associated with the selected Transition Rule Assumption.

3. **Click on the arrows in the "Min Value" and "Max Value" boxes for the softwood component to select an appropriate age range**

   and/or

   Click on the arrows in the "Min Value" and "Max Value" boxes for the hardwood component to select an appropriate age range
4. **Click on the "Add" button to proceed**

   or

   Click on the "Cancel" button to cancel the addition

If the user clicks on the "Add" button, the "Add/Edit Target Transition Information" window will close. The new age range(s) will appear in the "Age Ranges" table and the forest type with which they are associated will be highlighted in the "Forest Types" box.

Editing Age Ranges

To edit an existing age range associated with a forest type in the "Forest Types" box in the "Transition Rules Editor" window

1. **Click on a forest type in the "Forest Types" box**
2. **Click on the gray cell next to the row containing the age range to be edited in the "Age Ranges" table**
3. **Click on the "Edit" button**

The "Add/Edit Target Transition Information" window will pop up (Figure 6-30).

Note: Editing Forest Type

Although forest type and a transition description are displayed along with age range information in the "Add/Edit Target Transition Information" window, these fields cannot be edited until the "Forest Types" table is enabled. To edit forest type, the user must click on the "Add" button under the "Forest Types" table in the "Transition Rules Editor" window. The "Add/Edit Target Transition Information" window will pop up again with forest type enabled.

4. **Click on the arrows in the "Min Value" and "Max Value" boxes for the softwood component to edit the age ranges**

   and/or

   Click on the arrows in the "Min Value" and "Max Value" boxes for the hardwood component to edit the age ranges
5. **Click on the "Update" button to proceed (the "Update" button replaces the "Add" button in Figure 6-30)**

   or

   Click on the "Cancel" button to cancel the edits

If the user clicks on the "Update" button, the "Add/Edit Target Transition Information" window will close. The edited age range(s) will appear in the "Age Ranges" table and the forest type with which they are associated will be highlighted in the "Forest Types" box.

Deleting Age Ranges

To delete an age range associated with a forest type appearing in the "Forest Types" box in the "Transition Rules Editor" window

1. **Click on a forest type in the "Forest Types" box**
2. **In the "Age Ranges" table, click on the gray cell beside the age range to be deleted**
3. **Click on the "Delete" button under the "Age Ranges" table**

A "Delete Record" window will pop up asking the user to confirm deletion of the age ranges.

4. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the deletion

Adding Transition Rules

A transition rule describes the change in forest type that results from a disturbance or management event. The postdisturbance forest type is the forest type to which the target (original) forest type will convert (if different from the original) after a disturbance event or management activity. To add a Target Forest Type in the "Transition Rules Editor" window (Figure 6-29)

1. **Click on a forest type in the "Forest Types" box**

Note: Transitions back to the target forest type

It is not necessary to add a postdisturbance forest type if the target forest type converts back to the same forest type following disturbance. In this situation, the same forest type will automatically appear in the "Transition Rules for Selected Target Forest Type and Age Range" box.

To select the forest type that will result following the disturbance

2. **In the "Postdisturbance Forest Type" table, click on each row associated with a classifier name in the "Classifier Value" column, and select an option from the drop list that appears**

Next, the user must enter the proportion (e.g., 0.2 for 20%) of the target forest type that will become the postdisturbance forest type. To proceed

3. **Enter a proportion in the "Proportion" box**

Note: Entering a proportion

If only one postdisturbance forest type is created for the target forest type, the proportion is 100% and the value entered must be 1. If more than one postdisturbance forest type is created for the target forest type, the proportions entered must sum to 1.

To enter the regeneration delay for the postdisturbance forest following the disturbance

4. **Enter a number of years in the "Regeneration Delay" box**

Next, the user must select, on the growth and yield curve for the postdisturbance forest type, the age at which the postdisturbance forest type will begin growing. For example, target forest types burned in a wildfire may convert to postdisturbance forest types at age zero, whereas target forest types that are commercially thinned may convert to postdisturbance forest types at age 25. To proceed

5. **Click on the arrows in the "Stand Age following Transition" box to select an age (if required)**
6. **Click on the "Add Transition Rule" button**

The new transition rule will appear in the "Transition Rules for Selected Source Forest Type and Age Range" box.

Editing Transition Rules

Existing transition rules for a target forest type will appear in the "Transition Rules for Selected Source Forest Type and Age Range" box. To edit an existing transition rule for a target forest type in the "Forest Types" box (Figure 6-29)

1. **Click on a forest type in the "Forest Types" box**
2. **Click on a transition rule in the "Transition Rules for Selected Source Forest Type and Age Range" box**

The user can then proceed through a number of optional steps to edit the transition rule. In the "Postdisturbance Forest Type" table

3. **Click on each row associated with a classifier name in the "Classifier Value" column, and select an option from the drop list that appears**
4. **Enter a new proportion in the "Proportion" box**

Note: Entering a proportion

If only one postdisturbance forest type is created for the target forest type, the proportion is 100% and the value entered must be 1. If more than one postdisturbance forest type exists, the proportions entered must sum to 1.

5. **Enter a new number in the "Regeneration Delay" box**
6. **Click on the arrows in the "Stand Age following Transition" box to select a new age**
7. **Click on the "Update Transition Rule" button**

   or

   Right-click over the transition rule in the "Transition Rules for Selected Source Forest Type and Age Range" box and click "Update" on the menu that appears

Deleting Transition Rules

To delete an existing transition rule

1. **Click on a target forest type in the "Forest Types" box (Figure 6-29)**
2. **Right-click over a transition rule in the "Transition Rules for Selected Source Forest Type and Age Range" box**
3. **Click "Delete" on the menu that appears**

A "Delete Record" window will pop up asking the user to confirm deletion of the transition rule.

4. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the deletion process

If any transition rules remain in the "Transition Rules for Selected Source Forest Type and Age Range" box, the user will need to update the proportions for each so that 100% of the target forest type is accounted for in transitions to the postdisturbance forest types.

6.6.3 Adding Transition Rule Assumptions

Users who do not find an appropriate Transition Rule Assumption through a search in the "Search for Transition Rule Assumptions" window (Figure 6-28) have the option of creating a new Transition Rule Assumption. To do this in the "Search for Transition Rule Assumptions" window

Click on the "Add" button

This will cause the "Disturbance & Management" tab (see Figure 7-17 in Chapter 7) of the "Assumption Composers" window to pop up. On the "Transition Rule Assumption" tab (see Figure 7-19 in Chapter 7), the user must create a new Transition Rule Assumption (see section 7.9.9). Once the new Transition Rule Assumption has been created, the user can add transition rules to the assumption, either by clicking the "Add/Edit Transition Rules" button on the "Transition Rule Assumption" tab or by returning to the "Search for Transition Rule Assumptions" window, searching for the new assumption, and then editing the rules.

6.7 Default Input Data Editor

The Default Input Data Editor can be used to add, edit, or copy default disturbances or tree species (and their biomass parameters) in the model. In addition, user-created disturbance types can be deleted with this editor. If the user accesses the Default Input Data Editor while a project is open, they will be able to add, edit, or copy (or delete, as discussed above) only disturbances or tree species that are linked to the open project. If no project is open, any additions or edits will modify the CBM-CFS3 template database affecting all new projects created in the model. To access the "Default Input Data Editor" window (Figure 6-31)

1. **Click on "Tools" on the menu bar of the main CBM-CFS3 window**
2. **Select "Data Editors" from the drop list that appears**
3. **Select "Default Input Data Editor" from the side drop list that appears**

The "Default Input Data Editor" window will pop up. This window can be closed by clicking the "Close" button.

6.7.1 Adding a Disturbance Type

To add a default disturbance type

1. **Click on the "Disturbance Type" tab**
2. **Click on the "Add New" button**

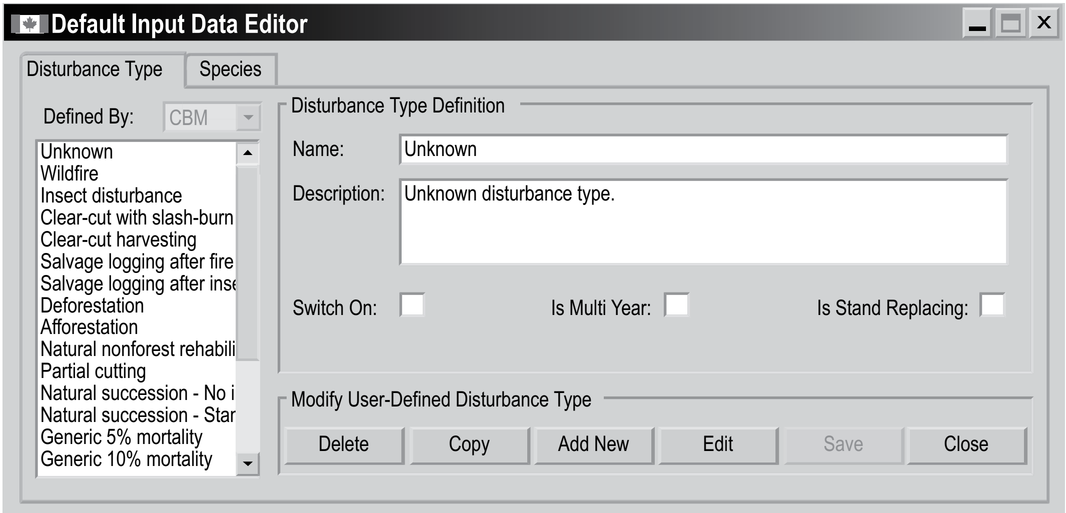


Figure 6-31. The "Default Input Data Editor" with the "Disturbance Type" tab selected.

3. **Enter a name in the "Name" box**
4. **Enter a description in the "Description" box**
5. **Click on the "Switch On" check box to turn the disturbance on (if required)**
6. **Click on the "Is Multi Year" check box to indicate that the disturbance can occur in more than one year (if required)**
7. **Click on the "Is Stand Replacing" check box to indicate that the disturbance completely removes a stand and returns the age class to zero (if required)**
8. **Click on the "Save" button to proceed**

   or

   Click on the "Cancel" button to cancel the addition

If the user clicks on the "Save" button, the new default disturbance type will be added to the box listing default disturbance types and the "Search for Disturbance Matrices" window (Figure 6-14) will pop up. In the Default Mode of this window, the new disturbance can be found by filtering for disturbance type, and it can then be selected and edited. To learn how to edit the disturbance matrix for the new disturbance type, see section 6.3.2.

6.7.2 Editing a Disturbance Type

To edit a disturbance type

1. **Click on the "Disturbance Type" tab in the "Default Input Data Editor" window (Figure 6-31)**
2. **Click on a disturbance type in the box listing all disturbance types**
3. **Click on the "Edit" button**
4. **Make the necessary edits to the "Name" and "Description" boxes and any applicable check boxes**

5. **Click on the "Save" button to proceed**

   or

   Click on the "Cancel" button to cancel the edits

6.7.3 Copying a Disturbance Type

To copy a disturbance type

1. **Click on the "Disturbance Type" tab (Figure 6-31)**
2. **Click on a disturbance type in the box listing all disturbance types**
3. **Click on the "Copy" button**

The "Search for Disturbance Matrices" window (Figure 6-14) will pop up. In the "Default Input Data Editor" window, the copied disturbance type will appear in the box listing disturbance types. To change the name or description of the copied disturbance type, the user can edit the disturbance type (see section 6.7.2). Once all of the edits are completed, the user will need to turn their attention to the "Search for Disturbance Matrices" window. In this window

4. **Click on the "Default Mode" radio button**
5. **Click on the "Search" button**

The "Resulting Disturbance Matrices" box will display a list of disturbance matrices by disturbance type–terrestrial ecozone combination. For more infomation on how to select and edit a disturbance matrix for a new disturbance type–terrestrial ecozone combination, read section 6.3.2.

6.7.4 Deleting a Disturbance Type

Any disturbance type that the user has created can also be deleted, but model default disturbance types cannot be deleted. To delete a user-created disturbance type

1. **Click on the name of the disturbance type in the box containing the list of disturbances on the "Disturbance Type" tab of the "Default Input Data Editor" window (Figure 6-31)**
2. **Click on the "Delete" button**

A "Delete Disturbance Type" window will pop up asking the user to confirm deletion of the selected disturbance type.

3. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the deletion

If the user clicks on the "Yes" button, the disturbance type will be deleted and any associated disturbance matrices will also be deleted.

6.7.5 Adding a Default Tree Species

To add a default tree species

1. **Click on the "Species" tab (Figure 6-32)**
2. **Click on the "Genus" box and select a genus from the drop list that appears**

3. **Click on the "Add New" button**
4. **Enter the tree species name in the "Name" box**

Next, the user must enter the Canadian Forest Inventory (CanFI) code for the species (see Appendix 3, Canadian Forest Inventory Codes for Tree Species).

5. **Enter the CanFI code in the "CanFI_Code" box**

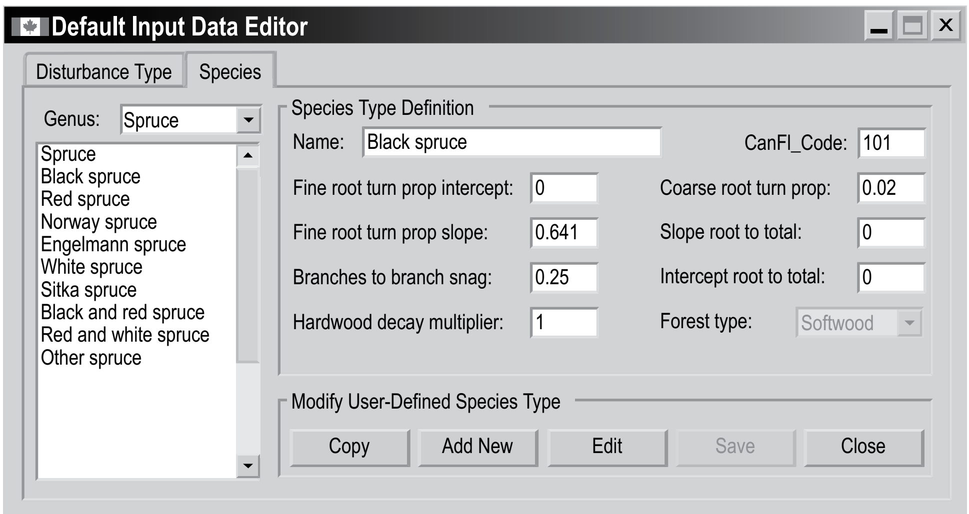


Figure 6-32. The "Default Input Data Editor" with the "Species" tab selected.

Note: Slope and intercept parameters disabled

Although the "Fine root turn prop intercept," "Fine root turn prop slope," "Slope root to total," and "Intercept root to total" boxes display default values and can be edited, these parameters are currently not applied in model calculations. In future versions of the CBM-CFS3 these parameters will be replaced with parameters from the equations in Li et al. (2003), and the new parameters will be enabled.

To enter the coarse root turnover proportion, representing the proportion (from 0 to 1) of coarse root biomass carbon that transfers to the fast belowground DOM pool annually

6. **Enter a proportion in the "Coarse root turn prop" (coarse root turnover proportion) box**

To enter the branch biomass to branch snags proportion, representing the proportion (from 0 to 1) of branch turnover that transfers to the branch snag pool annually

7. **Enter a proportion in the "Branches to branch snag" box**

To enter the hardwood decay multiplier, a number (from 0 to a maximum defined by the user) that can be used to increase or decrease decay rates of DOM pools for hardwood relative to softwood

8. **Enter a multiplier in the "Hardwood decay multiplier" box**
9. **Click on the "Forest type" box and select a type from the drop list that appears**

10. **Click on the "Save" button to proceed**

    or

    Click on the "Cancel" button to cancel the addition

If the user clicks on the "Save" button, the new default species type will appear in the box listing species.

6.7.6 Editing a Default Tree Species

To edit a default tree species

1. **Click on the "Species" tab (Figure 6-32)**
2. **Click on the "Genus" box and select a genus from the drop list that appears**
3. **Click on a tree species name in the box listing tree species**
4. **Click on the "Edit" button**
5. **Make the required modifications to any of the Species Type Definition options**
6. **Click on the "Save" button to proceed**

   or

   Click on the "Cancel" button to cancel the edits

6.7.7 Copying a Default Tree Species

To copy a default tree species

1. **Click on the "Genus" box and select a genus from the drop list that appears (Figure 6-32)**
2. **Click on the name of a tree species in the box listing tree species**
3. **Click on the "Copy" button**

The copied tree species will appear in the box listing tree species, where it will be named as a copy (e.g., "Copy of Trembling Aspen"). Users can edit the name, associated data, and parameters of the copy (as described in section 6.7.6).

CHAPTER 7

RUNNING SIMULATIONS AND BUILDING ASSUMPTIONS

The preceding chapters have described how to import data into a project, manage a project, edit imported project data, and run a project as a simulation. This chapter provides additional information about the Simulation Scheduler and its functions and introduces and describes the Assumption Composer Tools.

When the user imports data and information into a project in the CBM-CFS3, the model uses those data and information to create default assumptions about stand (carbon) initialization, biomass turnover, climate, DOM turnover, disturbance matrices, disturbance and management events, growth and yield, and volume-to-biomass; additional assumptions are created for the project run and simulation. When the user runs a Simulation Assumption for a project in the Simulation Scheduler, these default assumptions are used. Before or after a project simulation, the default assumptions can be viewed and modified in any of the Assumption Composer Tools, or new assumptions can be created for application to the project data. Several of the Assumption Composer Tools, specifically that for Disturbance Matrices, Disturbance and Management, Growth and Yield, and Climate, are linked to specific data editing tools (Figure 6-1), so that specific assumptions can be created using specific editor data.

Figure 7-1 displays the assumptions hierarchy. The Simulation Assumption is at the top and dictates the entire assumption selection for a given simulation. A Simulation Assumption is composed of a Stand Initialization Assumption and a CBM Run Assumption. A Stand Initialization Assumption is composed of six underlying default and/or user-defined assumptions (Figure 7-1). During a simulation, these assumptions model the forest ecosystem carbon dynamics that generate the initial (time step 0) carbon pools for all stands. A CBM Run Assumption is composed of seven underlying default and/or user-defined assumptions (Figure 7-1).

During a simulation these assumptions model the forest ecosystem carbon dynamics that generate the carbon pools for all stands for time step 1 and greater.

The underlying assumptions that make up a Stand Initialization Assumption and a CBM Run Assumption are displayed in Figure 7-1. A Biomass Turnover Assumption contains biomass turnover parameter settings for all tree species. A Run Climate Assumption is linked to mean annual temperature and precipitation data by time step. A

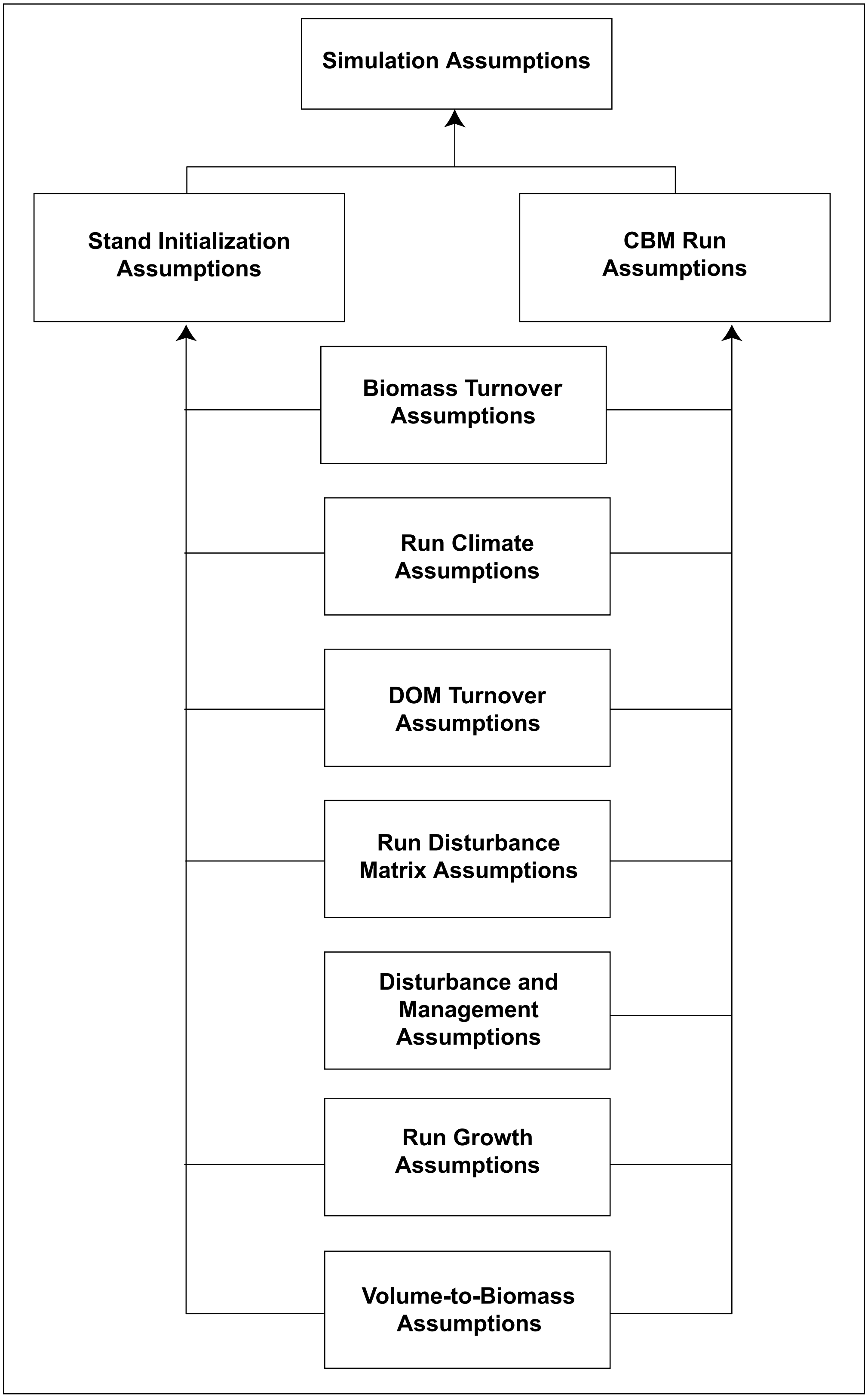


Figure 7-1. The hierarchy of assumptions (default or user-defined) in the CBM-CFS3.

DOM Assumption contains DOM turnover parameters and DOM parameters. A Run Disturbance Matrix Assumption is composed of one or several SPU Group Disturbance Matrix Assumptions, each of which is an association of an SPU Group ID, a disturbance type, and a disturbance matrix. A Disturbance and Management Assumption is composed of human and natural disturbance events that occur on a land base and their transition rules. A Run Growth Assumption is composed of one or several SPU Group Growth Assumptions linked to growth and yield curves in the Growth Curve Editor (see Figure 6-20). A Volume-to-Biomass Assumption is composed of both volume-to-biomass parameters and biomass-to-carbon parameters.

When putting together a set of assumptions for a simulation, the user should build from the bottom up, starting by modifying the underlying assumptions of interest, then creating a new Stand Initialization Assumption and CBM Run Assumption to assemble the underlying assumptions, and finally creating a new Simulation Assumption. The user can then proceed to the "Simulation Scheduler" (Figure 3-63) to run this new simulation through the CBM-CFS3.

The Assumption Composer Tools can be used to create, edit, copy, delete, and view assumptions. In the "Assumption Composers" window, the user can click from one assumption composer tab to another and can use (by clicking) the scroll arrow buttons at the top of the window to view all of the tabs.

7.1 Simulation Scheduler

To run imported data through the model under the default assumptions created by the CBM-CFS3, the user must use the Simulation Scheduler. To proceed

1. **Click on "Tools" on the menu bar of the main CBM-CFS3 window**
2. **Select "Simulation Scheduler" from the drop list that appears**

When the "Simulation Scheduler" window (Figure 3-60) opens, the names of the Simulation Assumption(s) that have been created and/or any default Simulation Assumption(s) should appear in the "Available Simulations" box. By clicking the "Display unqueued simulations" check box, the user can choose to display only Simulation Assumptions that have already been processed by the CBM-CFS3. If the user clicks on a Simulation Assumption name in the "Available Simulations" box, the details about the simulation will appear on the "Simulation Details" tab (Figure 3-60). Details of the Stand Initialization Assumption (Figure 7-2) and the CBM Run Assumption (Figure 7-3) can be viewed by clicking on the appropriate tabs in the "Simulation Scheduler" window.

Several command buttons also appear in the "Simulation Scheduler" window: the "Run" button "Close" button, "Reload" button, "Reset Selected" button, "Reset All" button, and "Show Logs" button. Use of the "Run" button is discussed in Chapter 3, Section 3.5.

To reconnect the "Simulation Scheduler" to the Archive Index Database (to allow verification of whether any new Simulation Assumptions have been added and to add them to the "Available Simulations" box in the "Simulation Scheduler" window)

Click on the "Reload" button

To close the "Simulation Scheduler" window

Click on the "Close" button

To rerun a Simulation Assumption that has been run before

1. **Click on the "Display unqueued simulations" check box**
2. **In the "Available Simulations" box, click on the name of a Simulation Assumption that failed or is to be rerun**
3. **Click on the "Reset Selected" button**
4. **Click on the "Add" button**

Note: Not using the "Reset Selected" button

If the user does not click on the "Reset Selected" button before the "Add" button, a pop-up window will appear stating, "Warning; you have chosen completed or failed simulations. Clicking 'Run' will replace any previous results." To proceed

Click on the "OK" button

5. **Click on the "Run" button**

To reset all Simulation Assumptions for a project as "Queued for Processing"

Click on the "Reset All" button

To make the "Message" window (Figure 5-4) pop up

Click on the "Show Logs" button

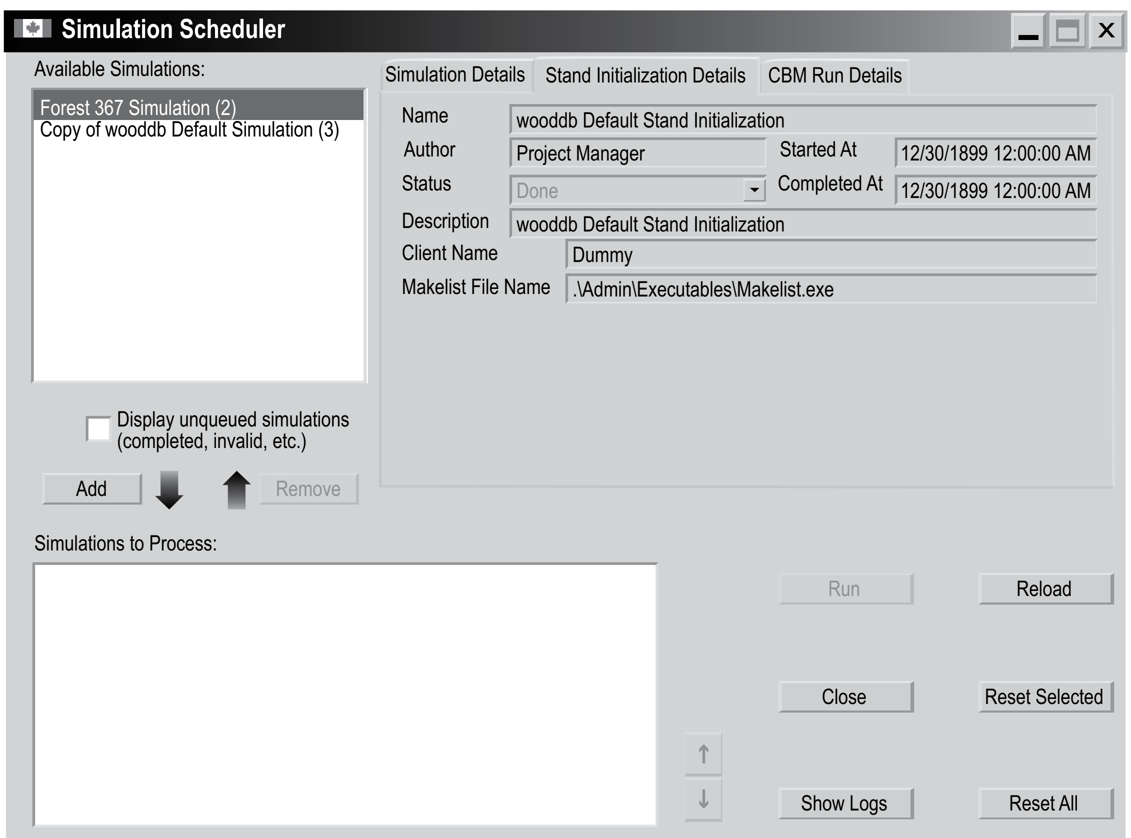


Figure 7-2. The "Simulation Scheduler" window with the "Stand Initialization Details" tab selected.

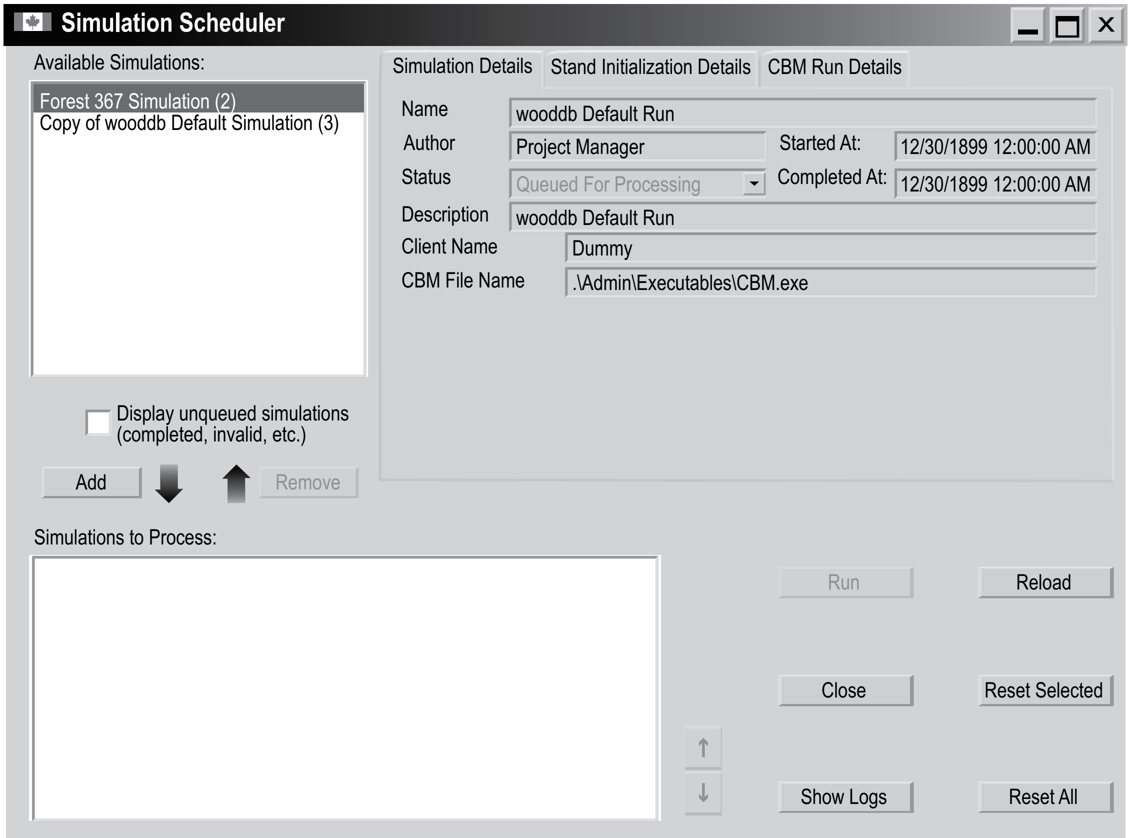


Figure 7-3. The "Simulation Scheduler" window with the "CBM Run Details" tab selected.

7.1.1 Selecting and Running a Simulation

To select a Simulation Assumption and run it through the model

1. **Click on the Simulation Assumption name in the "Available Simulations" box**
2. **Click on the "Add" button**

Note: Adding new simulations with modified default data

If the user makes changes to default data for a project and attempts to add the name of a new Simulation Assumption that uses the same base assumptions as a previous Simulation Assumption (but with altered data), a pop-up window will appear, stating, "Warning; you have chosen completed or failed simulations. Clicking 'Run' will replace any previous results." To proceed

Click on the "OK" button

3. **Click on the "Run" button**

The model will begin to process the user's project assumptions and data. Whether or not the simulation is successful, a window will pop up stating, "Successfully completed # of # selected simulations," where the numbers displayed will represent the number of simulations that were successfully processed through the model and the number of simulations that the user chose to run at once.

4. **Click on the "OK" button**

If the simulation is successful, the user can analyze results by creating and/or examining views for the processed data (see Chapter 8). If the simulation is unsuccessful, the user should consult the "Message" window (Figure 5-4) to identify the problem.

7.1.2 Removing a Simulation from Processing

If the user mistakenly adds the wrong Simulation Assumption to the "Simulations to Process" box

1. **Click on the Simulation Assumption name in the "Simulations to Process" box**
2. **Click on the "Remove" button**

7.2 Composing Simulation Assumptions

A Simulation Assumption is the top assumption for a project (Figure 7-1) and dictates the entire assumption selection for a given simulation. It is composed of a Stand Initialization Assumption and a CBM Run Assumption, which in turn are composed of underlying assumptions. If any new assumptions are created that can feed into a Simulation Assumption (Figure 7-1), the user must also create a new Simulation Assumption that uses these underlying assumptions, so that they can be run in the Simulation Scheduler.

To access the Assumption Composer for Simulations

1. **Click on "Tools" on the menu bar of the main CBM-CFS3 window**
2. **Select "Assumption Composers" from the drop list that appears**
3. **Select "Simulation" from the side drop list that appears**

The "Assumption Composers" window (Figure 7-4) will pop up, displaying the "Simulation" tab.

On the "Simulation" tab, the "List of Simulation Assumptions" box displays all existing Simulation Assumptions linked to a project that the user has opened (Figure 7-4). If the user clicks on a Simulation Assumption name in the "List of Simulation Assumptions" box, the tab will display the assumption name, description, author, status, and the names of the Stand Initialization and CBM Run Assumptions to which it is linked. Simulation Assumptions can be edited, copied, or deleted. To cancel any of these actions

Click on the "Cancel" button

To close the window

Click on the "Close" button

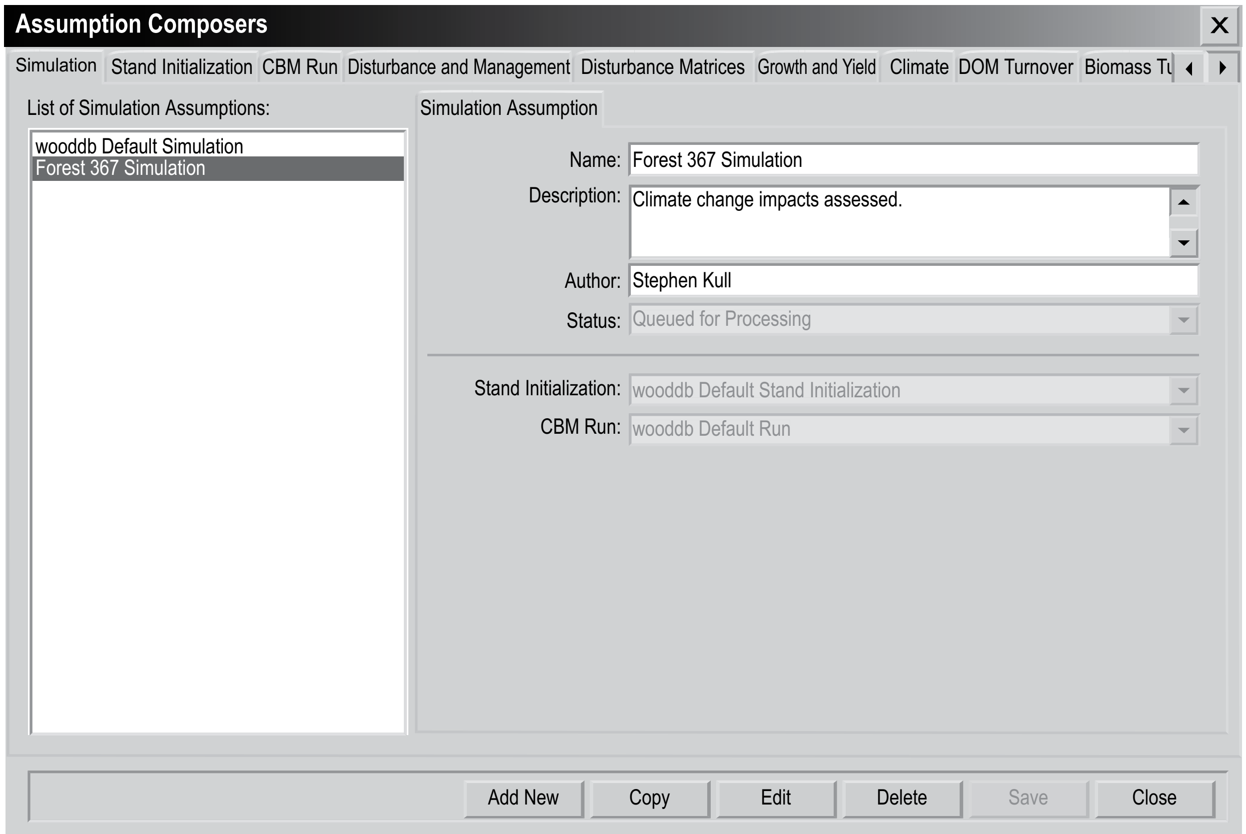


Figure 7-4. The "Assumption Composers" window with the "Simulation" tab selected.

7.2.1 Adding a Simulation Assumption

To add (create) a new Simulation Assumption using the "Simulation" tab in the "Assumption Composers" window (Figure 7-4)

1. **Click on the "Add New" button**
2. **Enter a name for the simulation in the "Name" box**
3. **Enter a description in the "Description" box (if this box is left blank, the default is "Created on 'current date'")**
4. **Enter the author's name in the "Author" box**
5. **Click on the "Status" box and select "Queued for Processing" from the drop list that appears**

By selecting "Queued for Processing," the user indicates to the CBM-CFS3 that the Simulation Assumption selected is available to be run through the Simulation Scheduler. At any time, the user can determine the run status of a Simulation Assumption by clicking on an assumption name in the "List of Simulation Assumptions" box and checking the status in the "Status" box.

6. **Click on the "Stand Initialization" box and select a Stand Initialization Assumption from the drop list that appears**
7. **Click on the "CBM Run" box and select a CBM Run Assumption from the drop list that appears**

8. **Click on the "Save" button to proceed**

   or

   Click on the "Cancel" button to terminate the addition

If the user clicks on the "Save" button, the new Simulation Assumption name will appear in the "List of Simulation Assumptions" box. Once the Simulation Assumption has been created, the user can run it through the CBM-CFS3 using the Simulation Scheduler (section 7.1.1).

7.2.2 Copying a Simulation Assumption

To copy an existing Simulation Assumption using the "Simulation" tab in the "Assumption Composers" window (Figure 7-4)

1. **Click on the name of a Simulation Assumption in the "List of Simulation Assumptions" box**
2. **Click on the "Copy" button**

The copy of the Simulation Assumption, called "Copy of 'original Simulation Assumption name'" will be added to the "List of Simulation Assumptions" box. The user can then edit the copy of the Simulation Assumption.

7.2.3 Editing a Simulation Assumption

To edit an existing Simulation Assumption using the "Simulation" tab in the "Assumption Composers" window (Figure 7-4)

1. **Click on the name of a Simulation Assumption in the "List of Simulation Assumptions" box**
2. **Click on the "Edit" button**
3. **Make the necessary changes to any of the Simulation Assumption settings (see section 7.2.1)**
4. **Click on the "Save" button to proceed**

   or

   Click on the "Cancel" button to cancel the edits

If the user clicks on the "Save" button, an "Add or Update Simulation Assumption" window will pop up asking the user to confirm modification of the selected simulation record.

5. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the edits

7.2.4 Deleting a Simulation Assumption

To delete an existing Simulation Assumption using the "Simulation" tab in the "Assumption Composers" window (Figure 7-4)

1. **Click on the name of a Simulation Assumption in the "List of Simulation Assumptions" box**
2. **Click on the "Delete" button**

A "Delete Simulation Record Confirmation" window will pop up asking the user to confirm deletion of the selected assumption record.

3. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the deletion

7.3 Composing Stand Initialization Assumptions

A Stand Initialization Assumption combines underlying assumptions (Figure 7-1) that, when combined with a Simulation Assumption (section 7.2) and run in the Simulation Scheduler (section 7.1.1), will be used to generate the initial (time step 0) carbon dynamics and pools for all stands during a project simulation. A Stand Initialization Assumption is linked to a specific project database. It is composed of assumptions created in the underlying Assumption Composer Tools. Stand Initialization Assumptions also contain specific default or user-defined initialization options for forested and nonforested stands. Forest stand options include specifics about the last disturbance type and historic disturbance type, by forest type, age, and area. Nonforested stand options include specifics about biomass carbon pool values and dead organic matter (DOM) carbon pool values by nonforested stand type.

To access the Assumption Composer for Stand Initialization

1. **Click on "Tools" on the menu bar of the main CBM-CFS3 window**
2. **Select "Assumption Composers" from the drop list that appears**
3. **Select "Stand Initialization" from the side drop list that appears**

The "Assumption Composers" window (Figure 7-5) will pop up, displaying the "Stand Initialization" tab. The "Stand Initialization" tab displays, in the "List of Stand Initialization Assumptions" box (Figure 7-5), all existing Stand Initialization Assumptions available to a project that the user has open. If the user clicks on the name of a Stand Initialization Assumption in the "List of Stand Initialization Assumptions" box, the "Stand Initialization Assumption" tab (Figure 7-5) will display the assumption name, description, author, and names of linked underlying assumptions.

The user can add, copy, edit, or delete Stand Initialization Assumptions. To cancel any of these actions

Click on the "Cancel" button

To close the window

Click on the "Close" button

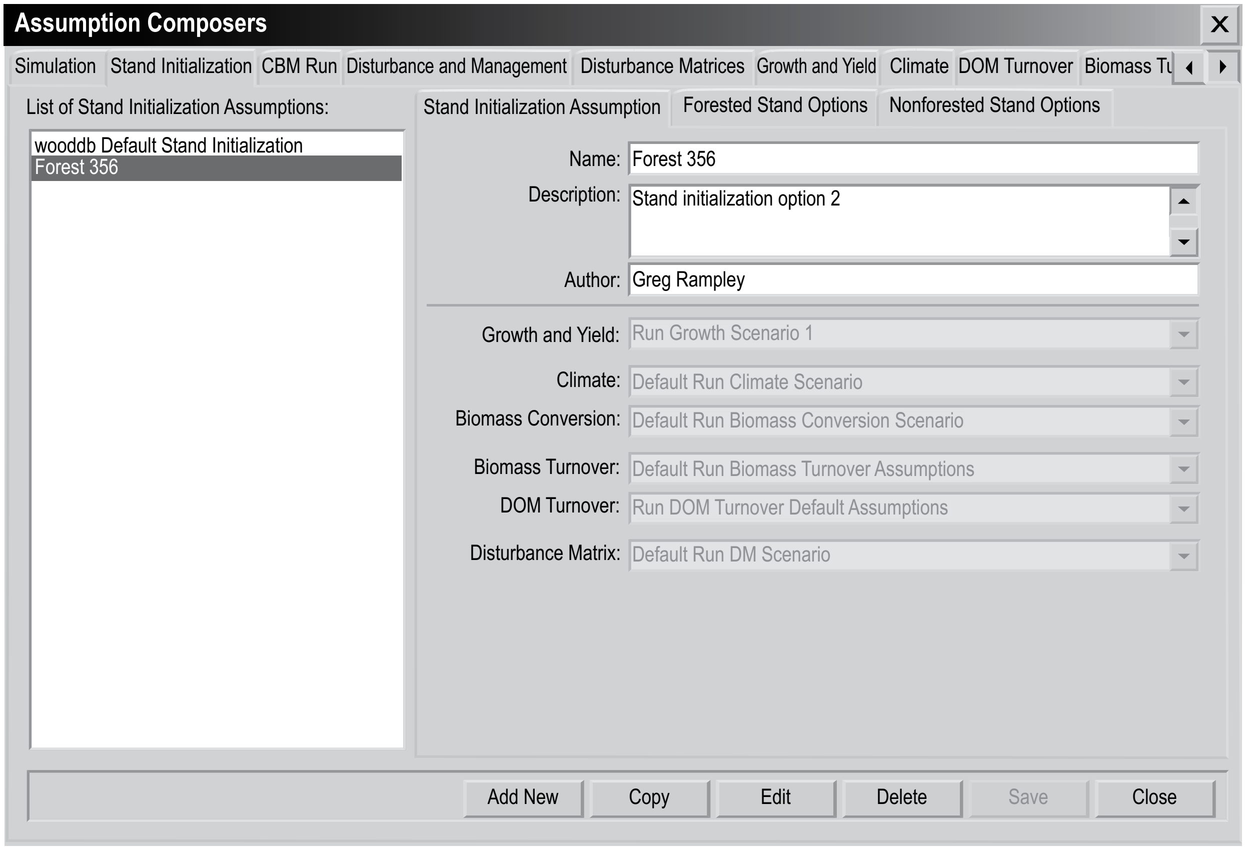


Figure 7-5. The "Assumption Composers" window with the "Stand Initialization" and "Stand Initialization Assumption" tabs selected.

7.3.1 Adding a Stand Initialization Assumption

To add (create) a new Stand Initialization Assumption using the "Stand Initialization" tab in the "Assumption Composers" window (Figure 7-5)

1. **Click on the "Add New" button**
2. **Enter a name for the assumption in the "Name" box**
3. **Enter a description in the "Description" box (if this box is left blank, the default is "Created on 'current date'")**
4. **Enter the author's name in the "Author" box**
5. **Click on the "Growth and Yield" box and select a Run Growth Assumption from the drop list that appears**
6. **Click on the "Climate" box and select a Run Climate Assumption from the drop list that appears**
7. **Click on the "Biomass Conversion" box and select a Volume-to-Biomass Assumption from the drop list that appears**
8. **Click on the "Biomass Turnover" box and select a Biomass Turnover Assumption from the drop list that appears**

9. **Click on the "DOM Turnover" box and select a DOM Turnover Assumption from the drop list that appears**
10. **Click on the "Disturbance Matrix" box and select a Run Disturbance Matrix Assumption from the drop list that appears**
11. **Click on the "Forested Stand Options" tab (Figure 7-6)**

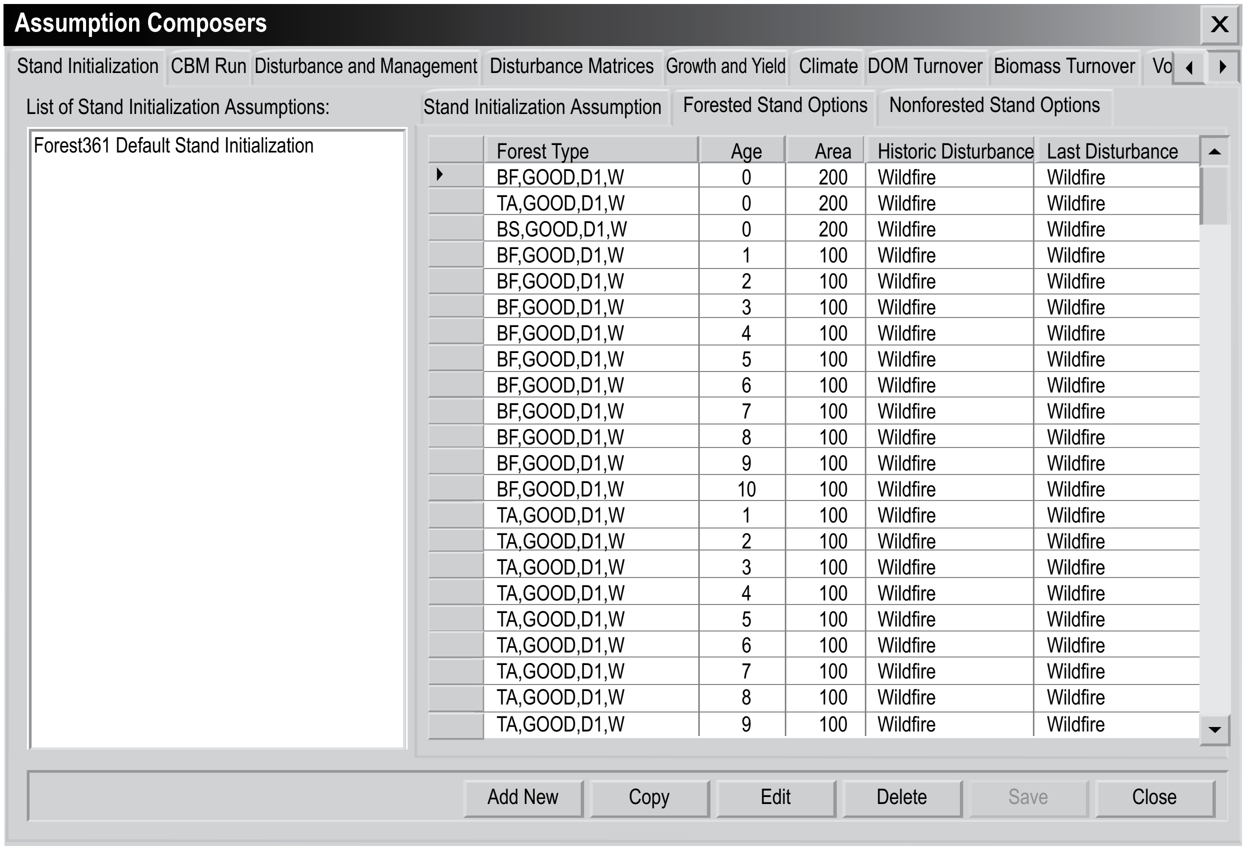


Figure 7-6. The "Assumption Composers" window with the "Stand Initialization" and "Forested Stand Options" tabs selected.

This tab displays a table of fields for the user's forested-stand inventory: "Forest Type" (defined forest type), "Age" (stand age in years), "Area" (stand area in hectares), "Historic Disturbance" (the most common historical disturbance), and "Last Disturbance" (the last disturbance to affect the stand). When the user first views the table, it will contain default information based on project data that the user has imported or set up. If satisfied with the default information, proceed to step 12. To edit the "Forest Type," "Age," and "Area" fields, click on the cell to be edited under the appropriate field name and change the value. Clicking on cells under the "Historic Disturbance" or "Last Disturbance" fields will cause a drop list to appear. To edit cells in either of these fields, select an option from the drop list.

12. **Click on the "Nonforested Stand Options" tab (Figure 7-7) to view the default nonforested stand options**

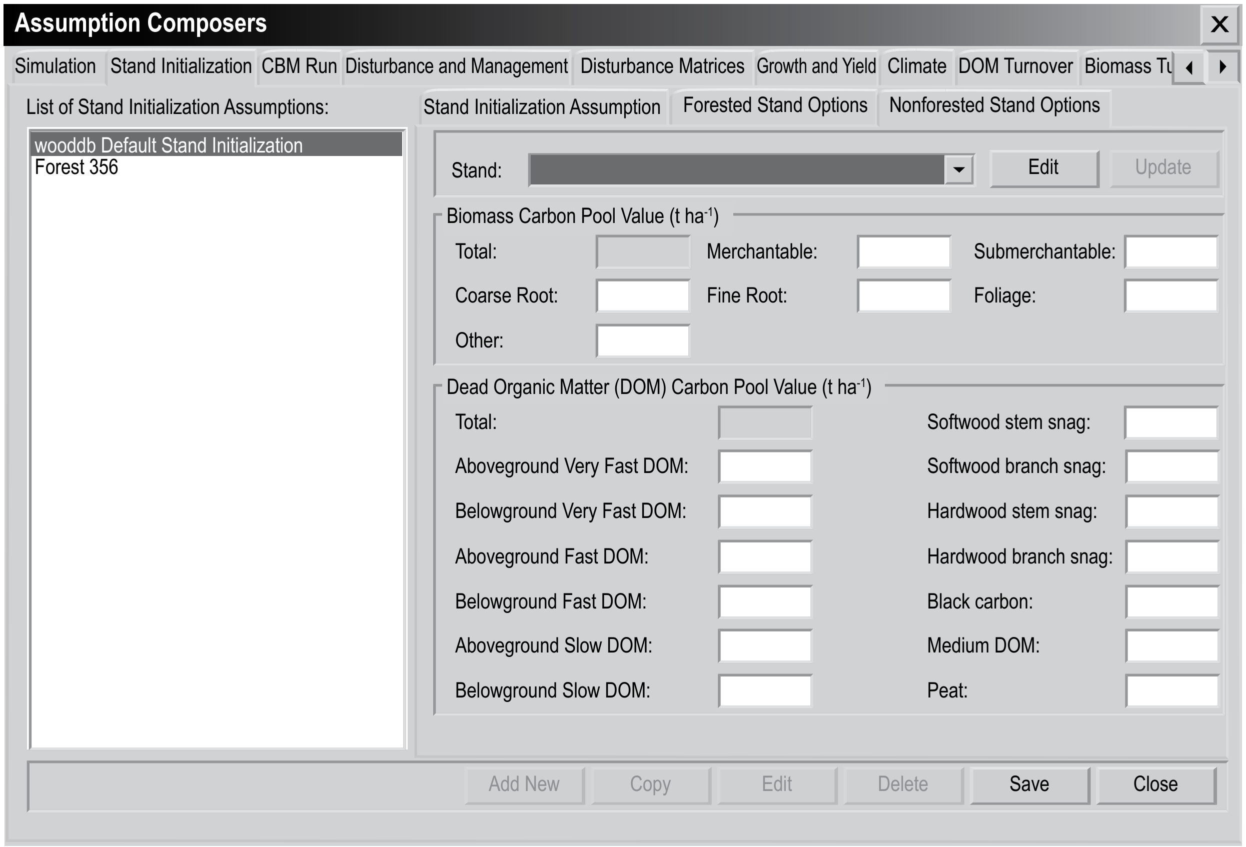


Figure 7-7. The "Assumption Composers" window with the "Stand Initialization" and "Nonforested Stand Options" tabs selected.

No stands will appear on this tab if the user did not create or import nonforested stands during the project import process; in this case, proceed to step 17. If the user did create and import nonforested stands, default values for biomass and DOM carbon pools (in tonnes per hectare by nonforested stand type) will appear. Descriptions of the pools are provided in Table 7-1.

If satisfied with the default values, proceed to step 17. To edit the values

13. **Click on the "Edit" button**
14. **Click on the "Stand" box and select a stand option from the drop list that appears**
15. **Click on the appropriate box and change the value**

When edits are complete

16. **Click on the "Update" button**
17. **Click on the "Save" button to proceed**

    or

    Click on the Cancel button to terminate the addition

The new Stand Initialization Assumption will be added to the "List of Stand Initialization Assumptions" box, and the user will be able to select it when creating a Simulation Assumption.

Table 7-1. Descriptions of biomass and dead organic matter (DOM) carbon pools found on the "Nonforested Stand Options" tab (Figure 7-7)

Box name	Carbon pool name	Description
Biomass Carbon Pool Value ($t\ ha^{-1}$)	Total	Total biomass carbon in the nonforested stand; typically zero
	Merchantable	Carbon in merchantable stemwood
	Submerchantable	Carbon in submerchantable stemwood
	Coarse Root	Carbon in coarse roots
	Fine Root	Carbon in fine roots
	Foliage	Carbon in foliage
	Other	Carbon in sapling stemwood, merchantable stem bark, branches, tops and stumps
Dead Organic Matter (DOM) Carbon Pool Value ($t\ ha^{-1}$)	Total	Total DOM carbon in the nonforested stand
	Aboveground Very Fast DOM	Carbon in DOM with input from foliage biomass and fine roots in the forest floor; very fast turnover rate
	Belowground Very Fast DOM	Carbon in DOM with input from fine root biomass in the mineral soil; very fast turnover rate
	Aboveground Fast DOM	Carbon in DOM with input from branches, tops, stumps, and submerchantable trees; fast turnover rate
	Belowground Fast DOM	Carbon in DOM with input from coarse roots; fast turnover rate
	Aboveground Slow DOM	Carbon in DOM with input from very fast, fast, and medium aboveground DOM pools; slow turnover rate
	Belowground Slow DOM	Carbon in DOM with input from very fast, fast, and medium belowground DOM pools; slow turnover rate
	Softwood Stem Snag	Carbon in merchantable stemwood proportion of softwood snags
	Softwood Branch Snag	Carbon in all softwood snags excluding merchantable stemwood proportion
	Hardwood Stem Snag	Carbon in merchantable stemwood proportion of hardwood snags
	Hardwood Branch Snag	Carbon in all hardwood snags excluding merchantable stemwood proportion
	Black Carbon	Stable carbon from incomplete combustion after fire; currently not included in calculations
	Medium DOM	Carbon in DOM with input from merchantable stemwood and/or stem snags; medium turnover rate
	Peat	Carbon in peat; currently not included in calculations

7.3.2 Copying a Stand Initialization Assumption

To copy an existing Stand Initialization Assumption using the "Stand Initialization Assumption" tab in the "Assumption Composers" window (Figure 7-5)

1. **Click on the name of a Stand Initialization Assumption in the "List of Stand Initialization Assumptions" box**
2. **Click on the "Copy" button**

The copy of the Stand Initialization Assumption, called "Copy of 'original Stand Initialization Assumption name'" will be added to the "List of Stand Initialization Assumptions" box. The user can then edit the copy of the Stand Initialization Assumption.

7.3.3 Editing a Stand Initialization Assumption

To edit an existing Stand Initialization Assumption using the "Stand Initialization Assumption" tab in the "Assumption Composers" window (Figure 7-5)

1. **Click on the name of a Stand Initialization Assumption in the "List of Stand Initialization Assumptions" box**
2. **Click on the "Edit" button**
3. **Make the necessary changes to any of the settings on the "Stand Initialization Assumption" tab, the "Forest Stand Options" tab, or the "Nonforested Stand Options" tab on the "Stand Initialization" tab (see section 7.3.1)**
4. **Click on the "Save" button to proceed**

   or

   Click on the "Cancel" button to cancel the edits

If the user clicks on the "Save" button, an "Add or Update Run Assumption" window will pop up asking the user to confirm modification of the selected stand initialization record.

5. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the edits

7.3.4 Deleting a Stand Initialization Assumption

To delete an existing Stand Initialization Assumption using the "Stand Initialization Assumption" tab in the "Assumption Composers" window (Figure 7-5)

1. **Click on the name of a Stand Initialization Assumption in the "List of Stand Initialization Assumptions" box**
2. **Click on the "Delete" button**

A "Delete Stand Initialization Record Confirmation" window will pop up asking the user to confirm deletion of the selected stand initialization record.

3. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the deletion

7.4 Composing CBM Run Assumptions

Like a Stand Initialization Assumption, a CBM Run Assumption combines a set of underlying assumptions that can be applied in a Simulation Assumption (Figure 7-1). A CBM Run Assumption, however, includes one additional underlying assumption, a Disturbance and Management Assumption (see section 7.9). Also, when a CBM Run Assumption is applied in a Simulation Assumption (see section 7.2) and run in the Simulation Scheduler (see section 7.1.1), the underlying assumptions combined in the CBM Run Assumption are used to generate the carbon dynamics and pools over the entire simulation period beginning with time step 1. A CBM Run Assumption also contains a user-specified simulation length. A CBM Run Assumption is linked to a specific project database, and the underlying assumptions combined in it are created with the other Assumption Composer Tools.

To access the Assumption Composer for CBM Run Assumptions

1. **Click on "Tools" on the menu bar of the main CBM-CFS3 window**
2. **Select "Assumption Composers" from the drop list that appears**
3. **Select "Model Run" from the side drop list that appears**

The "Assumption Composers" window (Figure 7-8) will pop up, displaying the "CBM Run" tab. The user can add, copy, edit, or delete CBM Run Assumptions. To cancel any of these actions

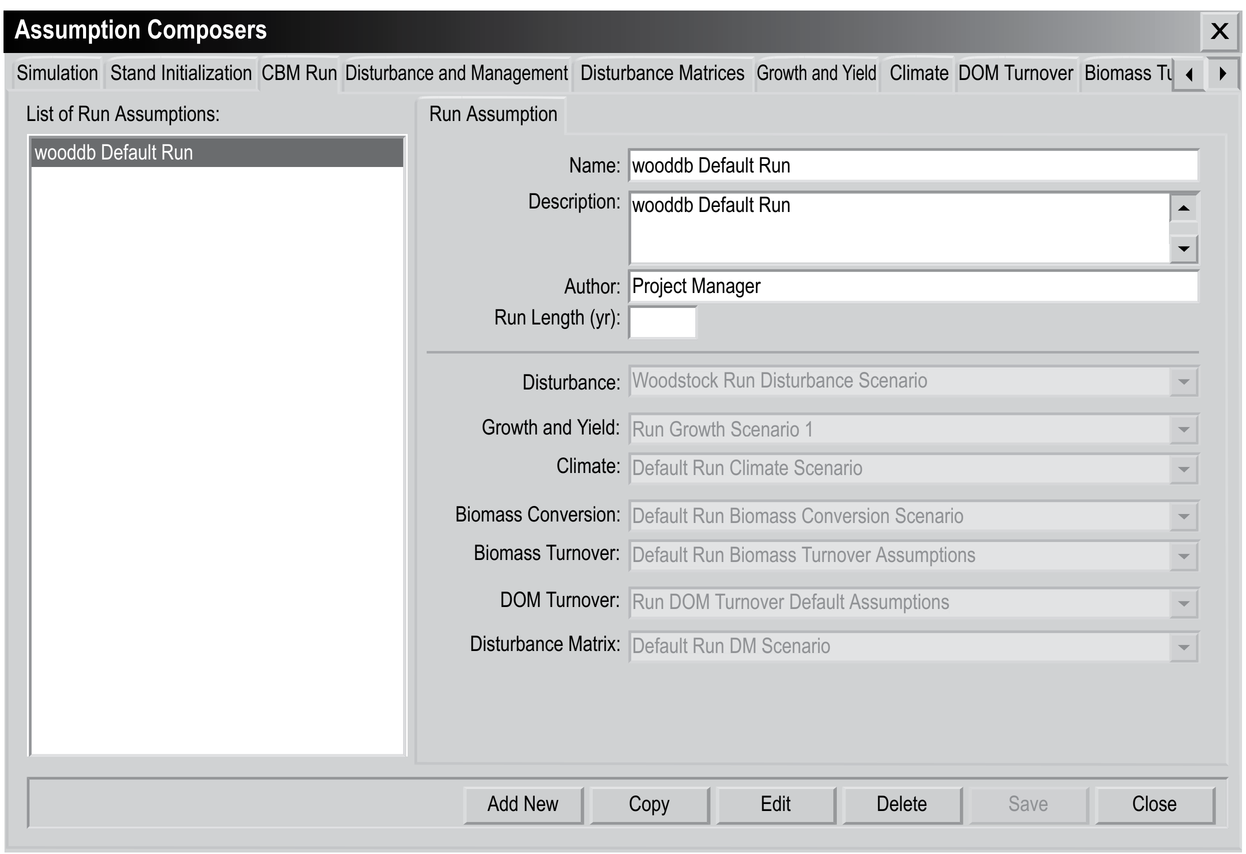


Figure 7-8. The "Assumption Composers" window with the "CBM Run" tab selected.

Click on the "Cancel" button

To close the window

Click on the "Close" button

7.4.1 Adding a CBM Run Assumption

To add (create) a new CBM Run Assumption using the "CBM Run" tab in the "Assumption Composers" window (Figure 7-8)

1. **Click on the "Add New" button**
2. **Enter a name for the assumption in the "Name" box**
3. **Enter a description in the "Description" box (if this box is left blank, the default is "Created on 'current date'")**
4. **Enter the author's name in the "Author" box**
5. **Enter a value (in years) for the length of the simulation run in the "Run Length (yrs)" box**
6. **Click on the "Disturbances" box and select a Disturbance and Management Assumption from the drop list that appears**
7. **Click on the "Growth and Yield" box and select a Run Growth Assumption from the drop list that appears**
8. **Click on the "Climate" box and select a Run Climate Assumption from the drop list that appears**
9. **Click on the "Biomass Conversion" box and select a Volume-to-Biomass Assumption from the drop list that appears**
10. **Click on the "Biomass Turnover" box and select a Biomass Turnover Assumption from the drop list that appears**
11. **Click on the "DOM Turnover" box and select a DOM Turnover Assumption from the drop list that appears**
12. **Click on the "Disturbance Matrix" box and select a Disturbance Matrix Assumption from the drop list that appears**
13. **Click on the "Save" button to proceed**

    or

    Click on the "Cancel" button to terminate the addition

The new CBM Run Assumption will be added to the "List of Run Assumptions" box and the user will be able to select it when creating a Simulation Assumption.

7.4.2 Copying a CBM Run Assumption

To copy an existing CBM Run Assumption using the "CBM Run" tab in the "Assumption Composers" window (Figure 7-8)

1. **Click on the name of the CBM Run Assumption in the "List of Run Assumptions" box**
2. **Click on the "Copy" button**

The copy of the CBM Run Assumption, called 'Copy of 'original CBM Run Assumption name" will be added to the "List of Run Assumptions" box. The user can then edit the copy of the CBM Run Assumption.

7.4.3 Editing a CBM Run Assumption

To edit an existing CBM Run Assumption using the "CBM Run" tab in the "Assumption Composers" window (Figure 7-8)

1. **Click on the name of the CBM Run Assumption in the "List of Run Assumptions" box**
2. **Click on the "Edit" button**
3. **Make the necessary changes to any of the CBM Run Assumption settings (see section 7.4.1)**
4. **Click on the "Save" button**

   or

   Click on the "Cancel" button to cancel the edits

If the user clicks on the "Save" button, an "Add or Update CBM Run Assumption" window will pop up asking the user to confirm modification of the selected run record.

5. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the edits

7.4.4 Deleting a CBM Run Assumption

To delete an existing CBM Run Assumption using the "CBM Run" tab in the "Assumption Composers" window (Figure 7-8)

1. **Click on the name of the CBM Run Assumption in the "List of Run Assumptions" box**
2. **Click on the "Delete" button**

A "Delete CBM Run Record Confirmation" window will pop up asking the user to confirm deletion of the assumption.

3. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the deletion

7.5 Composing Biomass Turnover Assumptions

A Biomass Turnover Assumption contains biomass turnover parameter settings that can be edited for each tree species. Parameter settings include the proportion of coarse root turnover, hardwood decay as a proportion of the softwood decay multiplier, and the proportion of "other" biomass that naturally becomes branch snags. "Other" biomass includes sapling stemwood, merchantable stem bark, branches, tops, and stumps.

To access the Assumption Composer for Biomass Turnover Assumptions

1. **Click on "Tools" on the menu bar of the main CBM-CFS3 window**
2. **Select "Assumption Composers" from the drop list that appears**
3. **Select "Biomass Turnover Parameters" from the side drop list that appears**

The "Assumption Composers" window (Figure 7-9) will pop up displaying the "Biomass Turnover" tab. Existing Biomass Turnover Assumptions are displayed in the "List of Biomass Turnover Assumptions" box. The user can click on the name of a specific assumption in this box to view its associated parameters. The user can add, copy, edit, or delete Biomass Turnover Assumptions. To cancel any of these actions

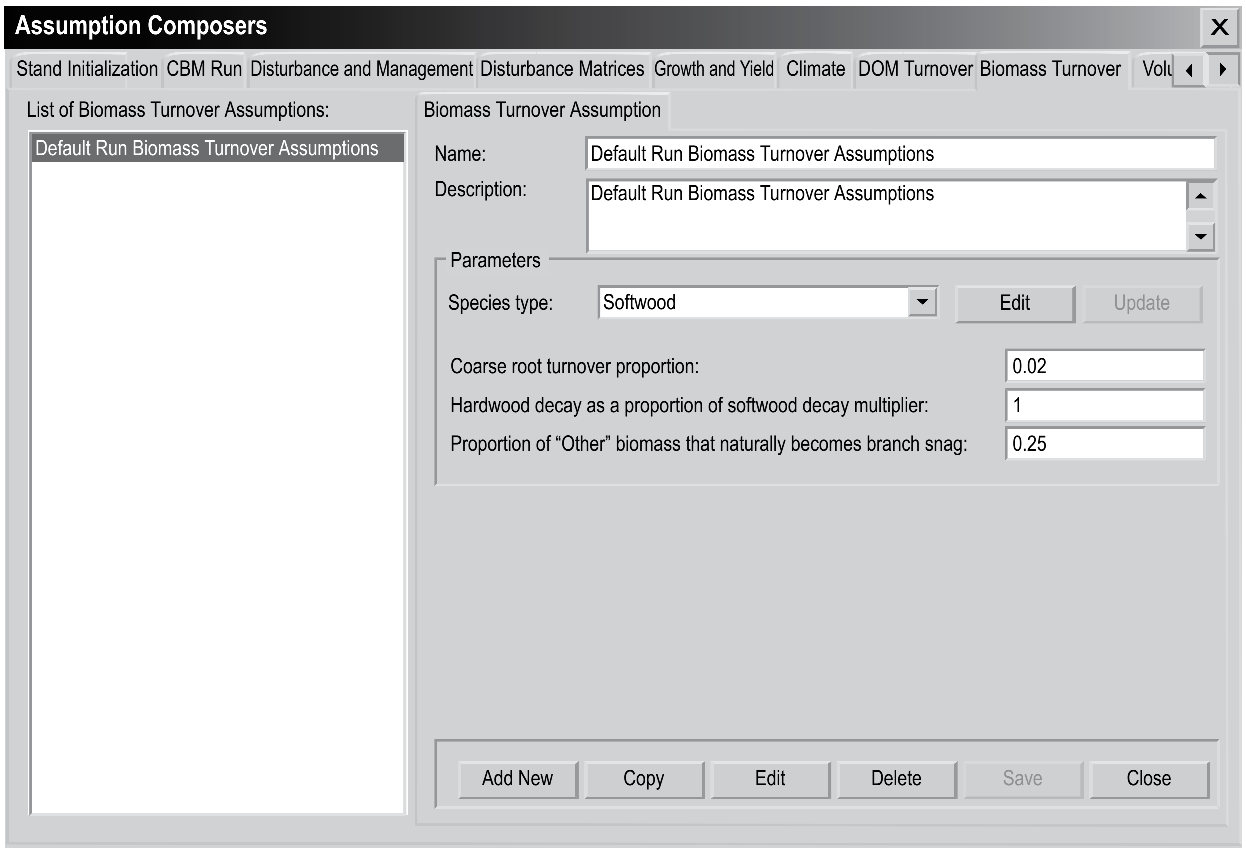


Figure 7-9. The "Assumption Composers" window with the "Biomass Turnover" tab selected.

Click on the "Cancel" button

To close the window

Click on the "Close" button

7.5.1 Adding a Biomass Turnover Assumption

To add (create) a new Biomass Turnover Assumption using the "Biomass Turnover" tab in the "Assumption Composers" window (Figure 7-9)

1. **Click on the "Add New" button**
2. **Enter a name for the assumption in the "Name" box**

3. **Enter the description in the "Description" box (if this box is left blank, the default is "Created on 'current date'")**

The CBM-CFS3 sets default parameters based on the administrative and ecological boundaries selected by the user during the data import process. If satisfied with the default parameters for all species types, proceed to step 12. Alternatively, to edit the default parameters for any species types in the inventory

4. **Click on the "Edit" button**
5. **Click on the "Species type" box and select a species from the drop list that appears**

Each step involving the change of a parameter is optional. The first parameter that the user can change is the coarse root turnover proportion, which represents the proportion (from 0 to 1) of coarse root biomass carbon that transfers to the belowground fast DOM pool annually. To change this parameter

6. **Enter a new proportion in the "Coarse root turnover proportion" box**

Next, the user can change hardwood decay, as a proportion of the softwood decay multiplier. This multiplier (0 to a maximum defined by the user) is used to increase or decrease decay rates of DOM pools for hardwood relative to softwood. To make a change

7. **Enter a new multiplier in the "Hardwood decay as a proportion of softwood decay multiplier" box**

Next, the user can change the proportion (from 0 to 1) of branch turnover that transfers to the branch snag pool annually. To make a change

8. **Enter a new proportion in the "Proportion of 'Other' biomass that naturally becomes branch snag" box**
9. **Click on the "Update" button**

An "Update Biomass Turnover Parameters" window will pop up asking the user to confirm modification of the biomass turnover parameters.

10. **Click on the "Yes" button to proceed**

    or

    Click on the "No" button to cancel the edits
11. **Repeat steps 4 to 10 to edit parameters for other species**
12. **Click on the "Save" button**

The new Biomass Turnover Assumption will be added to the "List of Biomass Turnover Assumptions" box.

7.5.2 Copying a Biomass Turnover Assumption

To copy an existing Biomass Turnover Assumption using the "Biomass Turnover" tab in the "Assumption Composers" window (Figure 7-9)

1. **Click on the name of a Biomass Turnover Assumption in the "List of Biomass Turnover Assumptions" box**
2. **Click on the "Copy" button**

The copy of the Biomass Turnover Assumption, called "Copy of 'original Biomass Turnover Assumption name'" will be added to the "List of Biomass Turnover Assumptions" box. The user can then edit the copy of the Biomass Turnover Assumption.

7.5.3 Editing a Biomass Turnover Assumption

To edit an existing Biomass Turnover Assumption using the "Biomass Turnover" tab in the "Assumption Composers" window (Figure 7-9)

1. **Click on the name of a Biomass Turnover Assumption in the "List of Biomass Turnover Assumptions" box**
2. **Click on the "Edit" button**
3. **Make the necessary changes to the name, description, and/or parameters (see section 7.5.1 for details)**
4. **Click on the "Save" button**

An "Add or Update Biomass Turnover Assumption" window will pop up asking the user to confirm modification of the selected biomass turnover record.

5. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the edits

7.5.4 Deleting a Biomass Turnover Assumption

To delete an existing Biomass Turnover Assumption using the "Biomass Turnover" tab in the "Assumption Composers" window (Figure 7-9)

1. **Click on the name of a Biomass Turnover Assumption in the "List of Biomass Turnover Assumptions" box**
2. **Click on the "Delete" button**

A "Delete Biomass Turnover Record Confirmation" window will pop up asking the user to confirm deletion of the selected biomass turnover record.

3. **Click on the "Yes" button to proceed,**

   or

   Click on the "No" button to cancel the deletion

7.6 Composing Run Climate Assumptions

Run Climate Assumptions are composed of one or several SPU Group Climate Assumptions, each linked to its own mean annual temperature and precipitation data by time step in the Climate Data Editor (see Figure 6-2).

To access the Assumption Composer for Run Climate Assumptions

1. **Click on "Tools" on the menu bar of the main CBM-CFS3 window**
2. **Select "Assumption Composers" from the drop list that appears**
3. **Select "Climate" from the side drop list that appears**

The "Assumption Composers" window (Figure 7-10) will pop up, displaying the "Climate" tab. On the "Climate" tab, existing Run Climate Assumptions are displayed in the "List of Run Climate Assumptions" box in a hierarchical directory tree structure. On the directory tree, the user can double-click on a specific Run Climate Assumption or click on the "+" next to the assumption to expand the tree and see the SPU Group Climate Assumption associated with it. Clicking on a "-" in the directory tree will collapse the corresponding assumption section of the directory tree. The user can also right-click in the directory tree box and choose, by selecting the appropriate option from the pop-up menu, to expand or collapse the directory tree. SPU Group Climate Assumptions are also displayed in the "Applied SPU Group Climate Assumptions" box and the "Available SPU Group Climate Assumptions" box.

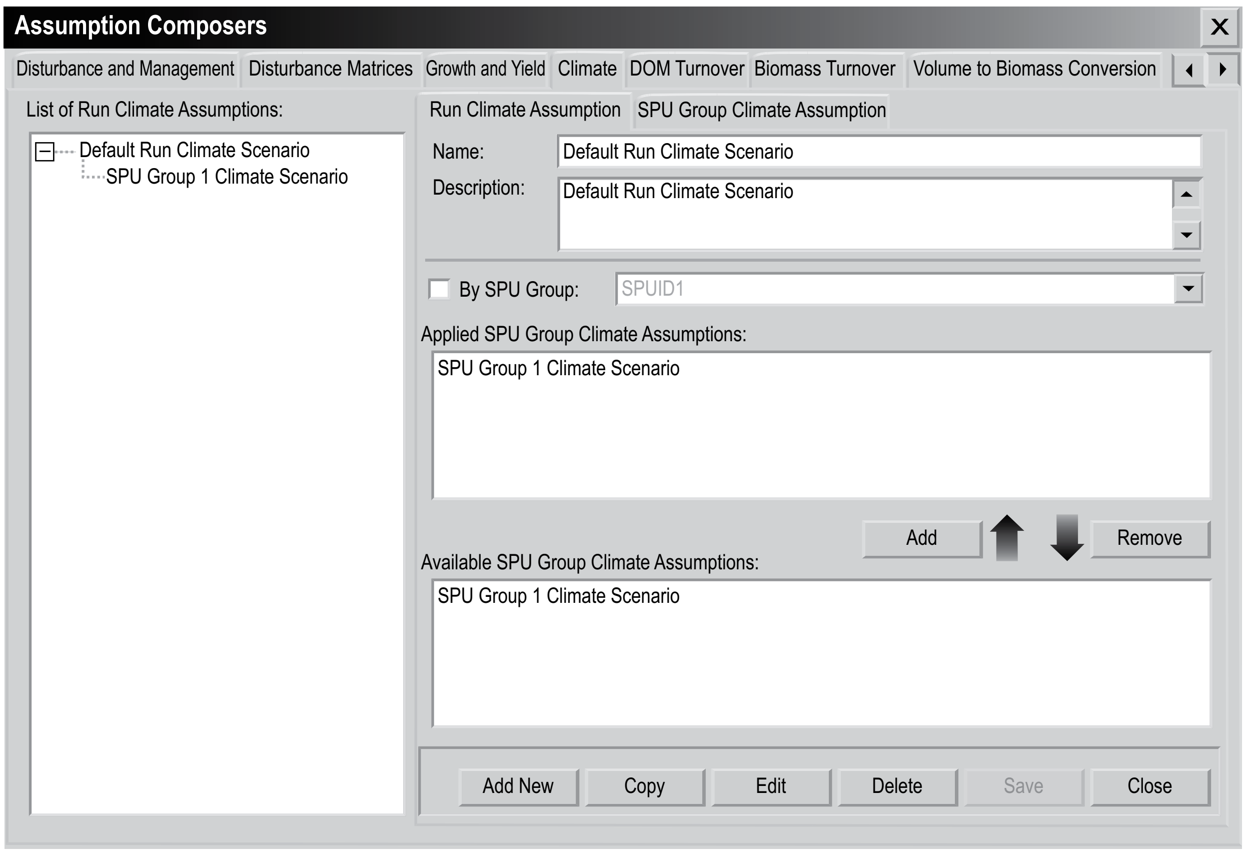


Figure 7-10. The "Assumption Composers" window with the "Climate" and "Run Climate Assumption" tabs selected.

The user can add, copy, edit, or delete Run Climate Assumptions or SPU Group Climate Assumptions. To cancel any of these actions

Click on the "Cancel" button

To close the window

Click on the "Close" button

7.6.1 Adding a Run Climate Assumption

To add (create) a new Run Climate Assumption using the "Run Climate Assumption" tab in the "Assumption Composers" window (Figure 7-10)

1. **Click on the "Add New" button**
2. **Enter a name for the assumption in the "Name" box**
3. **Enter a description in the "Description" box (if this box is left blank, the default is "Created on 'current date'")**
4. **Click on the "Save" button**

The new Run Climate Assumption will be added to the directory tree in the "List of Run Climate Assumptions" box.

Adding an SPU Group Climate Assumption to a Run Climate Assumption

As previously stated, a Run Climate Assumption is composed of one or more SPU Group Climate Assumptions. To add an existing SPU Group Climate Assumption to a Run Climate Assumption

1. **Click on the name of a Run Climate Assumption in the "List of Run Climate Assumptions" box (Figure 7-10)**
2. **Click on the name of an SPU Group Climate Assumption in the "Available SPU Group Climate Assumptions" box**

☞ ***Tip: Filtering the list of assumptions***

If the list of SPU Group Climate Assumptions is extensive

Click on the "By SPU Group" check box

Select an SPU Group from the drop list to filter the list of assumptions for the selected SPU Group

3. **Click on the "Add" button**

The added SPU Group Climate Assumption will appear in the "Applied SPU Group Climate Assumptions" box and in the "List of Run Climate Assumptions" box (linked to the selected Run Climate Assumption).

Removing an SPU Group Climate Assumption from a Run Climate Assumption

To remove an SPU Group Climate Assumption from a Run Climate Assumption

1. **Click on the name of a Run Climate Assumption in the "List of Run Climate Assumptions" box (Figure 7-10)**

2. **Click on the name of the SPU Group Climate Assumption in the "Applied SPU Group Climate Assumptions" box**
3. **Click on the "Remove" button**

7.6.2 Copying a Run Climate Assumption

To copy an existing Run Climate Assumption using the "Run Climate Assumption" tab in the "Assumption Composers" window (Figure 7-10)

1. **Click on the name of a Run Climate Assumption in the "List of Run Climate Assumptions" box**
2. **Click on the "Copy" button**

The copy of the Run Climate Assumption, called "Copy of 'original Run Climate Assumption name'" will be added to the "List of Run Climate Assumptions" box. The user can then edit the copy of the Run Climate Assumption.

7.6.3 Editing a Run Climate Assumption

To edit an existing Run Climate Assumption using the "Run Climate Assumption" tab in the "Assumption Composers" window (Figure 7-10)

1. **Click on the name of a Run Climate Assumption in the "List of Run Climate Assumptions" box**
2. **Click on the "Edit" button**
3. **Make the necessary changes to the Run Climate Assumption name and/or description (see section 7.6.1)**
4. **Click on the "Save" button**

An "Add or Update Run Climate Assumption" window will pop up asking the user to confirm modification of the selected climate record.

5. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the edits

The user can also modify the SPU Group Climate Assumptions that are associated with a Run Climate Assumption (see section 7.6.1).

7.6.4 Deleting a Run Climate Assumption

To delete an existing Run Climate Assumption using the "Run Climate Assumption" tab in the "Assumption Composers" window (Figure 7-10)

1. **Click on the name of a Run Climate Assumption in the "List of Run Climate Assumptions" box**
2. **Click on the "Delete" button**

A "Delete Climate Record Confirmation" window will pop up asking the user to confirm deletion of the selected climate record.

3. **Click on the "Yes" button to proceed**
   or
   Click on the "No" button to cancel the deletion

7.6.5 Adding an SPU Group Climate Assumption

To add (create) a new SPU Group Climate Assumption (to be added to a Run Climate Assumption) using the "SPU Group Climate Assumption" tab in the "Assumption Composers" window (Figure 7-11)

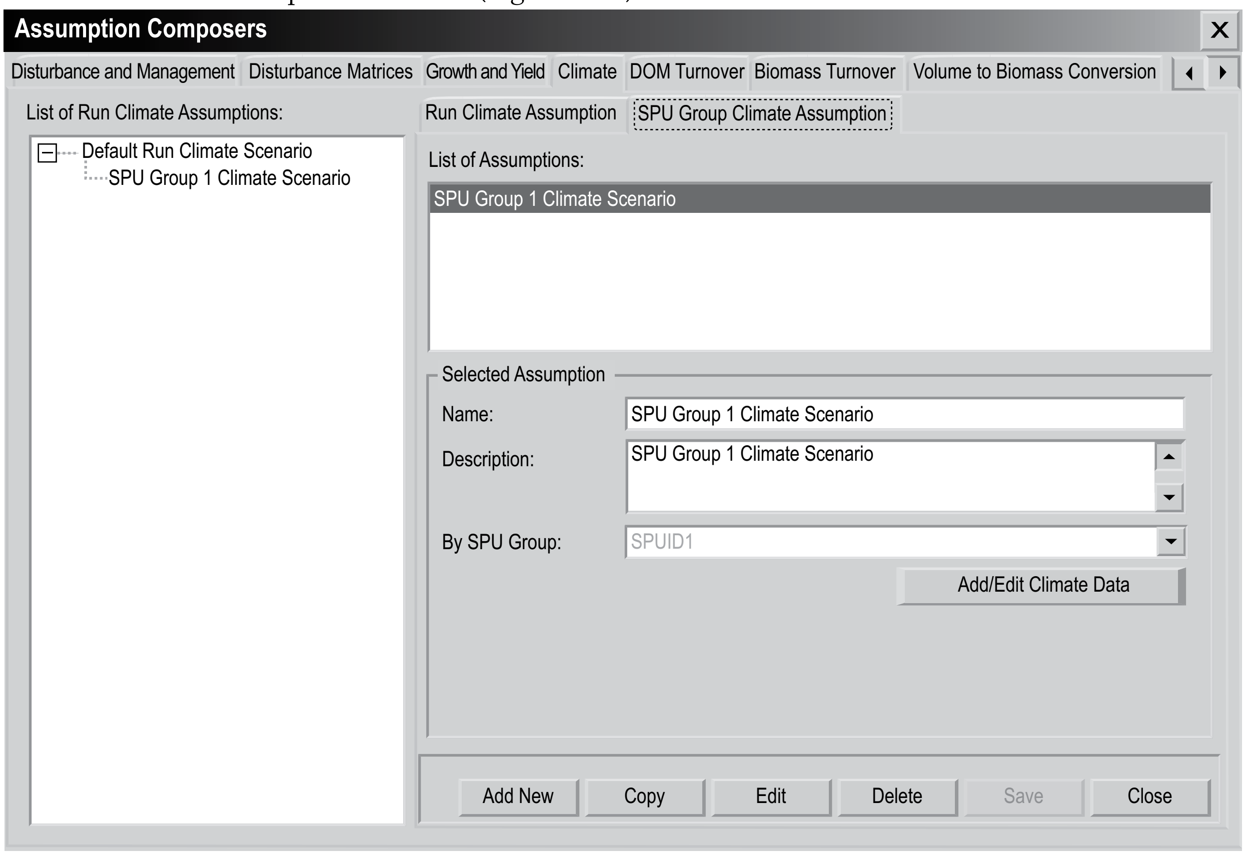


Figure 7-11. The "Assumption Composers" window with the "Climate" and "SPU Group Climate Assumption" tabs selected.

1. **Click on the "Add New" button**
2. **Enter a name for the assumption in the "Name" box**
3. **Enter a description for the assumption in the "Description" box (the default if this box is left blank, the default is "Created on 'current date'")**
4. **Click on the "SPU Group" box and select an SPU Group from the drop list that appears**
5. **Click on the "Save" button**

The new assumption will appear in the "List of Assumptions" box and in the "Available SPU Group Climate Assumptions" box on the "Run Climate Assumption" tab. The user must then enter the climate data associated with this new assumption. To proceed

6. **Click on the "Add/Edit Climate Data" button**

This will launch the "Climate Editor" window. To learn how to enter the data for the new SPU Group Climate Assumption in this window, consult section 6.1.

7.6.6 Copying an SPU Group Climate Assumption

To copy an existing SPU Group Climate Assumption using the "SPU Group Climate Assumption" tab in the "Assumption Composers" window (Figure 7-11)

1. **Click on the name of an SPU Group Climate Assumption in the "List of Assumptions" box**
2. **Click on the "Copy" button**

The copy of the SPU Group Climate Assumption, called "Copy of 'original SPU Group Climate Assumption name'" will be added to the "List of Assumptions" box. The user can then edit the copy of the SPU Group Climate Assumption.

7.6.7 Editing an SPU Group Climate Assumption

To edit an existing SPU Group Climate Assumption using the "SPU Group Climate Assumption" tab in the "Assumption Composers" window (Figure 7-11)

1. **Click on the name of an SPU Group Climate Assumption in the "List of Assumptions" box**
2. **Click on the "Edit" button**
3. **Make the necessary changes to the SPU Group Climate Assumption name, description, and/or assigned SPU Group (see section 7.6.5)**
4. **Click on the "Save" button**

An "Add or Update SPU Group Climate Assumption" window will pop up, asking the user to confirm modification of the selected SPU Group climate record.

5. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the edits

To edit the climate data associated with the assumption

Click on the "Add/Edit Climate Data" button

This will launch the "Climate Editor" window. To learn how to enter the data for the SPU Group Climate Assumption in this window, consult section 6.1.

7.6.8 Deleting an SPU Group Climate Assumption

To delete an existing SPU Group Climate Assumption using the "SPU Group Climate Assumption" tab in the "Assumption Composers" window (Figure 7-11)

1. **Click on the name of an SPU Group Climate Assumption in the "List of Assumptions" box**
2. **Click on the "Delete" button**

A "Delete SPU Group Climate Record Confirmation" window will pop up, asking the user to confirm deletion of the selected SPU Group Climate Assumption.

3. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the deletion

7.7 Composing Dead Organic Matter Turnover Assumptions

A DOM Turnover Assumption is linked to a particular ecological boundary and all carbon pools. Each assumption is composed of both DOM turnover parameters and DOM parameters.

DOM turnover parameters and DOM parameters are listed and defined in Table 7-2.

To access the Assumption Composer for DOM Turnover Assumptions

1. **Click on "Tools" on the menu bar of the main CBM-CFS3 window**
2. **Select "Assumption Composers" from the drop list that appears**
3. **Select "DOM Turnover Parameters" from the side drop list that appears**

The "Assumption Composers" window (Figure 7-12) will pop up displaying the "DOM Turnover" tab. Existing DOM Turnover Assumptions are displayed in the "List of DOM

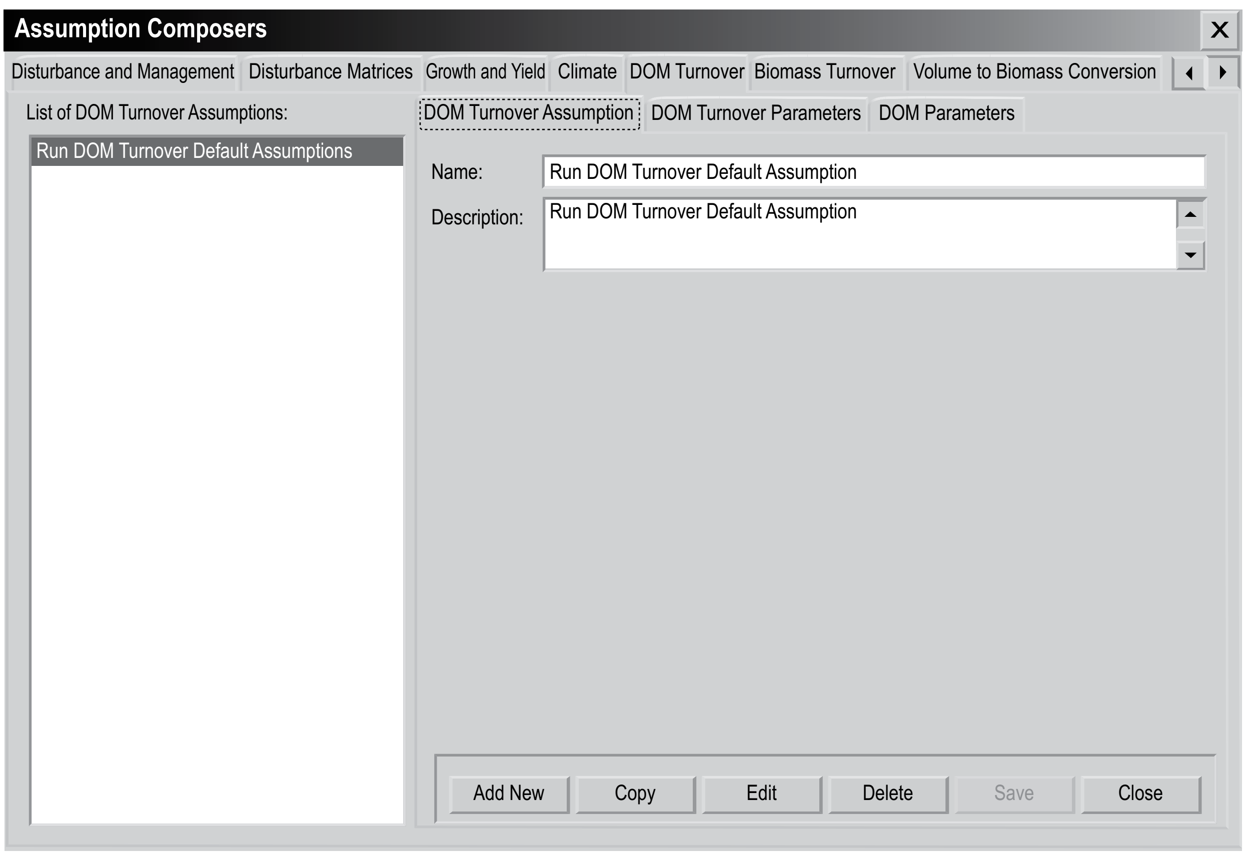


Figure 7-12. The "Assumption Composers" window with the "DOM Turnover" and "DOM Turnover Assumption" tabs selected.

Table 7-2. Definitions for dead organic matter (DOM) turnover parameters (Figure 7-13) and DOM parameters (Figure 7-14; units in parentheses)

Parameter type	Box name	Parameter name	Definition
DOM Turnover Parameters	Average	Slow DOM Pool (t ha^{-1})	Initial slow DOM pool value for the forest stand used by the stand initialization program (MAKELIST) that is run at the start of a simulation
		Decay Multiplier (0 to maximum defined by user)	Sensitivity analysis multiplier that alters the decay rates of all pools
		Stand Replacing Disturbance Interval (yr)	Average number of years between stand-replacing disturbances, which is used in MAKELIST to grow the stand(s) in an iterative process until equilibrium is reached in the slow DOM pool
	Turnover Rate (0 to 1)	Softwood Branch	Proportion of softwood branches that die annually
		Stem Annual	Proportion of stems that die annually
		Hardwood Branch	Proportion of hardwood branches that die annually
	Snag Fall Rate (0 to 1)	Softwood Stem	Proportion of softwood stem snags that transfer to the medium soil pool annually
		Softwood Branch	Proportion of softwood branch snags that transfer to the fast aboveground pool
		Hardwood Stem	Proportion of hardwood stem snags that transfer to the medium soil pool annually
		Hardwood Branch	Proportion of hardwood branch snags that transfer to the fast aboveground pool
	Foliage Fall Rate (0 to 1)	Softwood	Proportion of softwood foliage that transfers to the very fast aboveground pool
		Hardwood	Proportion of hardwood foliage that transfers to the very fast aboveground pool

Table 7-2. **Concluded**

Parameter type	Box name	Parameter name	Definition
DOM Parameters	Decay Rate	Decay rate of organic matter at the reference temperature (yr^{-1})	Annual base decay rate of organic matter at the specified reference temperature
		Maximum decay rate multiplier for the soil pool types (softwood) (≤1)	Maximum decay rate value that can be used for softwood DOM pools
		Maximum decay rate multiplier for the soil pool types (hardwood) (≤1)	Maximum decay rate value that can be used for hardwood DOM pools
	General	Reference mean annual temperature for decay rate (ºC)	Mean annual temperature for the base decay rate used as a reference point for application of q10
		q10 (ºC) (>1)	A parameter used to modify organic matter decay rates in response to mean annual temperature (e.g., a q10 value of 2 results in a doubling of the decay rate for every 10˚C increase in mean annual temperature relative to the reference temperature)
		Proportion of carbon transferred from soil pools to atmosphere (0 to 1)	Proportion of carbon in the selected soil pool that transfers to the atmosphere; default value is 0.83 for all DOM pools except the slow aboveground and belowground pools, for which the default is 1
	Carbon Flux Rate (peat only)	Rate at which carbon is added to the given soil pool	Rate at which carbon is added to the peat pool
		Rate at which carbon is lost from the given soil pool	Rate at which carbon is lost from the peat pool

Turnover Assumptions" box. The user can click on a specific assumption and then the various DOM tabs to view its associated parameters. The user can add, copy, edit, or delete DOM Turnover Assumptions. To cancel any of these actions

Click on the "Cancel" button

To close the window

Click on the "Close" button

7.7.1 Adding a Dead Organic Matter Turnover Assumption

To add (create) a new DOM Turnover Assumption using the "DOM Turnover Assumption" tab in the "Assumption Composers" window (Figure 7-12)

1. **Click on the "Add New" button**
2. **Enter a name for the assumption in the "Name" box**
3. **Enter a description in the "Description" box (if this box is left blank, the default is "Created on 'current date'")**
4. **Click on the "Save" button**

The new DOM Turnover Assumption will be added to the "List of DOM Turnover Assumptions" box. The user can then set up the DOM turnover parameters and DOM parameters for the assumption. To proceed

5. **Click on the name of the new assumption in the "List of DOM Turnover Assumptions" box**
6. **Click on the "DOM Turnover Parameters" tab (Figure 7-13) to view the default turnover parameters**

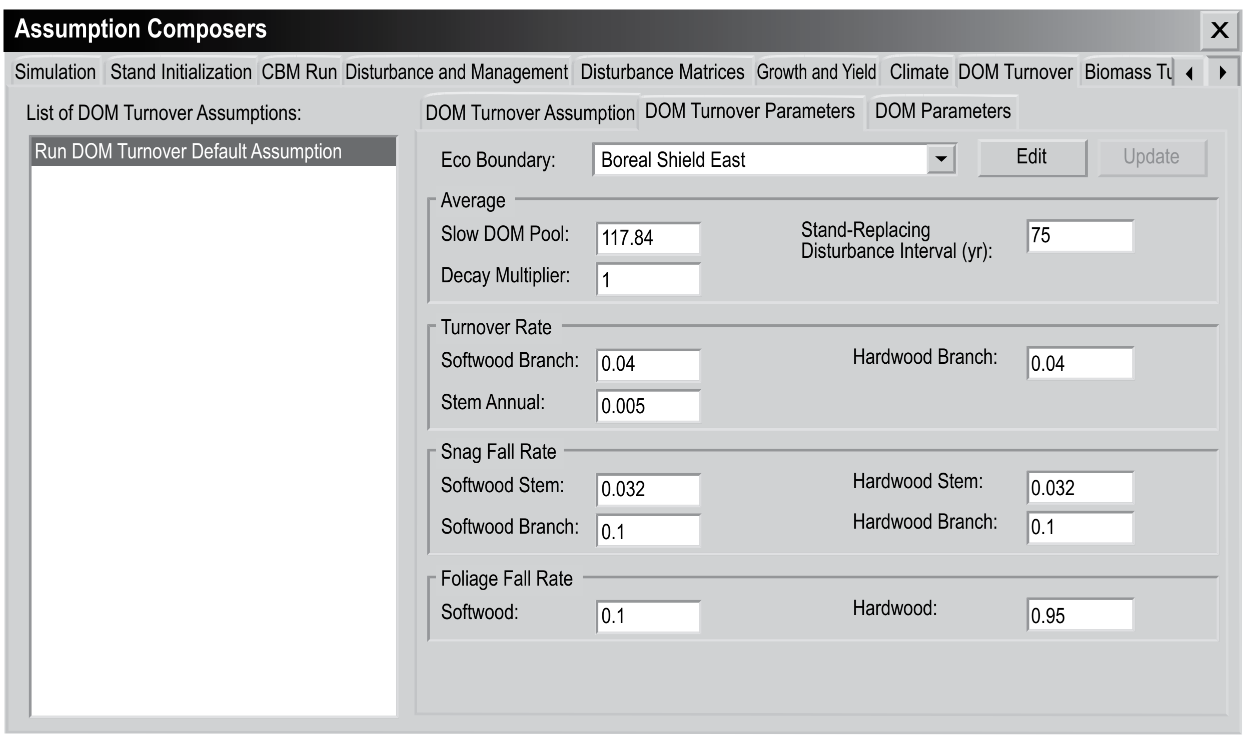


Figure 7-13. The "Assumption Composers" window with the "DOM Turnover" and "DOM Turnover Parameters" tabs selected.

Refer to Table 7-2 for parameter definitions. If satisfied with the default values, proceed to step 13. To edit the parameters

7. **Click on the "Edit" button**
8. **Click on the "Eco Boundary" box and select the name of an ecological boundary from the drop list that appears**
9. **Make the necessary changes to the DOM turnover parameter values**
10. **Click on the "Update" button**

An "Update Parameters" window will pop up, asking the user to confirm modification of the DOM turnover parameters.

11. **Click on the "Yes" button to proceed**

    or

    Click on the "No" button to cancel the edits

If required,

12. **Repeat steps 6 to 11 for any remaining ecological boundaries in the "Ecological Boundaries" box**
13. **Click on the "DOM Parameters" tab (Figure 7-14) to view the default DOM Parameters**

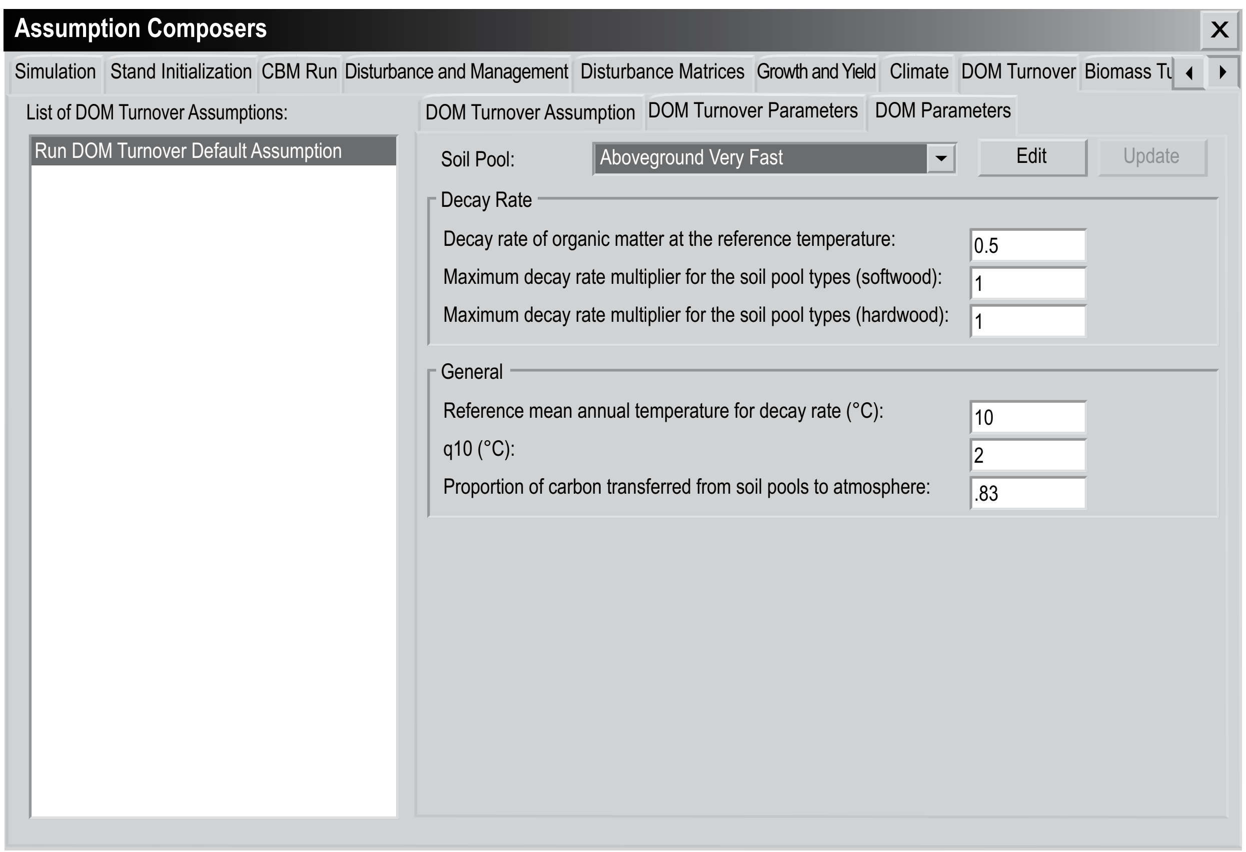


Figure 7-14. The "Assumption Composers" window with the "DOM Turnover" and "DOM Parameters" tabs selected.

Refer to Table 7-2 for parameter definitions. If satisfied with the default values, the new DOM Turnover Assumption is complete. To edit the parameters

14. **Click on the "Edit" button**
15. **Click on the "Soil Pool" box and select the name of a soil pool from the drop list that appears**
16. **Make the necessary changes to the DOM parameter values**
17. **Click on the "Update" button**

An "Update Parameters" window will pop up, asking the user to confirm modification of the DOM and peat parameters.

18. **Click on the "Yes" button to proceed**

    or

    Click on the "No" button cancel the edits
19. **Repeat steps 14 to 18 for the remaining soil types in the "Soil Pool" box**

7.7.2 Copying a Dead Organic Matter Turnover Assumption

To copy an existing DOM Turnover Assumption using the "DOM Turnover Assumption" tab in the "Assumption Composers" window (Figure 7-12)

1. **Click on the name of a DOM Assumption in the "List of DOM Turnover Assumptions" box**
2. **Click on the "Copy" button**

A copy of the DOM Turnover Assumption, called "Copy of 'original DOM Turnover Assumption name'" will be added to the "List of DOM Turnover Assumptions" box. The user can then edit the copy of the DOM Turnover Assumption.

7.7.3 Editing a Dead Organic Matter Turnover Assumption

Editing the Assumption Name and Description

To edit the name and description of an existing DOM Turnover Assumption using the "DOM Turnover Assumption" tab in the "Assumption Composers" window (Figure 7-12)

1. **Click on the name of a DOM Assumption in the "List of DOM Turnover Assumptions" box**
2. **Click on the "Edit" button**
3. **Make the necessary changes to the name and/or description (see section 7.7.1)**
4. **Click on the "Save" button**

An "Add or Update DOM Turnover Assumption" window will pop up, asking the user to confirm modification of the selected DOM turnover record.

5. **Click on the "Yes" button to proceed**

    or

    Click on the "No" button to cancel the edits

Editing Assumption Parameters

To edit the parameters of an existing DOM Turnover Assumption using the "DOM Turnover Assumption" tab in the "Assumption Composers" window (Figure 7-12)

1. **Click on the name of a DOM Turnover Assumption in the "List of DOM Turnover Assumptions" box**
2. **Click on either the "DOM Turnover Parameters" tab or the "DOM Parameters" tab**
3. **Click on the "Edit" button**
4. **Make the necessary changes to the parameters (see section 7.7.1)**
5. **Click on the "Update" button**

An "Update Parameters" window will pop up, asking the user to confirm modification of the DOM Parameters or the DOM and peat parameters (depending on which tab was selected).

6. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button cancel the edits

To edit the parameters tab not selected in step 2, repeat steps 2 to 6 for that tab.

7.7.4 Deleting a Dead Organic Matter Turnover Assumption

To delete an existing DOM Turnover Assumption using the "DOM Turnover Assumption" tab in the "Assumption Composers" window (Figure 7-12)

1. **Click on the name of a DOM Turnover Assumption in the "List of DOM Turnover Assumptions" box**
2. **Click on the "Delete" button**

A "Delete DOM Turnover Record Confirmation" window will pop up, asking the user to confirm deletion of the selected DOM Turnover Assumption.

3. **Click on the "Yes" button to proceed**

   or

4. **Click on the "No" button to cancel the deletion**

7.8 Composing Run Disturbance Matrix Assumptions

Run Disturbance Matrix Assumptions are composed of one or more SPU Group Disturbance Matrix Assumptions. Each SPU Group Disturbance Matrix Assumption is an association of an SPU Group ID, a disturbance type, and a disturbance matrix.

Run Disturbance Matrix Assumptions are, or can be, linked to disturbance matrices in the Disturbance Matrix Editor (see Figure 6-13). To learn about disturbance matrices, read section 6.3.

To access the Assumption Composer for Run Disturbance Matrix Assumptions

1. **Click on "Tools" on the menu bar of the main CBM-CFS3 window**

2. **Select "Assumption Composers" from the drop list that appears**
3. **Select "Disturbance Matrices" from the side drop list that appears**

The "Assumption Composers" window (Figure 7-15) will pop up, displaying the "Disturbance Matrices" tab.

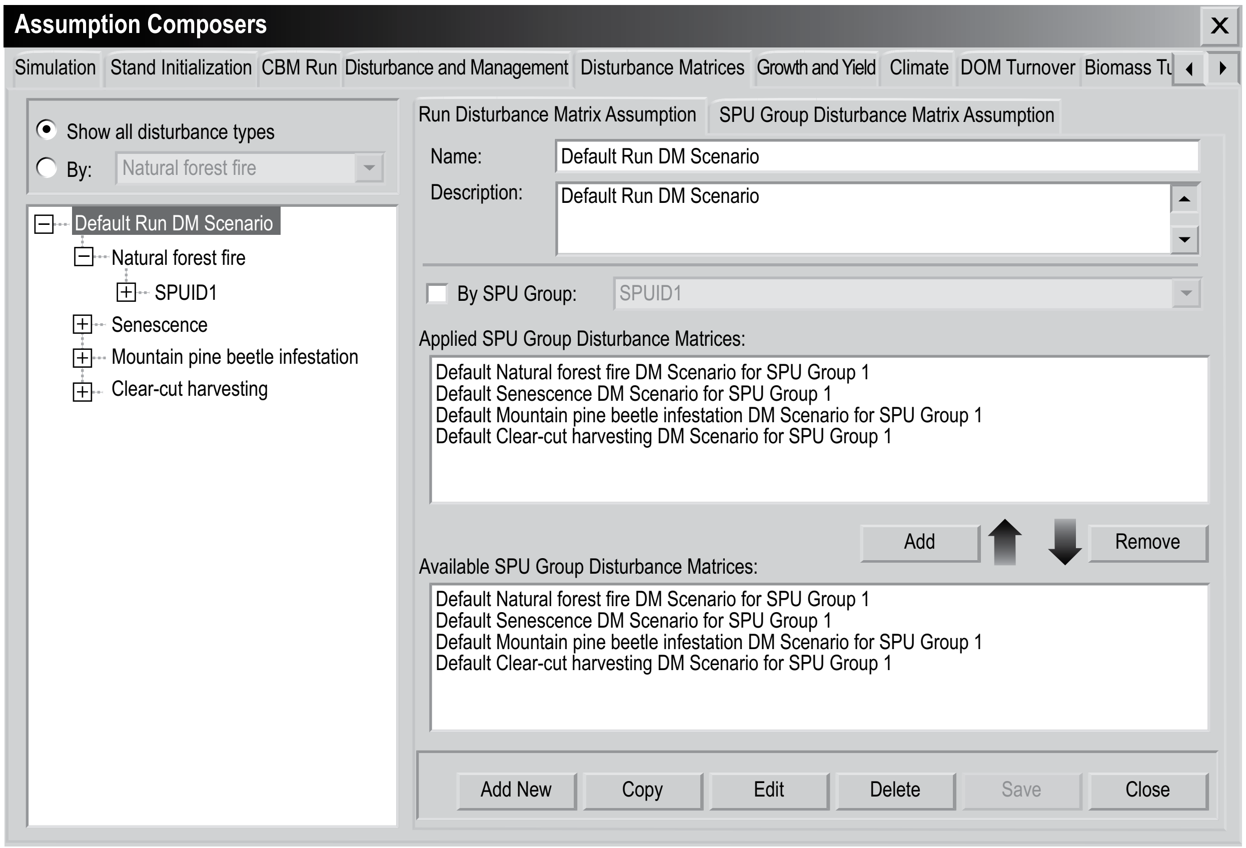


Figure 7-15. The "Assumption Composers" window with the "Disturbance Matrices" and "Run Disturbance Matrix Assumption" tabs selected.

On the "Disturbance Matrices" tab, existing Run Disturbance Matrix Assumptions are displayed in a hierarchical structure in the box containing the directory tree of assumptions. To view assumptions in the directory for all disturbance types, the user can click on the "Show all disturbance types" radio button. The user can also view assumptions linked to a specific disturbance type in the directory tree by clicking on the "By" radio button and selecting a disturbance type from the drop list that will appear beside it. On the directory tree, the user can then double-click on a specific Run Disturbance Matrix Assumption or click on the "+" next to the assumption to expand the tree and see the SPU and SPU Group Disturbance Matrices associated with that assumption. One Run Disturbance Matrix Assumption may contain many combinations of SPUs and SPU Group Disturbance Matrices. Clicking on a "-" in the directory tree will collapse the corresponding assumption section of the directory tree. The user can also right-click in the directory tree box and choose, by selecting the appropriate option from the pop-up menu, to expand or collapse the directory tree.

The user can add, copy, edit, or delete Run Disturbance Matrix Assumptions or SPU Group Disturbance Matrix Assumptions. To cancel any of these actions

Click on the "Cancel" button

To close the window

Click on the "Close" button

The hierarchical structure for a Run Disturbance Matrix Assumption is as follows:

1. Run Disturbance Matrix Assumption
2. Disturbance Type
3. SPU Group
4. Disturbance Matrix

7.8.1 Adding a Run Disturbance Matrix Assumption

To add (create) a new Run Disturbance Matrix Assumption using the "Run Disturbance Matrix Assumption" tab on the "Disturbance Matrices" tab (Figure 7-15)

1. **Click on the "Add New" button**
2. **Enter a name for the assumption in the "Name" box**
3. **Enter a description in the "Description" box (if this box is left blank, the default is "Created on 'current date'")**
4. **Click on the "Save" button**

The new Run Disturbance Matrix Assumption will be added to the directory tree box.

Adding an SPU Group Disturbance Matrix to a Run Disturbance Matrix Assumption

If a Run Disturbance Matrix Assumption is to be used in a model simulation it must be linked to an SPU Group Disturbance Matrix Assumption. To add an SPU Group Disturbance Matrix appearing in the "Available SPU Group Disturbance Matrix" box to a Run Disturbance Matrix Assumption

1. **Click on the name of a Run Disturbance Matrix Assumption in the directory tree box**
2. **Click on the name of an SPU Group Disturbance Matrix in the "Available SPU Group Disturbance Matrix" box**

☞ *Tip: Filtering the list of SPU Group Disturbance Matrices*

If the list of SPU Group Disturbance Matrices is extensive

Click on the "By SPU Group" check box

Select an SPU Group from the drop list to filter the list of matrices for the selected SPU

---

3. **Click on the "Add" button**

The SPU Group Disturbance Matrix will appear in the "Applied SPU Group Disturbance Matrix" box and in the directory tree box linked to the selected Run Disturbance Matrix Assumption.

Removing an SPU Group Disturbance Matrix from a Run Disturbance Matrix Assumption

To remove an SPU Group Disturbance Matrix from a Run Disturbance Matrix Assumption

1. **Click on the name of a Run Disturbance Matrix Assumption in the directory tree box**
2. **Click on the name of an SPU Group Disturbance Matrix in the "Applied SPU Group Disturbance Matrix" box**
3. **Click on the "Remove" button**

7.8.2 Copying a Run Disturbance Matrix Assumption

To copy an existing Run Disturbance Matrix Assumption using the "Run Disturbance Matrix Assumption" tab on the "Disturbance Matrices" tab (Figure 7-15)

1. **Click on the name of a Run Disturbance Matrix Assumption in the directory tree box**
2. **Click on the "Copy" button**

The copy of the Run Disturbance Matrix Assumption, called "Copy of 'original Run Disturbance Matrix Assumption name'" will be added to the directory tree box. The assumption will not have any assigned SPU Group Disturbance Matrices. To learn how to add SPU Group Disturbance Matrices to this assumption, read section 7.8.1. The user can then edit the copy of the Run Disturbance Matrix Assumption.

7.8.3 Editing a Run Disturbance Matrix Assumption

To edit the name and/or description of an existing Run Disturbance Matrix Assumption using the "Run Disturbance Matrix Assumption" tab on the "Disturbance Matrices" tab (Figure 7-15)

1. **Click on the name of a Run Disturbance Matrix Assumption in the directory tree box**
2. **Click on the "Edit" button**
3. **Make the necessary changes to the Run Disturbance Matrix Assumption name and/or description**
4. **Click on the "Save" button**

An "Add or Update Assumption" window will pop up asking the user to confirm modification of the selected disturbance matrix record.

5. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the edits

To learn how to add or remove SPU Group Disturbance Matrix Assumptions associated with a Run Disturbance Matrix Assumption, see section 7.8.1.

7.8.4 Deleting a Run Disturbance Matrix Assumption

To delete an existing Run Disturbance Matrix Assumption using the "Run Disturbance Matrix Assumption" tab on the "Disturbance Matrices" tab (Figure 7-15)

1. **Click on the name of a Run Disturbance Matrix Assumption in the directory tree box**
2. **Click on the "Delete" button**

A "Delete Run Disturbance Matrix Record Confirmation" window will pop up, asking the user to confirm deletion of the selected disturbance matrix.

3. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the deletion

7.8.5 Adding an SPU Group Disturbance Matrix Assumption

To add (create) an SPU Group Disturbance Matrix Assumption using the "SPU Group Disturbance Matrix Assumption" tab on the "Disturbance Matrices" tab (Figure 7-16)

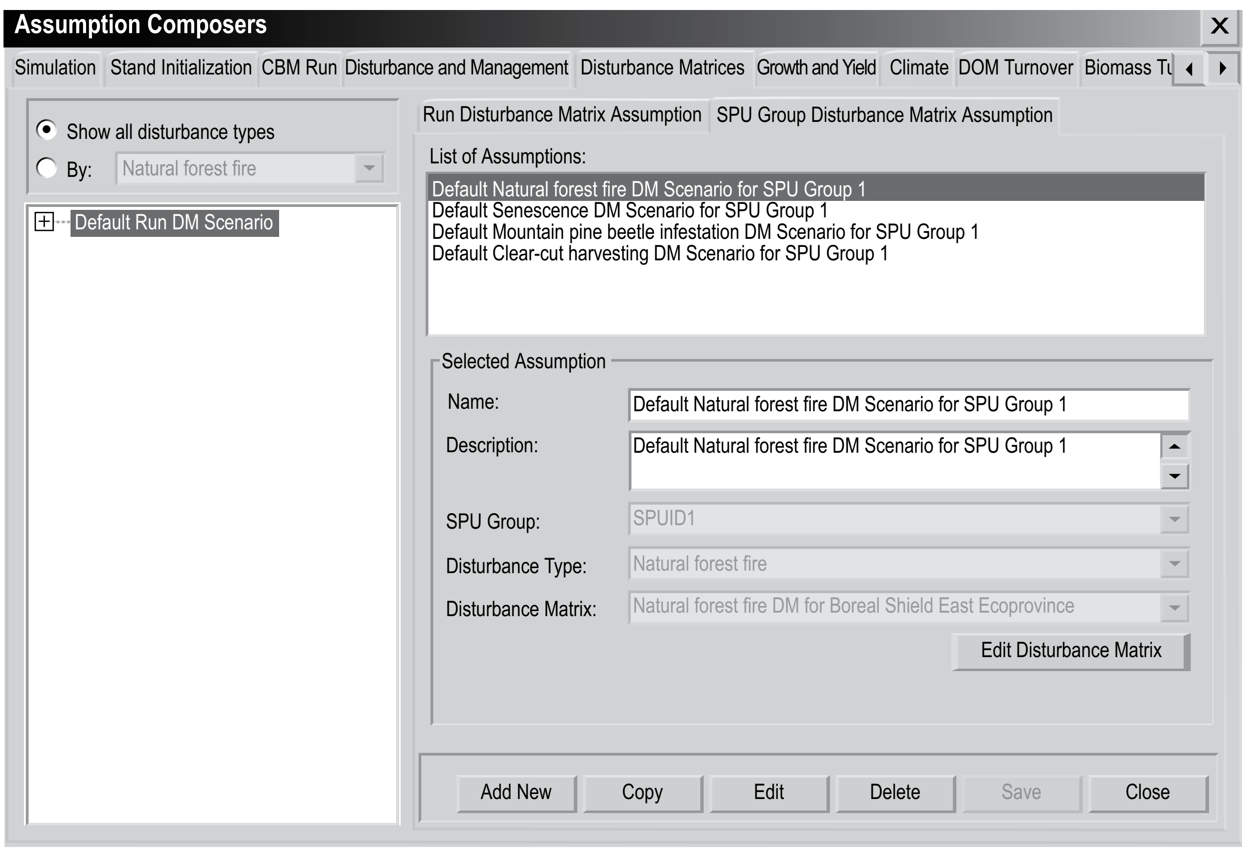


Figure 7-16. The "Assumption Composers" window with the "Disturbance Matrices" and "SPU Group Disturbance Matrix Assumption" tabs selected.

1. **Click on the "Add New" button**
2. **Enter a name in the "Name" box**
3. **Enter a description in the "Description" box (if this box is left blank, the default is "Created on 'current date'")**
4. **Click on the "SPU Group" box and select an SPU Group name from the drop list that appears**
5. **Click on the "Disturbance Type" box and select a disturbance type name from the drop list that appears**
6. **Click on the "Disturbance Matrix" box and select a disturbance matrix name from the drop list that appears**
7. **Click on the "Save" button**

The new SPU Group Disturbance Matrix Assumption will be added to the "List of Assumptions" box and can be linked to a Run Disturbance Matrix Assumption on the "Run Disturbance Matrix Assumption" tab (Figure 7-15).

7.8.6 Copying an SPU Group Disturbance Matrix Assumption

To copy an existing SPU Group Disturbance Matrix Assumption using the "SPU Group Disturbance Matrix Assumption" tab on the "Disturbance Matrices" tab (Figure 7-16)

1. **Click on the name of an SPU Group Disturbance Matrix Assumption in the "List of Assumptions" box**
2. **Click on the "Copy" button**

The copy of the SPU Group Disturbance Matrix Assumption, called "Copy of 'original SPU Group Disturbance Matrix Assumption name'" will be added to the "List of Assumptions" box. The user can then edit the SPU Group Disturbance Matrix Assumption.

7.8.7 Editing an SPU Group Disturbance Matrix Assumption

To edit an existing SPU Group Disturbance Matrix Assumption using the "SPU Group Disturbance Matrix Assumption" tab on the "Disturbance Matrices" tab (Figure 7-16)

1. **Click on the name of an SPU Group Disturbance Matrix Assumption in the "List of Assumptions" box**
2. **Click on the "Edit" button**
3. **Make the necessary changes to the SPU Group Disturbance Matrix Assumption name, description, SPU Group, disturbance type, and/or disturbance matrix (see section 7.8.5)**
4. **Click on the "Save" button**

Editing a Disturbance Matrix

The "Edit Disturbance Matrix" button appears on the "SPU Group Disturbance Matrix Assumption" tab (Figure 7-16). By clicking on this button, the user can access the "Disturbance Matrix Editor" window to view and/or edit a specific disturbance matrix in the model. To use this feature

1. **Click on the "SPU Group Disturbance Matrix Assumption" tab (Figure 7-16)**
2. **In the "List of Assumptions" box, click on the name of an SPU Group Disturbance Matrix Assumption that is linked to a disturbance matrix of interest (see the "Disturbance Matrix" box)**
3. **Click on the "Edit Disturbance Matrix" button**

The "Disturbance Matrix Editor" window (Figure 6-15) will pop up displaying the selected disturbance matrix. For details on how to edit a disturbance matrix, read section 6.3.

7.8.8 Deleting an SPU Group Disturbance Matrix Assumption

To delete an existing SPU Group Disturbance Matrix Assumption using the "SPU Group Disturbance Matrix Assumption" tab on the "Disturbance Matrices" tab (Figure 7-16)

1. **Click on the name of an SPU Group Disturbance Matrix Assumption in the "List of Assumptions" box**
2. **Click on the "Delete" button**

A "Delete SPU Group Disturbance Matrix Record Confirmation" window will pop up, asking the user to confirm deletion of the selected SPU Group Disturbance Matrix Assumption.

3. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the deletion

7.9 Composing Disturbance and Management Assumptions

Disturbance and Management Assumptions are assumptions about human and natural disturbance events that occur on a land base. They are composed of one or more Disturbance Group Assumptions, each of which is linked to of a Transition Rule Assumption.

Disturbance Group Assumptions are, or can be, linked to disturbance events in the Disturbance Events Editor (see Figure 6-5) and Transition Rule Assumptions are, or can be, linked to transition rules in the Transition Rules Editor (see Figure 6-27).

To access the Assumption Composer for Disturbance and Management Assumptions

1. **Click on "Tools" on the menu bar of the main CBM-CFS3 window**
2. **Select "Assumption Composers" from the drop list that appears**
3. **Select "Disturbance Events and Management Activities" from the side drop list that appears**

The "Assumption Composers" window (Figure 7-17) will pop up displaying the "Disturbance and Management" tab.

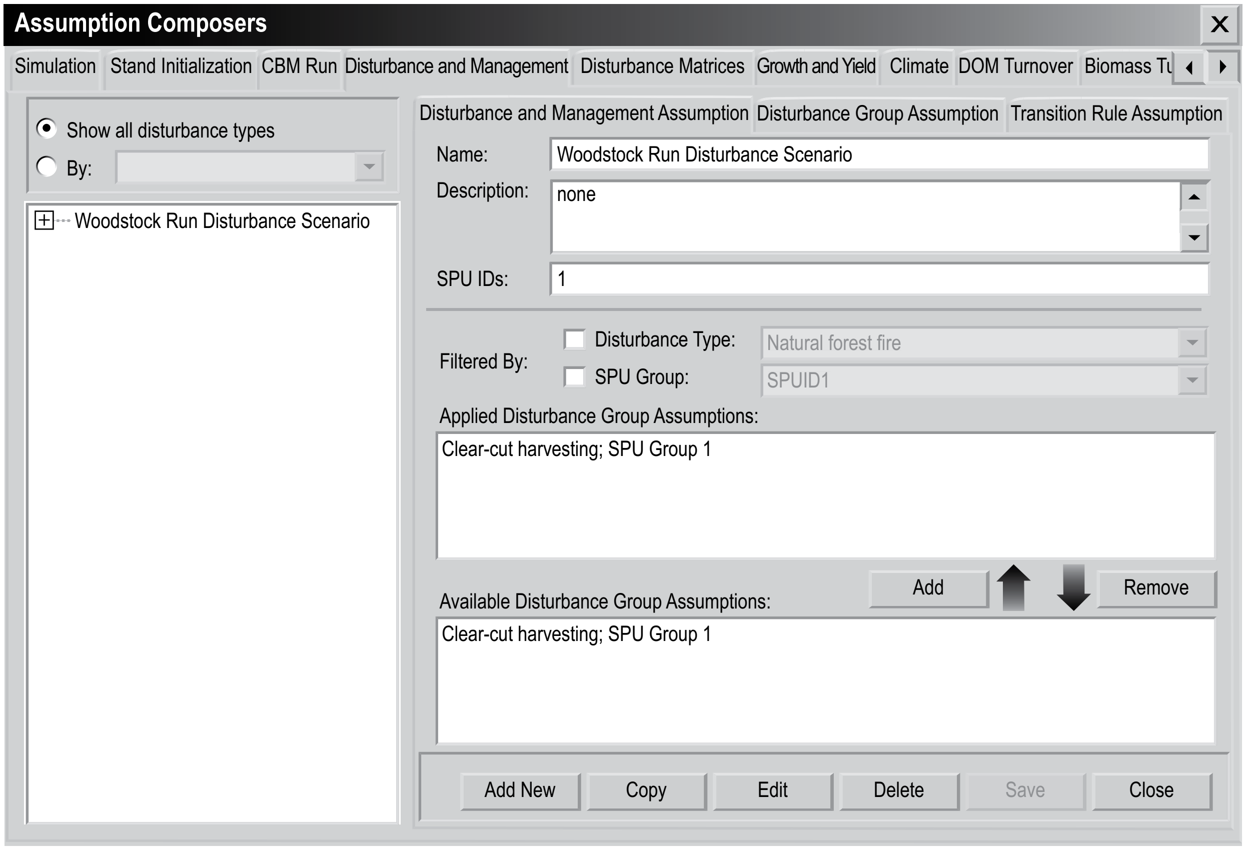


Figure 7-17. The "Assumption Composers" window with the "Disturbance and Management" and "Disturbance and Management Assumption" tabs selected.

Existing Disturbance and Management Assumptions are displayed in this window in a hierarchical structure in the box containing the directory tree of assumptions. To view assumptions in the directory for all disturbance types, the user can click on the "By all disturbance types" radio button. The user can also view assumptions linked to a specific disturbance type in the directory tree by clicking on the "By" radio button and selecting a disturbance type from the drop list beside it.

On the directory tree, the user can then double-click on a specific Disturbance and Management Assumption or click on the "+" next to it to expand the tree and see the management, natural disturbance, land-use change, and/or other disturbance hierarchy. The Disturbance Group Assumptions associated with this Disturbance and Management Assumption will be displayed in the "Applied Disturbance Group Assumptions" box. On the directory tree, the user can double-click on one of the four headings to view the Disturbance Group Assumptions and Transition Rule Assumptions in the tree structure and click on either of these to view the details about them. Clicking on a "-" in the directory tree will collapse the corresponding assumption section of the directory tree. The user can also right-click in the directory tree box and choose, by selecting the appropriate option from the pop-up menu, to expand or collapse the directory tree.

Users can add, copy, edit, or delete Disturbance and Management Assumptions, Disturbance Group Assumptions, or Transition Rule Assumptions. To cancel any of these actions

Click on the "Cancel" button

To close the window

Click on the "Close" button

The hierarchical structure for a Disturbance and Management Assumption is as follows

1. **Disturbance and Management Assumption**
2. **Disturbance Group Assumption**
3. **Transition Rule Assumption**

7.9.1 Adding a Disturbance and Management Assumption

To add (create) a new Disturbance and Management Assumption using the "Disturbance and Management Assumption" tab on the "Disturbance and Management " tab (Figure 7-17)

1. **Click on the "Add New" button**
2. **Enter a name for the assumption in the "Name" box**
3. **Enter a description in the "Description" box (if this box is left blank, the default is "Created on 'current date'")**
4. **Enter the eligible SPU identification (ID) numbers separated by commas, if the project contains more than one**
5. **Click on the "Save" button**

The new Disturbance and Management Assumption will be added to the directory tree box. To be used in a simulation, a Disturbance and Management Assumption must be composed of one or more Disturbance Group Assumptions.

Adding a Disturbance Group Assumption to a Disturbance and Management Assumption

To add a Disturbance Group Assumption to a Disturbance and Management Assumption

1. **Click on the name of a Disturbance and Management Assumption in the directory tree box (Figure 7-17)**
2. **In the "Available Disturbance Group Assumptions" box, click on the name of the Disturbance Group Assumption to be linked to it**

☞ ***Tip: Filtering Disturbance Group Assumptions***

If the list of Disturbance Group Assumptions is extensive, the user can filter the list to show only those Disturbance Group Assumptions associated with a particular disturbance type and/or SPU Group. To do this

Click on the "Disturbance Type" check box and select an item from the drop list

and/or

Click on the "SPU Group" check box and select an item from the drop list

3. **Click on the "Add" button**

The Disturbance Group Assumption will appear in the "Applied Disturbance Groups Assumptions" box.

Removing a Disturbance Group Assumption from a Disturbance and Management Assumption

To remove a Disturbance Group Assumption from a Disturbance and Management Assumption

1. **Click on the name of the Disturbance and Management Assumption in the directory tree box (Figure 7-17)**
2. **Click on the name of the Disturbance Group Assumption in the "Applied Disturbance Group Assumptions" box**
3. **Click on the "Remove" button**

7.9.2 Copying a Disturbance and Management Assumption

To copy an existing Disturbance and Management Assumption using the "Disturbance and Management Assumption" tab on the "Disturbance and Management" tab (Figure 7-17)

1. **Click on the name of a Disturbance and Management Assumption in the directory tree box**
2. **Click on the "Copy" button**

The copy of the Disturbance and Management Assumption, called "Copy of 'original Disturbance and Management Assumption name'" will be added to the directory tree box. The user can then edit the copy of the Disturbance and Management Assumption.

7.9.3 Editing a Disturbance and Management Assumption

To edit an existing Disturbance and Management Assumption using the "Disturbance and Management Assumption" tab on the "Disturbance and Management" tab (Figure 7-17)

1. **Click on the name of a Disturbance and Management Assumption in the directory tree box**
2. **Click on the "Edit" button**
3. **Make the necessary changes to the Disturbance and Management Assumption name, description, and/or SPU ID(s) (see section 7.9.1)**
4. **Click on the "Save" button**

The Disturbance Group Assumptions linked to a Disturbance and Management Assumption can also be added or removed (see section 7.9.1).

7.9.4 Deleting a Disturbance and Management Assumption

To delete an existing Disturbance and Management Assumption using the "Disturbance and Management Assumption" tab on the "Disturbance and Management" tab (Figure 7-17)

1. **Click on the name of a Disturbance and Management Assumption in the directory tree box**
2. **Click on the "Delete" button**

A "Delete Disturbance Record Confirmation" window will pop up, asking the user to confirm deletion of the selected disturbance assumption.

3. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the deletion

7.9.5 Adding a Disturbance Group Assumption

Disturbance Group Assumptions are composed of a disturbance type, an SPU Group, and a Transition Rule Assumption. Existing Disturbance Group Assumptions (if any) appear in the "List of Assumptions" box on the "Disturbance Group Assumption" tab (Figure 7-18).

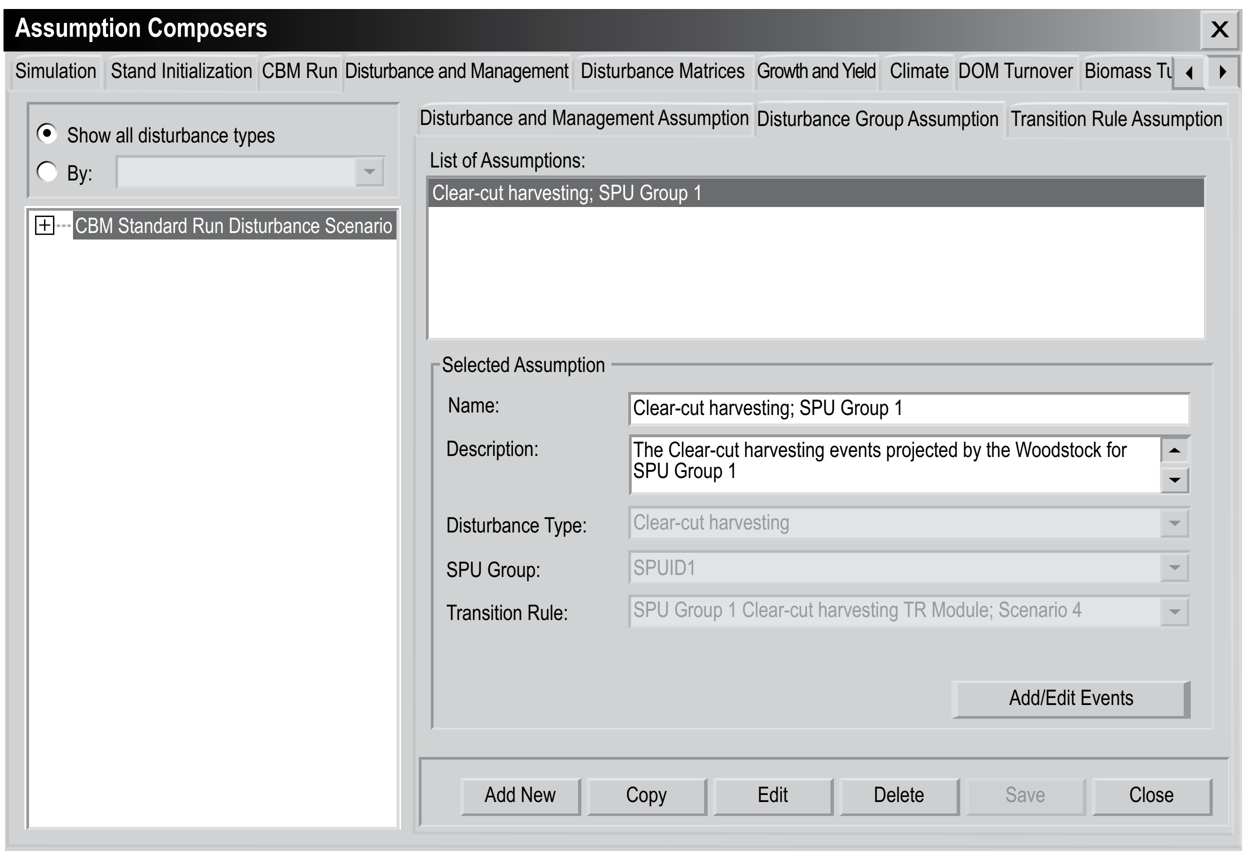


Figure 7-18. The "Assumption Composers" window with the "Disturbance and Management" and "Disturbance Group Assumption" tabs selected.

To add (create) a new Disturbance Group Assumption using the "Disturbance Group Assumption" tab on the "Disturbance and Management" tab (Figure 7-18)

1. **Click on the "Add New" button**
2. **Enter a name for the assumption in the "Name" box**
3. **Enter a description in the "Description" box (the default if this box is left blank, the default is "Created on 'current date'")**
4. **Click on the "Disturbance Type" box and select a disturbance type from the drop list that appears**
5. **Click on the "SPU Group" box and select an SPU Group from the drop list that appears**

Next, the user must select a transition rule. A transition rule describes the transition of a specific predisturbance forest type to one or more postdisturbance forest types following a specific disturbance event. For example, following clear-cutting, an area with a black spruce forest type may convert to 50% black spruce and 50% trembling aspen forest types. To proceed

6. **Click on the "Transition Rule" box and select a transition rule from the drop list that appears**
7. **Click on the "Save" button**

The new Disturbance Group Assumption will be added to the "List of Assumptions" box and can be linked to a Disturbance and Management Assumption.

7.9.6 Copying a Disturbance Group Assumption

To copy an existing Disturbance Group Assumption using the "Disturbance Group Assumption" tab on the "Disturbance and Management" tab (Figure 7-18)

1. **Click on the name of a Disturbance Group Assumption in the "List of Assumptions" box**
2. **Click on the "Copy" button**

The copy of the Disturbance Group Assumption called "Copy of 'original Disturbance Group Assumption name'" will be added to the "List of Assumptions" box. The user can then edit the copy of the Disturbance Group Assumption.

7.9.7 Editing a Disturbance Group Assumption

To edit an existing Disturbance Group Assumption using the "Disturbance Group Assumption" tab on the "Disturbance and Management" tab (Figure 7-18)

1. **Click on the name of a Disturbance Group Assumption in the "List of Assumptions" box**
2. **Click on the "Edit" button**
3. **Make the necessary changes to the Disturbance Group Assumption name, description, disturbance type, SPU Group, and/or transition rule (see section 7.9.5)**
4. **Click on the "Save" button**

Editing a Disturbance Event

The "Add/Edit Events" button is found on the "Disturbance Group Assumption" tab. By clicking on this button, the user can access the "Disturbance Events Editor" window to view or edit a specific disturbance event in the model. To use this feature

1. **Click on the "Disturbance Group Assumption" tab (Figure 7-18)**
2. **In the "List of Assumptions" box, click on the name of a Disturbance Group Assumption with the appropriate components**
3. **Click on the "Add/Edit Events" button**

The "Disturbance Events Editor" window (Figure 6-7) will pop up. For details on how to use the Disturbance Events Editor, read section 6.2.

7.9.8 Deleting a Disturbance Group Assumption

To delete an existing Disturbance Group Assumption using the "Disturbance Group Assumption" tab on the "Disturbance and Management" tab (Figure 7-18)

1. **Click on the name of a Disturbance Group Assumption in the "List of Assumptions" box**
2. **Click on the "Delete" button**

A "Delete Disturbance Group Record Confirmation" window will pop up, asking the user to confirm deletion of the Disturbance Group Assumption.

3. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the deletion

7.9.9 Adding a Transition Rule Assumption

Transition Rule Assumptions are composed of a disturbance type, an SPU Group, and an associated forest type. Each assumption is linked to transition rules in the Transition Rules Editor. If a Transition Rule Assumption is to be used in a simulation run, it must be linked to a Disturbance Group Assumption (which must in turn be linked to a Disturbance and Management Assumption). Existing Transition Rule Assumptions (if any) appear in the "List of Assumptions" box on the "Transition Rule Assumption" tab (Figure 7-19).

To add (create) a new Transition Rule Assumption using the "Transition Rule Assumption" tab on the "Disturbance and Management" tab (Figure 7-19)

1. **Click on the "Add New" button**
2. **Enter a name for the assumption in the "Name" box**
3. **Enter a description in the "Description" box (if this box is left blank, the default is "Created on 'current date'")**
4. **Click on the "Disturbance Type" box and select the name of a disturbance type from the drop list that appears**
5. **Click on the "SPU Group" box and select the name of an SPU Group from the drop list that appears**
6. **Click on the "Save" button**

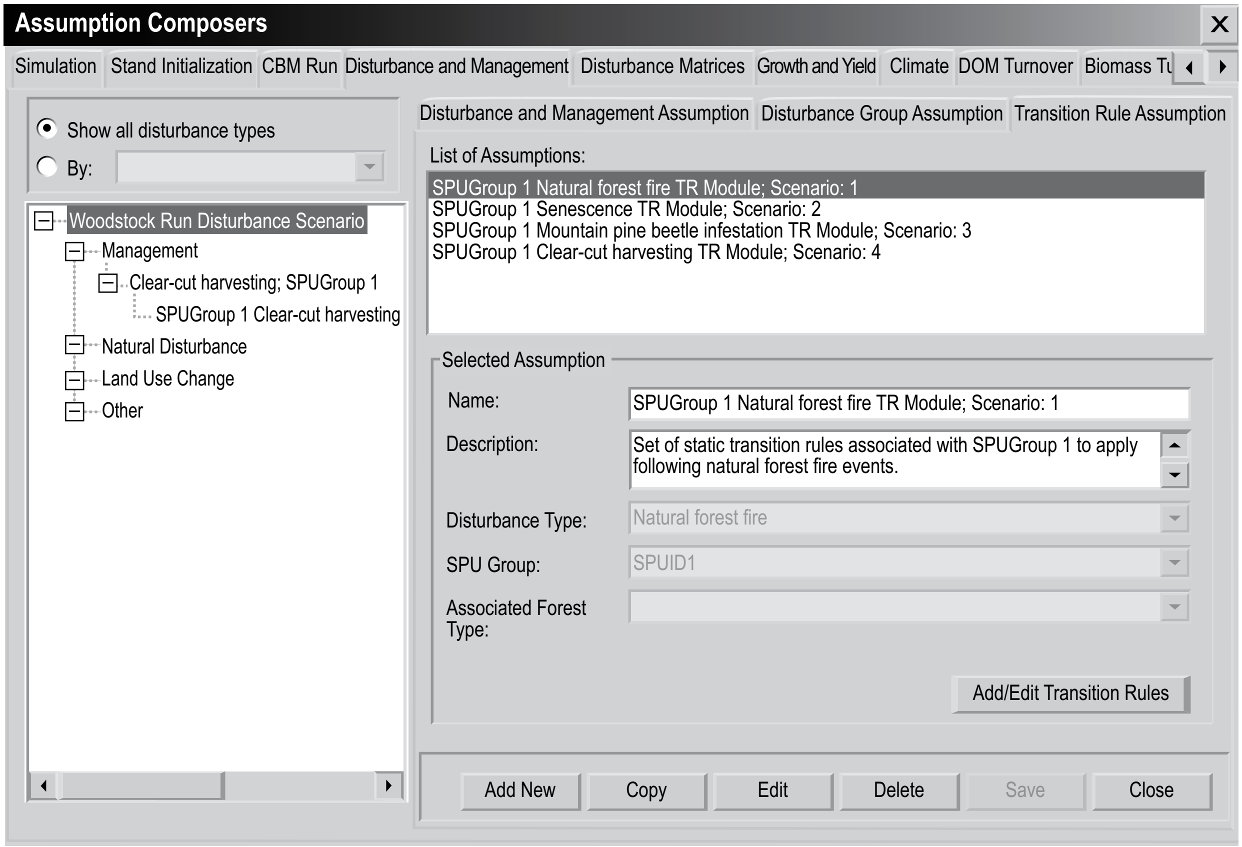


Figure 7-19. The "Assumption Composers" window with the "Disturbance and Management" and "Transition Rule Assumption" tabs selected.

The new Transition Rule Assumption will be added to the "List of Assumptions" box and can be linked to a Disturbance Group Assumption. The user can edit the transition rules associated with the Transition Rule Assumption (see section 7.9.11).

7.9.10 Copying a Transition Rule Assumption

To copy an existing Transition Rule Assumption using the "Transition Rule Assumption" tab on the "Disturbance and Management" tab (Figure 7-19)

1. **Click on the name of a Transition Rule Assumption in the "List of Assumptions" box**
2. **Click on the "Copy" button**

The copy of the Transition Rule Assumption called "Copy of 'original Transition Rule Assumption name'" will be added to the "List of Assumptions" box. The user can then edit the copy of the Transition Rule Assumption.

7.9.11 Editing a Transition Rule Assumption

To edit an existing Transition Rule Assumption using the "Transition Rule Assumption" tab on the "Disturbance and Management" tab (Figure 7-19)

1. **Click on the name of a Transition Rule Assumption in the "List of Assumptions" box**
2. **Click on the "Edit" button**
3. **Make the necessary changes to the Transition Rule Assumption name, description, applied disturbance type, SPU Group, and/or associated forest type (see section 7.8.9)**
4. **Click on the "Save" button**

Editing Transition Rules

To edit the transition rules associated with a disturbance type in a Transition Rule Assumption

1. **Click on the "Transition Rules Assumption" tab (Figure 7-19)**
2. **Click on the name of a Transition Rule Assumption in the "List of Assumptions" box**
3. **Click on the "Add/Edit Transition Rules" button**

At this point, the "Transition Rules Editor" window (Figure 6-29) will pop up. For details on how to use the Transition Rules Editor, read section 6.6.

7.9.12 Deleting a Transition Rule Assumption

To delete an existing Transition Rule Assumption using the "Transition Rule Assumption" tab on the "Disturbance and Management" tab (Figure 7-19)

1. **Click on the name of a Transition Rule Assumption in the "List of Assumptions" box**
2. **Click on the "Delete" button**

A "Delete Transition Rule Record Confirmation" window will pop up, asking the user to confirm deletion of the Transition Rule Assumption.

3. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the deletion

7.10 Composing Run Growth Assumptions

Run Growth Assumptions are composed of one or more SPU Group Growth Assumptions. SPU Group Growth Assumptions are, or can be, linked to growth and yield curves in the Growth Curve Editor (see Figure 6-20).

To access the Assumption Composer for Run Growth Assumptions

1. **Click on "Tools" on the menu bar of the main CBM-CFS3 window**
2. **Select "Assumption Composers" from the drop list that appears**
3. **Select "Growth and Yield" from the side drop list that appears**

The "Assumption Composers" window (Figure 7-20) will pop up displaying the "Growth and Yield" tab.

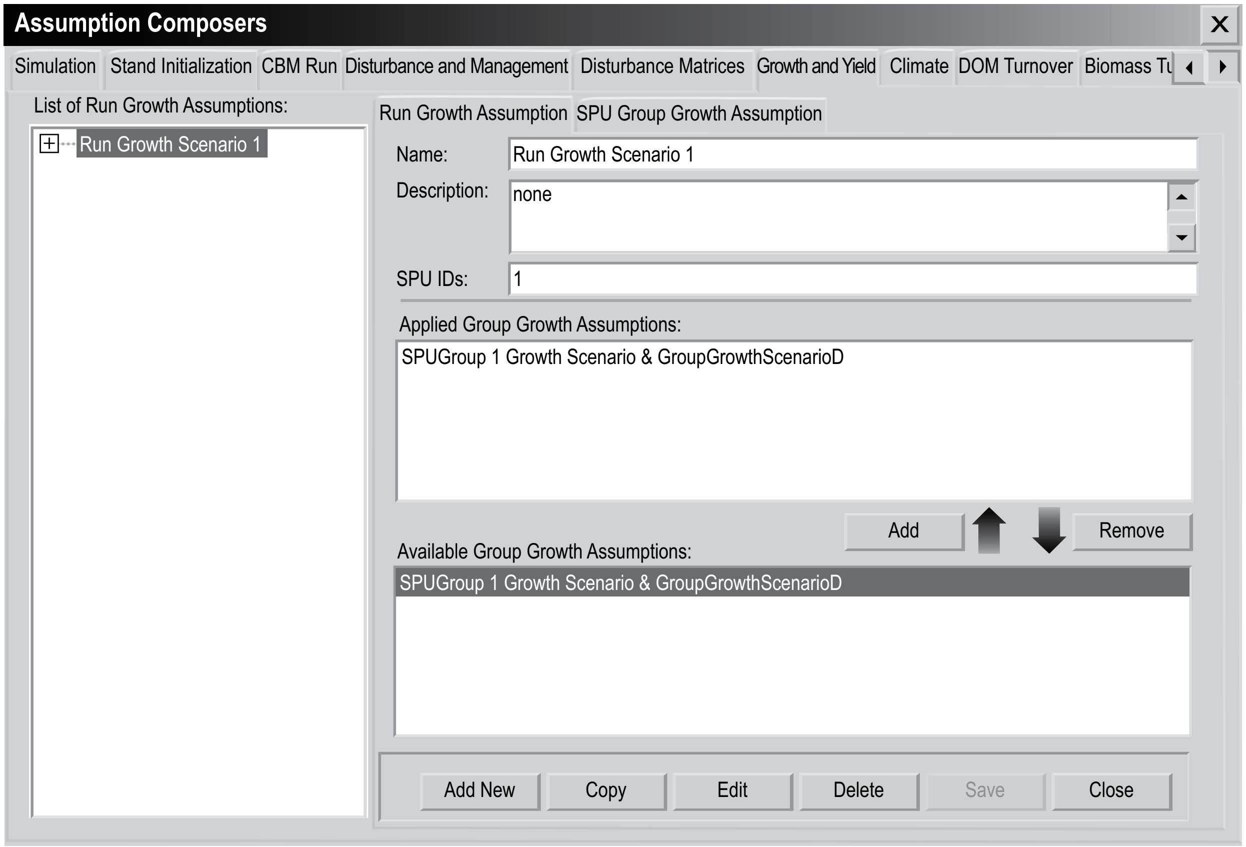


Figure 7-20. The "Assumption Composers" window with the "Growth and Yield" and "Run Growth Assumption" tabs selected.

Existing Run Growth Assumptions are displayed in the "List of Run Growth Assumptions" box in a hierarchical directory tree structure. On the directory tree, the user can double-click on a specific Run Growth Assumption or click on the "+" next to the assumption to view details about it and its associated SPU Group Growth Assumptions, either in the directory tree or in the "Applied Group Growth Assumptions" box. Clicking on a "-" in the directory tree will collapse the corresponding assumption section of the directory tree. The user can click on an associated SPU Group Growth Assumption in the directory tree to view its details on the "SPU Group Growth Assumptions" tab. The user can also right-click in the "List of Run Growth Assumptions" box and choose, by selecting the appropriate option from the pop-up menu, to expand or collapse the directory tree.

The user can add, copy, edit, or delete Run Growth Assumptions or SPU Group Growth Assumptions. To cancel any of these actions

Click on the "Cancel" button

To close the window

Click on the "Close" button

The hierarchical structure for a Run Growth Assumption is as follows:

1. **Run Growth Assumption**

2. **SPU Group Growth Assumption**

7.10.1 Adding a Run Growth Assumption

To add (create) a new Run Growth Assumption using the "Run Growth Assumption" tab on the "Growth and Yield" tab (Figure 7-20)

1. **Click on the "Add New" button**
2. **Enter a name for the assumption in the "Name" box**
3. **Enter a description in the "Description" box (if this box is left blank, the default is "Created on 'current date'")**
4. **Enter the eligible SPU identification (ID) numbers separated by commas, if the project contains more than one**
5. **Click on the "Save" button**

The new Run Growth Assumption will be added to the "List of Run Growth Assumptions" box. To be eligible for use in a model simulation, a Run Growth Assumption should consist of one SPU Group Growth Assumption.

Adding an SPU Group Growth Assumption to a Run Growth Assumption

An SPU Group Growth Assumption is composed of user-specified growth and yield curves linked to specific forest types. To add an SPU Group Growth Assumption to a Run Growth Assumption

1. **Click on the name of a Run Growth Assumption in the "Run Growth Assumptions" box (Figure 7-20)**
2. **In the "Available Group Growth Assumptions" box, click on the name of the SPU Group Growth Assumption to be added**
3. **Click on the "Add" button**

The new SPU Group Growth Assumption will be added to the "Applied Group Growth Assumptions" box and will be linked to the Run Growth Assumption in the "List of Run Growth Assumptions" box.

Removing an SPU Group Growth Assumption from a Run Growth Assumption

To remove an SPU Group Growth Assumption from a Run Growth Assumption

1. **Click on the name of the Run Growth Assumption in the "List of Run Growth Assumptions" box (Figure 7-20)**
2. **Click on the name of the SPU Group Growth Assumption in the "Applied Group Growth Assumptions" box**
3. **Click on the "Remove" button**

7.10.2 Copying a Run Growth Assumption

To copy an existing Run Growth Assumption using the "Run Growth Assumption" tab on the "Growth and Yield" tab (Figure 7-20)

1. **Click on the name of a Run Growth Assumption in the "List of Run Growth Assumptions" box**

2. **Click on the "Copy" button**

The copy of the Run Growth Assumption, called "Copy of 'original Run Growth Assumption name'" will be added to the directory tree in the "List of Run Growth Assumptions" box. The user can add SPU Group Growth Assumptions to this copy by following the steps in the "Adding an SPU Group Growth Assumption to a Run Growth Assumption" subsection of section 7.10.1. The user can then edit the copy of the Run Growth Assumption.

7.10.3 Editing a Run Growth Assumption

To edit an existing Run Growth Assumption using the "Run Growth Assumption" tab on the "Growth and Yield" tab (Figure 7-20)

1. **Click on the name of a Run Growth Assumption in the "List of Run Growth Assumptions" box**
2. **Click on the "Edit" button**
3. **Make the necessary changes to the Run Growth Assumption name, description, and/or SPU ID(s) (see section 7.9.1)**
4. **Click on the "Save" button**

An "Add or Update Assumption" window will pop up, asking the user to confirm modification of the selected growth record.

5. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the edits

7.10.4 Deleting a Run Growth Assumption

To delete an existing Run Growth Assumption using the "Run Growth Assumption" tab on the "Growth and Yield" tab (Figure 7-20)

1. **Click on the name of a Run Growth Assumption in the "List of Run Growth Assumptions" box**
2. **Click on the "Delete" button**

A "Delete Growth Record Confirmation" window will pop up, asking the user to confirm deletion of the Growth Assumption.

3. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the deletion

7.10.5 Adding an SPU Group Growth Assumption

SPU Group Growth Assumptions are linked to an SPU Group and one or more user-assigned growth and yield curves. Existing SPU Group Growth Assumptions (if any) appear in the "List of Assumptions" box on the "SPU Group Growth Assumption" tab (Figure 7-21).

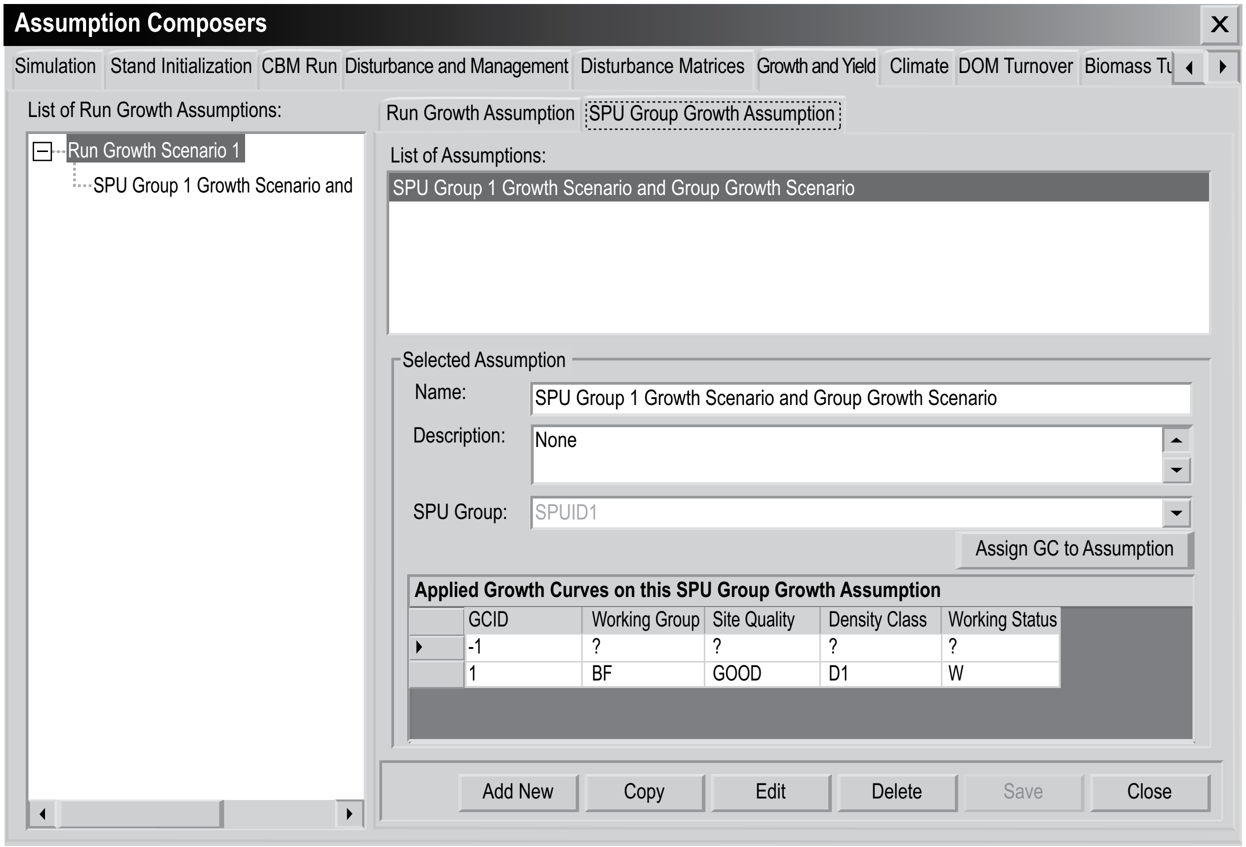


Figure 7-21. The "Assumption Composers" window with the "Growth and Yield" and "SPU Group Growth Assumption" tabs selected.

When the user clicks on an SPU Group Growth Assumption name in this box, the assigned growth and yield curves (if any) will be displayed in the scrollable "Applied Growth Curves on this SPU Group Growth Assumption" table.

To add a new SPU Group Growth Assumption using the "SPU Group Growth Assumption" tab on the "Growth and Yield" tab (Figure 7-21)

1. **Click on the "Add New" button**
2. **Enter a name in the "Name" box**
3. **Enter a description in the "Description" box (if this box is left blank the default is "Created on 'current date'")**
4. **Click on the "SPU Group" box and select an option from the drop list that appears**
5. **Click on the "Save" button**

The new SPU Group Growth Assumption will be added to the "List of Assumptions" box. Next, the user must assign growth and yield curves and stand types to the new assumption.

6. **Click on the "Assign GC to Assumption" button**
7. **Proceed to the "Assigning Growth and Yield Curves and Stand Types to an SPU Group Growth Assumption" subsection in section 7.10.9**

7.10.6 Copying an SPU Group Growth Assumption

To copy an existing SPU Group Growth Assumption using the "SPU Group Growth Assumption" tab on the "Growth and Yield" tab (Figure 7-21)

1. **Click on the name of an SPU Group Growth Assumption in the "List of Assumptions" box**
2. **Click on the "Copy" button**

The copy of the SPU Group Growth Assumption, called "Copy of 'original SPU Group Growth Assumption name'" will be added to the "Available SPU Group Growth Assumptions" box on the "Run Growth Assumption" tab and will appear in the "List of Assumptions" box on the "SPU Group Growth Assumption" tab. The user can then edit the copy of the SPU Group Growth Assumption.

7.10.7 Editing an SPU Group Growth Assumption

To edit an existing SPU Group Growth Assumption using the "SPU Group Growth Assumption" tab on the "Growth and Yield" tab (Figure 7-21)

1. **Click on the name of an SPU Group Growth Assumption in the "List of Assumptions" box**
2. **Click on the "Edit" button**
3. **Make the necessary changes to the SPU Group Growth Assumption name, description, and/or SPU group**
4. **Click on the "Save" button**

An "Add or Update SPU Group Growth Assumption" window will pop up, asking the user to confirm modification of the selected SPU group growth record.

5. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the edits

The user can also edit the growth and yield curves and stand types associated with an assumption by clicking on the "Assign GC to Assumption" button and following instructions in the "Updating Growth and Yield Curves and Stand Types of an SPU Group Growth Assumption" subsection in section 7.10.9.

7.10.8 Deleting an SPU Group Growth Assumption

To delete an existing SPU Group Growth Assumption using the "SPU Group Growth Assumption" tab on the "Growth and Yield" tab (Figure 7-21)

1. **Click on the name of an SPU Group Growth Assumption in the "List of Assumptions" box**
2. **Click on the "Delete" button**

A "Delete SPU Group Growth Record Confirmation" window will pop up, asking the user to confirm deletion of the SPU Group Growth Assumption.

3. **Click on the "Yes" button to proceed**
   or
   Click on the "No" button to cancel the deletion

7.10.9 Viewing, Assigning, Updating, or Removing Associated Growth and Yield Curves and/or Stand Types

If the user clicks on the "Assign GC to Assumption" button on the "SPU Group Growth Assumption" tab (Figure 7-21), the "Growth Curve Assignment" window will pop up (Figure 7-22). The "Growth Curve Assignment" window displays the SPU Group Growth Assumption being edited (in the "Name" box), a list of growth and yield curves associated with the project (in the "Defined Growth Curves" box), and a list of stand types associated with the project (in the "Defined Stand (Classifier Sets)" box).

In this window, for any selected SPU Group Growth Assumptions, the user can view associated growth and yield curves and/or stand types, update associated growth and yield curves and stand types, remove some or all of the associated growth and yield curves and/or stand types, or reset all associated growth and yield curve(s) and stand type(s) to their original imported settings.

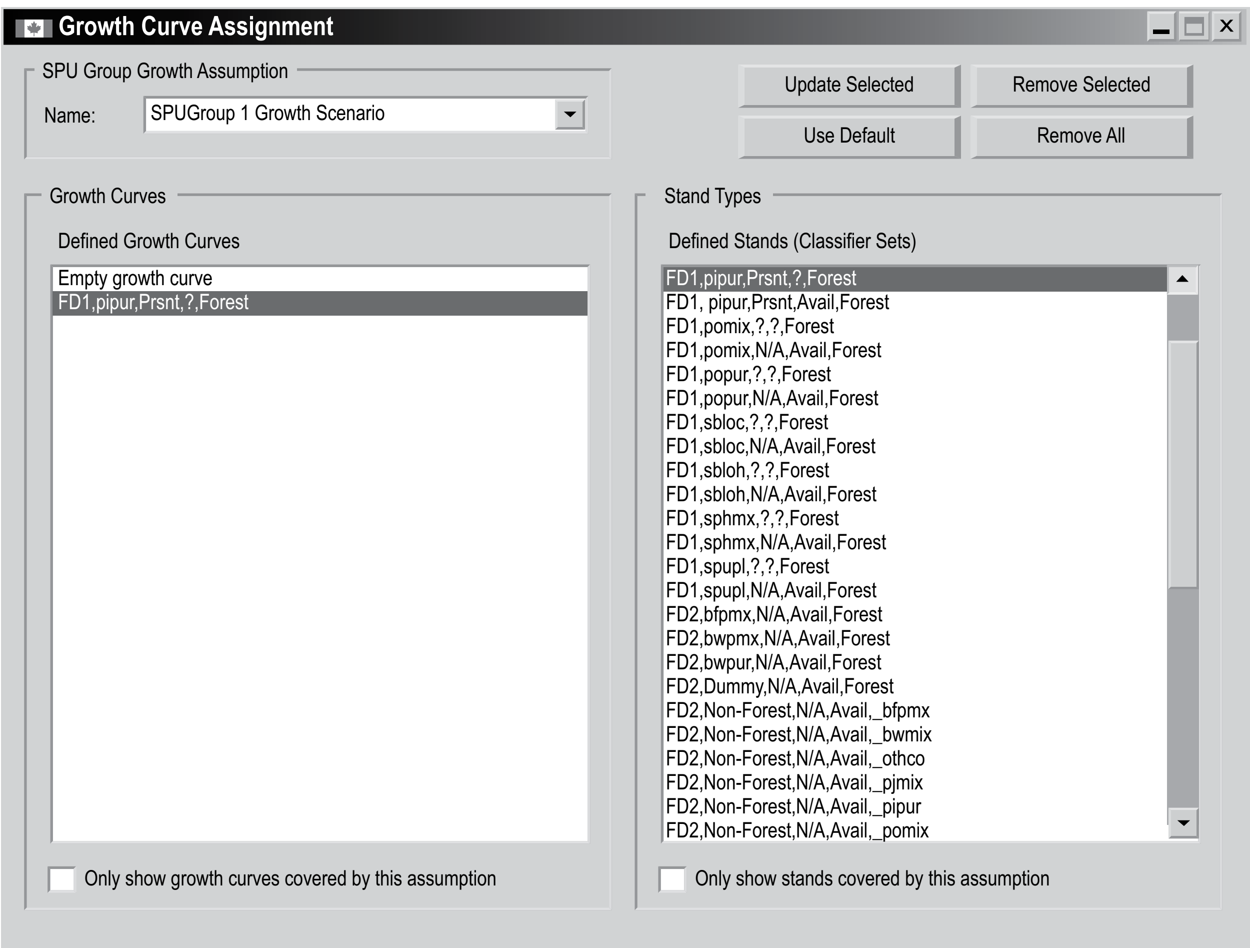


Figure 7-22. The "Growth Curve Assignment" window.

Viewing Associated Growth and Yield Curves and/or Stand Types

In the "Growth Curve Assignment" window (Figure 7-22), the "Only show growth curves covered by this assumption" check box and "Only show stands covered by this assumption" check box permit the user to view all available growth and yield curve(s) or stand type(s) associated with a project or only those associated with the SPU Group Growth Assumption selected in the "Name" box. When these check boxes are unchecked, the user will see all available growth and yield curve(s) or stand type(s) associated with a project displayed in the "Defined Growth Curves" box and "Defined Stand (Classifier Sets)" box.

To view only those growth and yield curve(s) or stand type(s) associated with an SPU Group Growth Assumption

1. **Click on the "Name" box and select an SPU Group Growth Assumption from the drop list that appears**
2. **Click on the "Only show growth curves covered by this assumption" check box (so that a check mark is displayed)**

Following this step, only growth and yield curves that are associated with the SPU Group Growth Assumption will be displayed.

3. **Click on the "Only show stands covered by this assumption" check box (so that a check mark is displayed)**

Following this step, only stands that are associated with the SPU Group Growth Assumption will be displayed.

To view the stand types associated with each growth and yield curve

Click on a growth and yield curve name in the "Defined Growth Curves" box

The associated stand type(s) will be highlighted in the "Defined Stand (Classifier Sets)" box.

To exit the "Growth Curve Assignment" window

4. **Click on the "X" button**

Assigning Growth and Yield Curves and Stand Types to an SPU Group Growth Assumption

When the user creates a new SPU Group Growth Assumption, growth and yield curves and stand types must be assigned to it before it can be associated with a Run Growth Assumption. To assign growth and yield curves and stand types to a new SPU Group Growth Assumption using the "Growth Curve Assignment" window (Figure 7-22)

1. **Click on the "Name" box and select the new SPU Group Growth Assumption from the drop list that appears**

The "Only show growth curves covered by this assumption" check box and "Only show stands covered by this assumption" check box should not be checked. If they are

Click on each check box to remove the check mark

Next, the user must select the growth and yield curves to be linked to the SPU Group Growth Assumption and must associate stand types with these growth and yield curves.

2. **Click on the name of a growth and yield curve in the "Defined Growth Curves" box**
3. **Click on one or more (by holding down the Shift key or Ctrl key on the keyboard) stand types in the "Defined Stand (Classifier Sets)" box**
4. **Click on the "Update Selected" button**

An "Associate Growth Curve and Stand Type(s)" window will pop up, asking the user to confirm the association of the selected growth and yield curves and stand type(s).

5. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to terminate the process

After clicking on the "No" button, skip to step 7. Otherwise (i.e., the user clicked on the "Yes" button)

6. **Repeat steps 2 to 5 to add more growth and yield curves and stand types**

Should the user link the wrong stand types to a growth and yield curve and click on the "Update Selected" button, steps 2 to 5 can be repeated to overwrite the previous association.

To exit the "Growth Curve Assignment" window

7. **Click on the "X" button**

Updating Growth and Yield Curves and Stand Types of an SPU Group Growth Assumption

To update the growth and yield curves and their associated stand types for an SPU Group Growth Assumption in the "Growth Curve Assignment" window (Figure 7-22)

1. **Click on the "Name" box and select an SPU Group Growth Assumption from the drop list that appears**

The user should verify which growth and yield curves are linked to the SPU Group Growth Assumption and the stand type(s) with which each growth and yield curve is associated (see "Viewing Associated Growth Curves and/or Stand Types," above in this section). To proceed, the "Only show growth curves covered by this assumption" check box and "Only show stands covered by this assumption" check box should not be checked. If they are

Click on each check box to remove the checkmark

Next, users must select the growth and yield curve linked to the SPU Group Growth Assumption and update the stand type(s) associated with it.

2. **Click on the growth and yield curve name in the "Defined Growth Curves" box**
3. **Click on one or more (by holding down the Shift key or Ctrl key on the keyboard) stand types in the "Defined Stand (Classifier Sets)" box**
4. **Click on the "Update Selected" button**

An "Associate Growth Curve and Stand Type(s)" window will pop up asking users if they are sure that they want to associate the selected growth and yield curve and stand type(s).

5. **Click on the "Yes" button to proceed,**

   or

   Click on the "No" button to terminate the process

If users clicked on the "Yes" button, they can (otherwise skip to step 7)

6. **Repeat steps 2 to 5 to update the stand types for another growth and yield curve**

Should users link the wrong stand types to a growth and yield curve and click on the "Update Selected" button, they can repeat steps 2-5 to overwrite the previous association.

To exit the "Growth Curve Assignment" window

7. **Click on the "X" button**

Removing Growth and Yield Curves and Stand Types from an SPU Group Growth Assumption

The user has two options for removing growth and yield curves (and their associated stand types) from an SPU Group Growth Assumption in the "Growth Curve Assignment" window (Figure 7-22): removing all or removing only selected growth and yield curves. To remove all growth and yield curves

1. **Click on the "Name" box and select the name of an SPU Group Growth Assumption from the drop list that appears**
2. **Click on the "Remove All" button**

A "Remove Growth Curve and Stand Type Associations" window will pop up, asking the user to confirm removal of the association between the currently selected growth and yield curves and stand type(s).

3. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to terminate the process

If the user clicks on the "Yes" button, all growth and yield curves and their associated stand types will no longer be associated with the selected SPU Group Growth Assumption. Although all growth and yield curves and stand types have been removed from the SPU Group Growth Assumption, the entry "Empty growth curve" will be displayed in the "Defined Growth Curves" box and a number of question marks representing the number of classifiers in the project will be displayed in the "Defined Stand (Classifier Sets)" box, separated by commas. Both of these entries are simply placeholders with no value. The "Empty Growth Curve" has volumes of zero assigned to each age class, and the question marks represent all stands associated with the "Empty growth curve."

To remove selected growth and yield curves

1. **Click on the "Name" box and select an SPU Group Growth Assumption name from the drop list that appears**
2. **Click on the "Only show growth curves covered by this assumption" check box (so that a check mark is displayed)**
3. **Click on one or more (by holding down the Shift key or Ctrl key on the keyboard) growth and yield curves in the "Defined Growth Curves" box**

4. **Click on the "Remove Selected" button**

A "Remove Growth Curve and Stand Type Associations" window will pop up, asking the user to confirm removal of the association between the selected growth and yield curve and stand type(s).

5. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to terminate the process

If the user clicks on the "Yes" button, the selected growth and yield curves and their associated stand types will no longer be associated with the selected SPU Group Growth Assumption.

To exit the "Growth Curve Assignment" window

6. **Click on the "X" button**

7.11 Composing Volume-to-Biomass Assumptions

A Volume-to-Biomass Assumption is composed of both volume-to- biomass parameters and biomass-to-carbon parameters. Default or user-defined volume-to-biomass parameters are assigned for all combinations of tree species and SPUs imported by the user and include nonmerchantable expansion factors, sapling expansion factors, proportions of stem bark, proportions of branches, proportions of foliage, and total stemwood biomass estimates, by species type and SPU group. Biomass-to-carbon parameters include softwood and hardwood multipliers for the merchantable biomass component, foliage biomass component, other biomass component, submerchantable biomass component, coarse root biomass component, and fine root biomass component. All of these parameters are parts of equations developed by the Program on Energy Research and Development biomass study. Default parameters that the user encounters in the model are assigned on the basis of the ecological boundary chosen during the data import process.

To access the Assumption Composer for Volume-to-Biomass Assumptions

1. **Click on "Tools" on the menu bar of the main CBM-CFS3 window**
2. **Select "Assumption Composers" from the drop list that appears**
3. **Select "Volume-to-Biomass Parameters" from the side drop list that appears**

The "Assumption Composers" window (Figure 7-23) will pop up, displaying the "Volume-to-Biomass Conversion" tab.

Existing Volume-to-Biomass Assumptions are displayed in the "List of Volume-to-Biomass Assumptions" box. Users can click on a specific assumption name to view its associated parameters on the "Volume-to-Biomass Parameters" tab or the "Biomass-to-Carbon Parameters" tab. The user can add, copy, edit, or delete Volume-to-Biomass Assumptions and/or edit their assigned volume-to-biomass or biomass-to-carbon parameters. To cancel any of these actions

Click on the "Cancel" button

To close the window

Click on the "Close" button

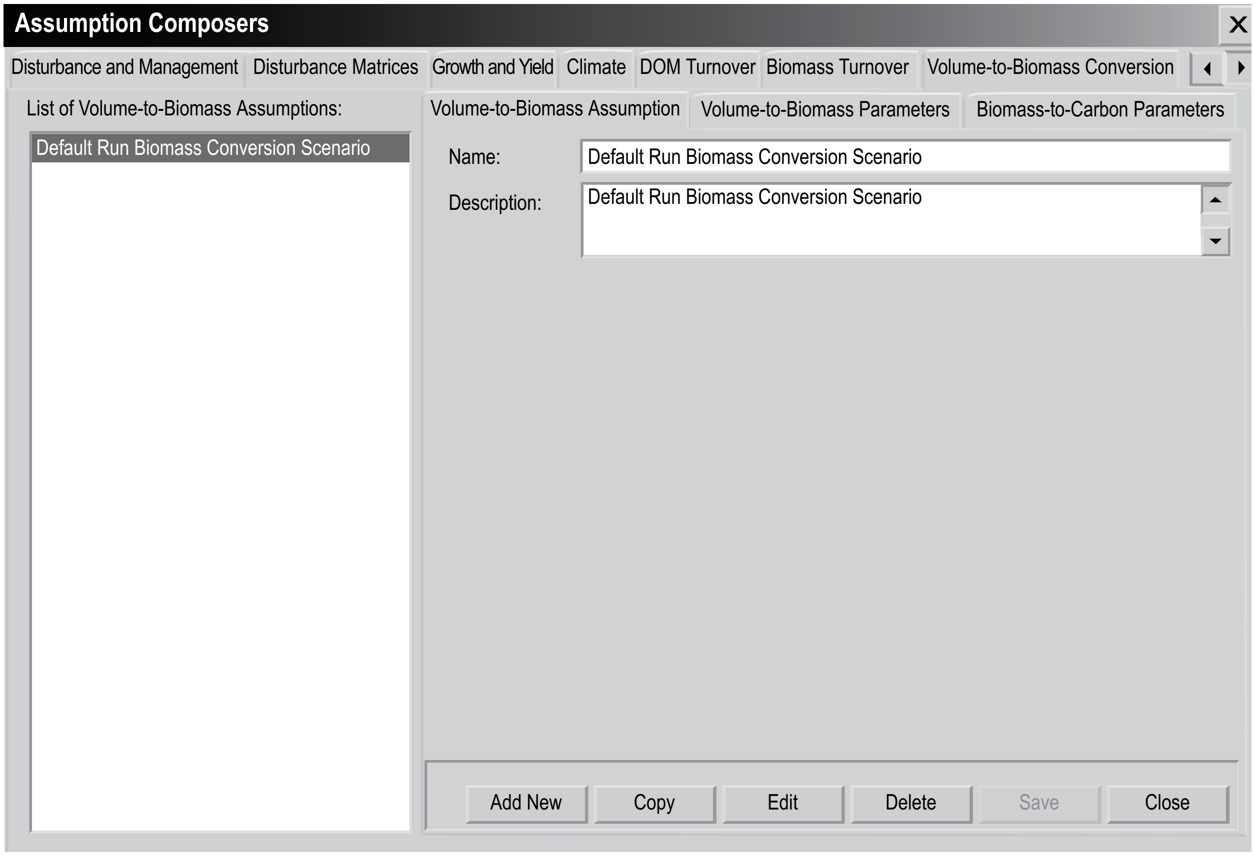


Figure 7-23. The "Assumption Composers" window with the "Volume-to-Biomass Conversion" and "Volume-to-Biomass Assumption" tabs selected.

7.11.1 Adding a Volume-to-Biomass Assumption

To add (create) a new Volume-to-Biomass Assumption using the "Volume-to-Biomass Assumption" tab on the "Volume-to-Biomass Conversion" tab Figure 7-23)

1. **Click on the "Add New" button**
2. **Enter a name for the assumption in the "Name" box**
3. **Enter the description in the "Description" box (if this box is left blank, the default is "Created on 'current date'")**
4. **Click on the "Save" button**

The new Volume-to-Biomass Assumption will be added to the "List of Volume-to-Biomass Assumptions" box. The model will automatically assign default parameter values for all of the user's species based on the project's administrative and ecological boundaries.

In future versions of the CBM-CFS3, users will be able to edit the volume-to-biomass parameters for the assumption, and the parameters will be displayed on the "Volume-to-Biomass Parameters" tab (Figure 7-24).

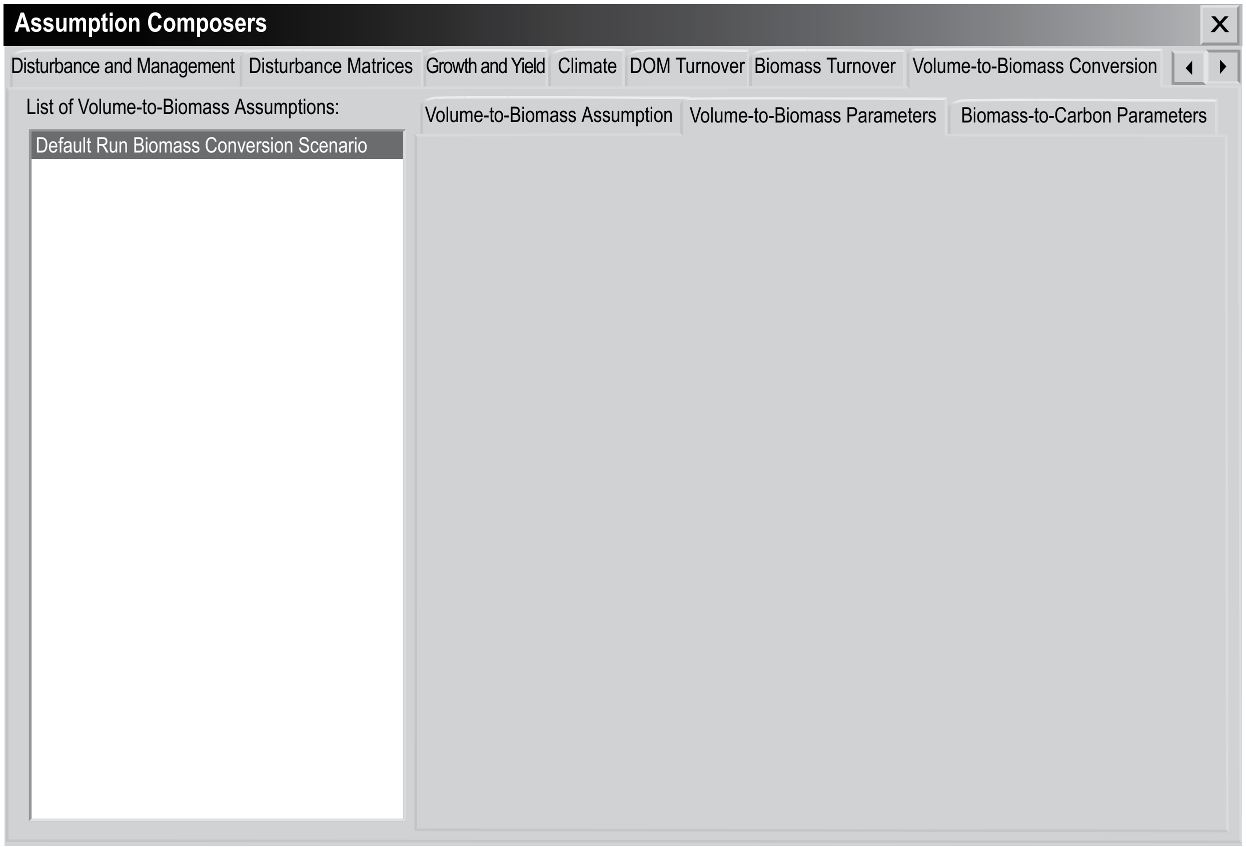


Figure 7-24. The "Assumption Composers" window with the "Volume-to-Biomass Conversion" and "Volume-to-Biomass Parameters" tabs selected.

These parameters are not displayed in the CBM-CFS3 because publication is pending. At this time, users can edit the default hardwood and softwood biomass-to-carbon conversion multipliers for biomass components linked to a Volume-to-Biomass Assumption (if required). To edit these parameters

5. **Click on the "Biomass-to-Carbon Parameters" tab (Figure 7-25)**
6. **Click on the "Edit" button**
7. **Enter a conversion multiplier in the softwood and/or hardwood column for each biomass component in the "Biomass Component Name" column of the table displayed (as required)**
8. **Click on the "Update" button**

An "Update Parameters" window will pop up, asking the user to confirm modification of the biomass-to-carbon parameters.

9. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the edits

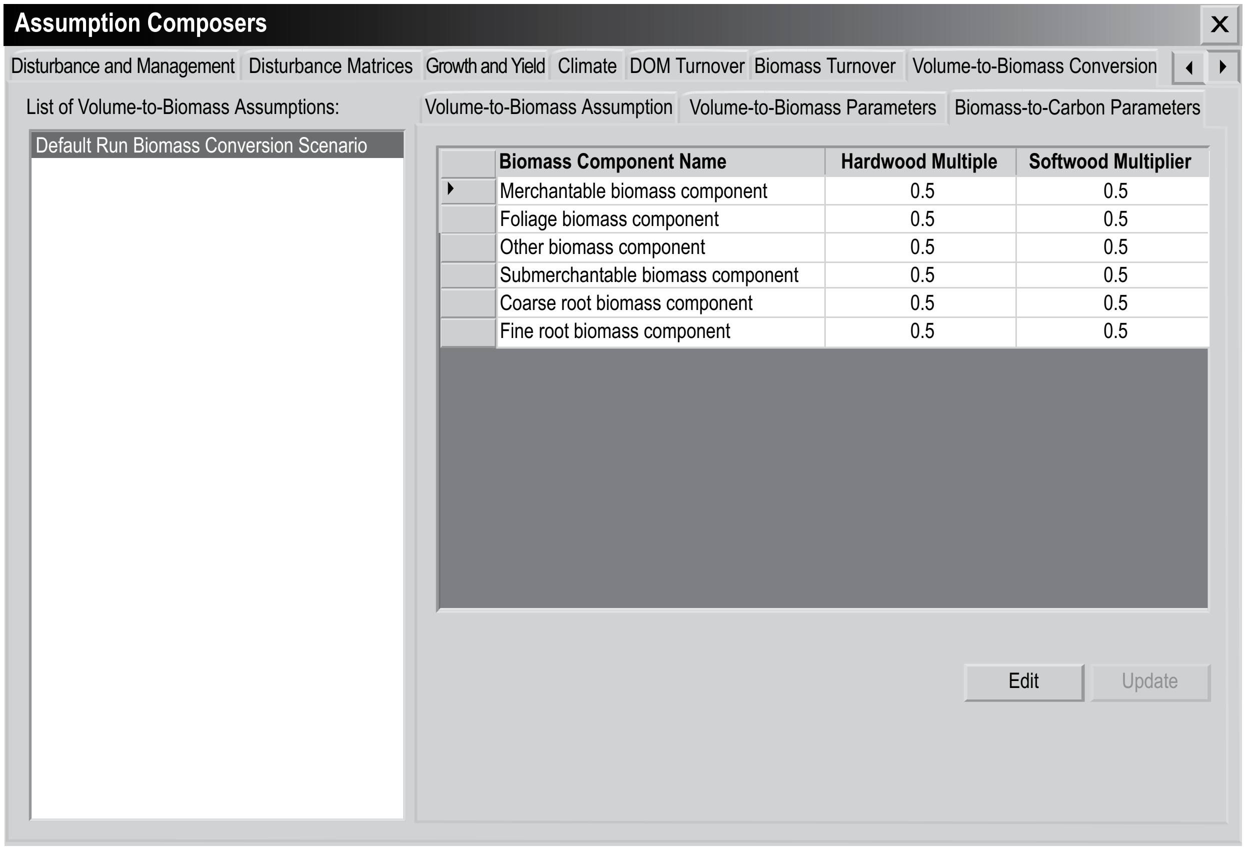


Figure 7-25. The "Assumption Composers window" with the "Volume-to-Biomass Conversion" and "Biomass-to-Carbon Parameters" tabs selected.

7.11.2 Copying a Volume-to-Biomass Assumption

To copy an existing Volume-to-Biomass Assumption using the "Volume-to-Biomass Assumption" tab on the "Volume-to-Biomass Conversion" tab (Figure 7-23)

1. **Click on the name of a Volume-to-Biomass Assumption in the "List of Volume-to-Biomass Assumptions" box**
2. **Click on the "Copy" button**

The copy of the Volume-to-Biomass Assumption, called "Copy of 'original Volume-to-Biomass Assumption name'" will be added to the "List of Volume-to-Biomass Assumptions" box. The user can then edit the copy of the Volume-to-Biomass Assumption.

7.11.3 Editing a Volume-to-Biomass Assumption

Editing the Assumption Name and Description

To edit the name and description of an existing Volume-to-Biomass Assumption using the "Volume-to-Biomass Assumption" tab on the "Volume-to-Biomass Conversion" tab (Figure 7-23)

1. **Click on the name of an assumption in the "List of Volume-to-Biomass Assumptions" box**
2. **Click on the "Edit" button**
3. **Make the necessary changes to the Volume-to-Biomass Assumption name and/or description**
4. **Click on the "Save" button**

An "Add or Update Run Biomass Conversion Assumption" window will pop up, asking the user to confirm modification of the selected run biomass conversion record.

5. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the edits

Editing the Assumption Parameters

To edit parameters of an existing Volume-to-Biomass Assumption using the "Volume-to-Biomass Assumption" tab on the "Volume-to-Biomass Conversion" tab (Figure 7-23)

1. **Click on the name of an assumption in the "List of Volume-to-Biomass Assumptions" box**
2. **Click on either the "Volume-to-Biomass Parameters" tab or the "Biomass-to-Carbon Parameters" tab**
3. **Click on the "Edit" button**
4. **Make the necessary changes to the parameters (see section 7.11.1)**
5. **Click on the "Update" button**

An "Update Volume-to-Biomass Parameters" window or "Update Parameters" window (depending on which tab is in use) will pop up, asking the user to confirm modification of the parameters.

6. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the edits

To edit the parameters tab not selected in step 2, repeat steps 2 to 6 for that tab.

7.11.4 Deleting a Volume-to-Biomass Assumption

To delete an existing Volume-to-Biomass Assumption using the "Volume-to-Biomass Assumption" tab on the "Volume-to-Biomass Conversion" tab (Figure 7-23)

1. **Click on the name of an assumption in the "List of Volume-to-Biomass Assumptions" box**
2. **Click on the "Delete" button**

A "Delete Biomass Conversion Record Confirmation" window will pop up, asking the user to confirm deletion of the selected biomass conversion assumption.

3. **Click on the "Yes" button to proceed**

   or

4. **Click on the "No" button to cancel the deletion**

CHAPTER 8

USING THE RESULTS EXPLORER

This chapter describes the options for exploring the results of CBM-CFS3 project simulation runs.

At the completion of a project simulation run performed with the Simulation Scheduler (read section 3.6 or 7.1.1), the results are stored in a simulation results database. The Results Explorer (Figure 8-1) allows the user to query the results and extract relevant information from the database. This information can be used to generate a variety of views (graph, table, and report) summarizing the simulation results, to compare one or more variables from one or more simulation runs, and to export the underlying data in several formats.

To access the "Results Explorer" window (Figure 8-1)

1. **Click on "View" on the menu bar of the main CBM-CFS3 window**
2. **Select "Results Explorer" from the drop list that appears**

The "Results Explorer" window contains a small library of predefined views in categorized folders labeled "Stocks", "Stock Changes", "Age Classes", and "Advanced Views", to assist users in their initial exploration of model results. These folders are located in a folder labeled "Default Views". The user can modify and expand the initial library of views by creating a view for the variable(s) of interest to be displayed and then saving the view for future use. For example, a user might create a view to display the dynamics of aboveground and belowground biomass carbon over time. The user defines the variables to display, the type of graph desired, the title of the graph, the scale of the *y*-axis, and other graph properties. The user can also define certain filters (e.g., display the carbon stocks only for areas with certain attributes, whose values are defined in the forest inventory and are accessible through the results database). Technically, a view represents a Structured Query Language (SQL) query with additional information on the attributes of the graph. An empty folder in the "Views" box labeled "My Views" can be used to store any new views the user creates.

The Results Explorer can be used to Open, Save, add (New View), Display, Edit, Rename, Copy, Delete, remove all (Blank Explorer), or see a Description of a view, and to add (New Folder), Rename, Copy, or Delete folders. Once a view has been created, it can be applied to the results of one or more project simulations using the same data classifiers.

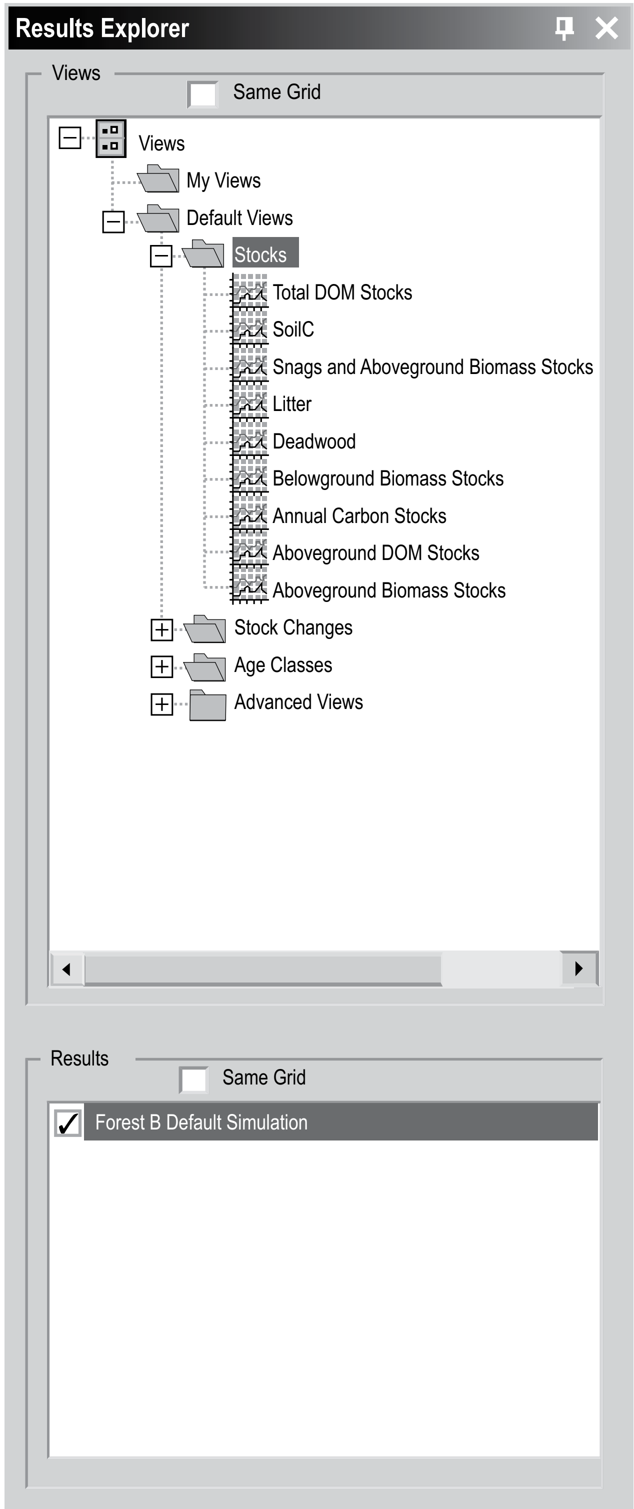


Figure 8-1. The "Results Explorer" window.

For example, the carbon stocks in two scenarios using the same input data set but with different harvest rates could be displayed and compared, or the carbon stocks in two scenarios using different input data sets could be compared.

The views in the "Results Explorer" window are displayed in the "Views" box in a directory tree that is collapsible (click on a "-") and expandable (click on a "+").

If the user right-clicks over the name of a view or a folder in the "Views" box, a menu will appear with options allowing the user to open a stored directory of views (Open), save a directory of views (Save), create a folder (New Folder), create a view (New View), display a view (Display), edit a view (Edit), rename a view (Rename), copy a view (Copy), delete a view (Delete), remove all views in the directory tree in the "Results Explorer" window (Blank Explorer), refresh the list of simulations in the "Results" box (Refresh), or view the description of a view (Description).

If the user right-clicks over a blank area in the "Views" box, only "Blank Explorer" and "Refresh" will be available on the menu that appears.

A small Results Explorer icon toolbar (Figure 8-2), normally grayed-out in the main CBM-CFS3 window, will become functional when the "Results Explorer" window is opened.

These icons can be used to perform various actions in the Results Explorer (described in more detail in the following sections). The name of the tool with which an icon is associated is displayed when the user positions the cursor over the icon.

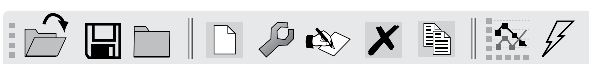


Figure 8-2. The Results Explorer icon toolbar.

8.1 Managing Simulation Results Databases

When the user completes a simulation run for a project using the Simulation Scheduler (see section 7.1) a simulation results database is created. These databases are managed in the "Results Explorer" window (Figure 8-1). The user can choose which database(s) to make available for viewing and analysis, which to archive, which to delete, and view information to help identify a database, beyond its name.

8.1.1 Making a Simulation Results Database Available for Viewing Results

To make a simulation results database available so that particular views can be applied to it using the "Results Explorer" window (Figure 8-1)

1. **Right-click over the "Results" box**

On the menu that appears

2. **Click on "Manage Results"**

The "Simulation Results" window (Figure 8-3) will pop up.

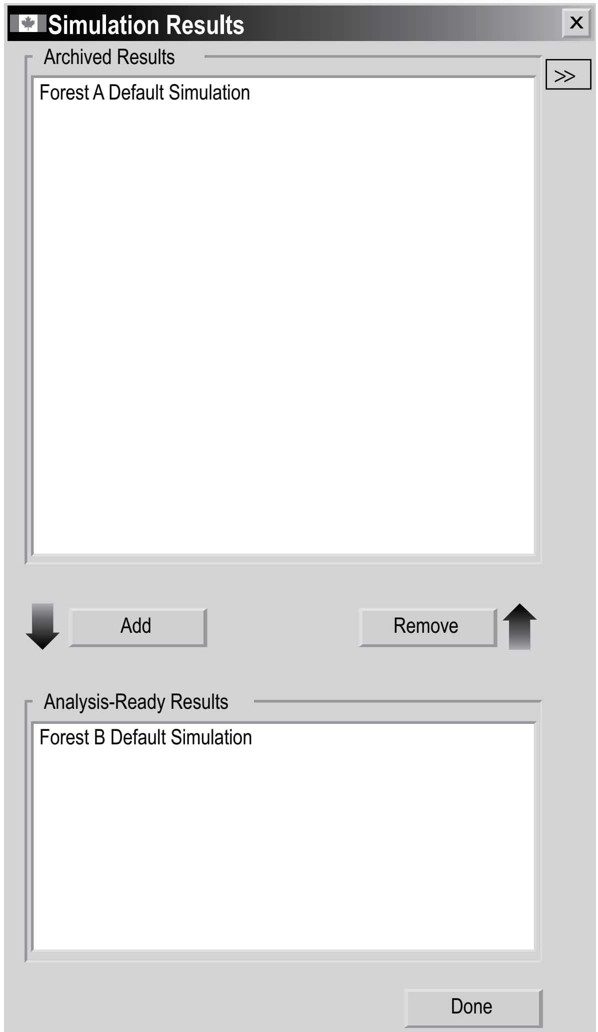


Figure 8-3. The "Simulation Results" window.

3. **Click on the name of a simulation results database in the "Archived Results" box**
4. **Click on the "Add" button**

The name of the selected simulation results database will appear in the "Analysis-Ready Results" box.

5. **Click on the "Done" button**

The selected simulation results database will appear in the "Results" box in the "Results Explorer" window (Figure 8-1) and will be available for viewing and analysis.

8.1.2 Archiving a Simulation Results Database

When the "Results" box in the "Results Explorer" window (Figure 8-1) becomes too cluttered with simulation results databases, the user may want to remove and archive some of them. When a simulation results database is archived, it is no longer displayed in the "Results" box and is not available for analysis or viewing, but it can be added back to the window at a later time (as described in section 8.1.1). To archive a simulation results database in the "Results Explorer" window

1. **Click on the name of a simulation results database in the "Results" box (Figure 8-1) so that a check mark is displayed beside it**
2. **Right-click over the "Results" box**
3. **Select "Manage Results" from the menu that appears**

The "Simulation Results" window (Figure 8-3) will pop up.

4. **Click on the name of the simulation results database selected in step 1 which is displayed in the "Analysis-Ready Results" box**
5. **Click on the "Remove" button**
6. **Click on the "Done" button**

8.1.3 Deleting a Simulation Results Database

Instead of storing multiple simulation results databases for a project (which will take up space on the hard drive), the user may want to delete a simulation results database after the results have been viewed and analyzed. To delete a simulation results database in the "Results Explorer" window (Figure 8-1)

1. **Click on the name of the simulation results database in the "Results" box so that a check mark is displayed beside it**
2. **Right-click over the "Results" box**
3. **Select "Delete Checked Results" from the menu that appears**

The simulation results database name will be removed from the "Results" box and the database will be deleted.

8.1.4 Identifying a Simulation Results Database

Should the user forget the details of a simulation for a simulation results database that is identified only by the simulation name in the "Results" box in the "Results Explorer" window (Figure 8-1), detailed information about the database, such as the project name, path, description, simulation name, author, completion date, and full location path, can be viewed. To access this information via the "Results Explorer" window (Figure 8-1)

1. **Click on the name of the simulation results database of interest in the "Results" box so that a check mark is displayed beside it**
2. **Right-click over the "Results" box**
3. **Select "Results Info" from the menu that appears**

The "Simulation Results" window will pop up, displaying a "Results Info" box (Figure 8-4). The "Results Info" box contains the additional information about the selected simulation results database. To return to the "Results Explorer" window

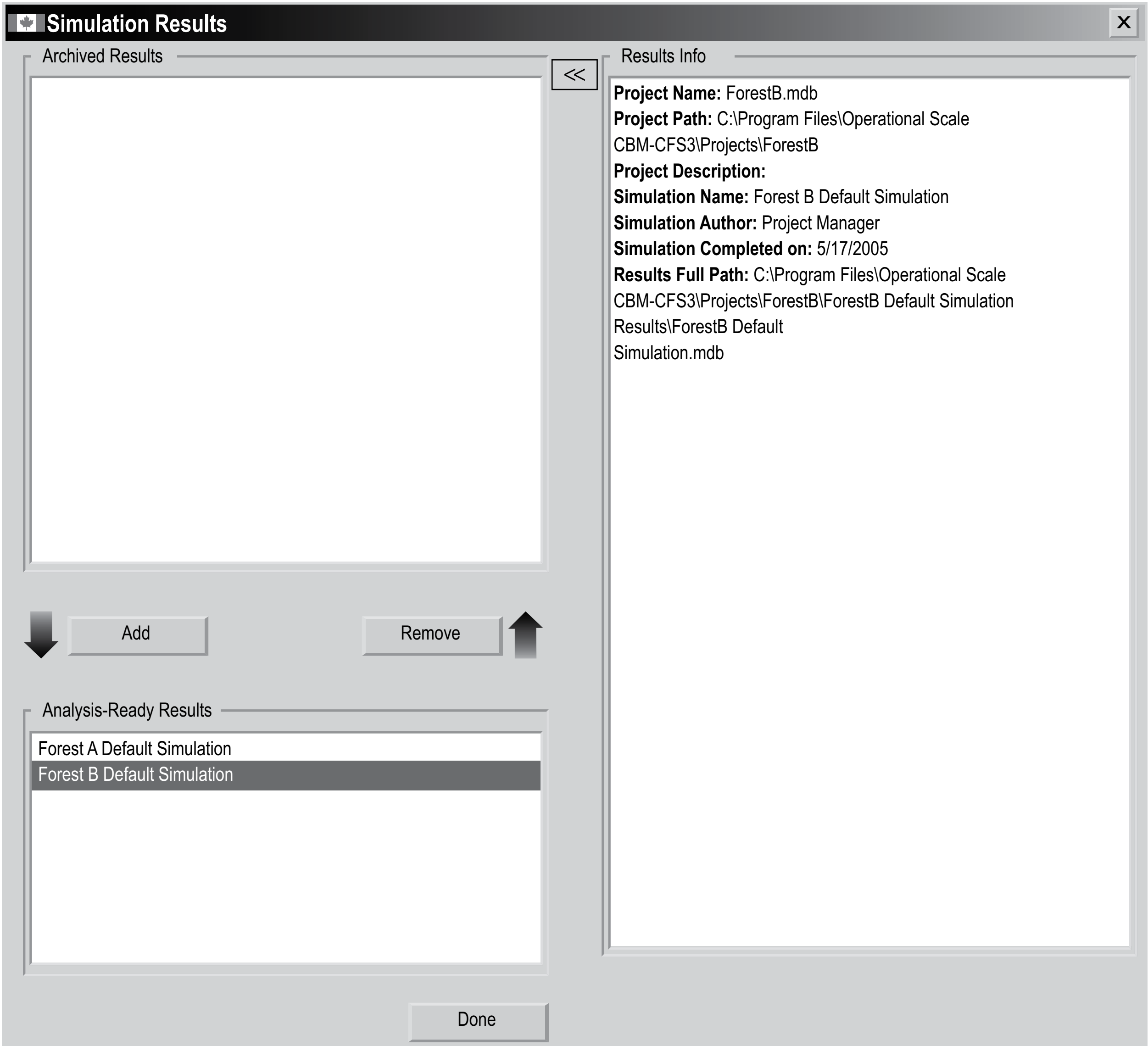


Figure 8-4. The "Simulation Results" window displaying the "Results Info" box.

4. **Click on the "Done" button**

An alternative way to view the "Results Info" box, when only the "Simulation Results" window is displayed, is to click on the ">>" button (Figure 8-3). To close the display of the "Results Info" box in the "Simulation Results" window, click on the "<<" button.

8.2 Creating a New Folder for Views

Views represent SQL queries with some additional properties that enable users to analyze, visualize (in graphs, tables, or reports), and share simulation results. Any existing user-created and/or predefined views are displayed in the "Views" box in the directory tree and are linked to a particular folder in the directory tree. Before creating new views, the user may want to first create a folder in which to store them. The user can create as many folders and subfolders as desired to store and organize the views created.

8.2.1 Making a New Folder in the Directory Tree

To create a folder in the "Views" box in the "Results Explorer" window (Figure 8–1)

1. **Make sure the "Same Grid" check box in the "Views" box is not checked**
2. **Click on "Views" in the directory tree in the "Views" box**
3. **Click on the "New Folder" icon on the Results Explorer icon toolbar (Figure 8-2)**

A new folder, named "New Folder," will appear in the directory tree connected to the node selected. The user can then rename the folder (see section 8.3.2).

8.2.2 Making a Subfolder in the Directory Tree

To create a subfolder in an existing folder in the "Views" box in the "Results Explorer" window (Figure 8–1)

1. **Make sure the "Same Grid" check box in the "Views" box is not checked**
2. **Click on the name of an existing folder in the directory tree in the "Views" box**
3. **Right-click and select "New Folder" from the menu that appears**

   or

   Click on the "New Folder" icon on the Results Explorer icon toolbar (Figure 8-2)

A new subfolder, named "New Folder," will appear in the directory tree connected to the selected folder. The user can then rename the folder (see section 8.3.2).

8.3 Copying, Renaming, Deleting, or Relocating a View or Folder

Views and folders displayed in the directory tree in the "Views" box in the "Results Explorer" window (Figure 8-1) can be copied, renamed, deleted, or relocated.

8.3.1 Copying a View or Folder

To make a copy of an existing view or folder in the directory tree in the "Views" box in the "Results Explorer" window (Figure 8-1)

1. **Make sure the "Same Grid" check box in the "Views" box is not checked**
2. **Click on the name of a view or folder in the directory tree in the "Views" box**
3. **Right-click and select "Copy" from the menu that appears**

   or

   Click on the "Duplicate the selected view/folder" icon on the Results Explorer icon toolbar (Figure 8-2)

The copy of the view or folder named "Copy of 'original folder or view name'" will appear in the directory tree, linked to the same node or folder as the original folder or view in the directory tree in the "Views" box. The user can then rename the copied view or folder (see section 8.3.2).

8.3.2 Renaming a View or Folder

To rename an existing view or folder in the "Results Explorer" window (Figure 8-1)

1. **Make sure the "Same Grid" check box in the "Views" box is not checked**
2. **Click on the name of a view or folder in the directory tree in the "Views" box**
3. **Right-click and select "Rename" from the menu that appears**

   or

   Click on the "Rename" icon on the Results Explorer icon toolbar (Figure 8-2)

The "Rename View" window (Figure 8-5) will pop up.

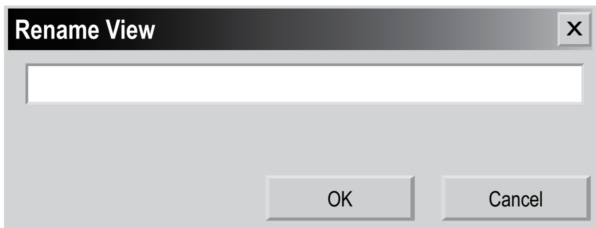


Figure 8-5. The "Rename View" window.

4. **Enter a new name in the text box**
5. **Click on the "OK" button to proceed**

   or

   Click on the "Cancel" button to terminate the process

If the user clicks on the "OK" button, the view or folder will appear in the directory tree in the "Views" box with its new name.

8.3.3 Deleting a View or Folder, or Closing all Views and Folders

The user has the options of deleting a single view or folder or closing all views and folders from the directory tree in the "Views" box in the "Results Explorer" window (Figure 8-1).

Deleting a Single View or Folder

To delete a single view or folder from the directory tree in the "Views" box in the "Results Explorer" window (Figure 8-1)

1. **Make sure the "Same Grid" check box in the "Views" box is not checked**
2. **Click on the name of a view or folder in the directory tree in the "Views" box**
3. **Right-click and select "Delete" from the menu that appears**

   or

   Click on the "Remove" icon on the Results Explorer icon toolbar (Figure 8-2)

A "Confirmation" window will pop up asking the user to confirm deletion of the selected view or folder.

4. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the deletion

Closing All Views and Folders

To close all views and folders displayed in the "Views" box in the "Results Explorer" window (Figure 8-1)

1. **Right-click over the "Views" box**
2. **Select "Blank Explorer" from the menu that appears**

A "Save?" window will pop up asking the user if changes (to views or folders) in the Results Explorer should be saved before they are closed. Any changes not saved will be lost after they are closed. Closed views and folders are stored as .dat files and can be opened at a later time (see section 8.6.7).

3. **Click on the "Yes" button to save the changes**

   or

   Click on the "No" button to cancel any changes

   or

   Click on the "Cancel" button to terminate the process

If the user clicks on the "No" button, all views and folders will be removed from the "Views" box.

If the user clicks on the "Yes" button, the "Save As" window will pop up (Figure 8-6). To proceed

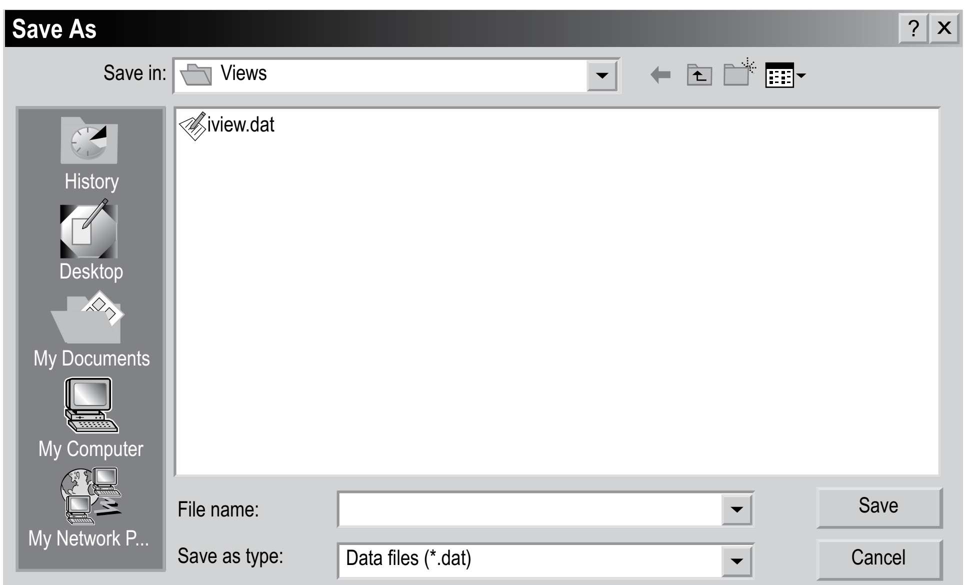


Figure 8-6. The "Save As" window.

4. **Enter a name for the collection of views and folders in the "File Name" box**
5. **Click on the "Save" button to proceed**

   or

   Click on the "Cancel" button to terminate the process

If the user clicks on the "Save" button, a "Success!" window will pop up stating that the views have been successfully saved and providing the location where they were saved. To proceed

6. **Click on the "OK" button**

8.3.4 Relocating a View or Folder

To relocate any view or folder displayed in the "Views" box of the "Results Explorer" window (Figure 8-1)

1. **Click on the name of a folder or the icon beside a view in the "Views" box**
2. **Drag (by holding down the left mouse button) the selected folder or view to the desired location in the "Views" box and release the mouse button** (for left-handed mouse users, the button designation may need to be reversed)

8.4 Views

Views represent SQL queries with some additional properties that enable users to analyze, visualize (in graphs, tables, or reports), and share simulation results. The user can create views even if no folder has been created in which to place the new view (see section 8.2.1 for instructions on creating a new folder). Any existing user-created and/or predefined views are displayed in the "Views" box (Figure 8-1) in the directory tree and are linked to a particular folder in the directory tree.

8.4.1 View Components

Views can be created from a wide variety of output variables, which are grouped into several categories, specifically (carbon) Stocks, (carbon) Stock Changes, Ecosystem Indicators, Ecosystem Transfers, (disturbance) Emissions, Disturbed Area, Age Classes, Age Classes by Time Step, Disturbance Transfers, and Unrealized Disturbance.

The Stocks category of output variables contains information on all biomass and dead organic matter (DOM) stocks. The stock results are reported in tonnes of carbon for each year for the forest area selected by the user. The user can select each stock individually, sum various stocks, select subtotals (such as total aboveground biomass), or select total ecosystem carbon.

Note: Peat dynamics and black carbon

Although the peat carbon pool appears in the CBM-CFS3, peat carbon dynamics are not simulated in the model. Research into peatland carbon dynamics is in progress, and these processes will be incorporated into the model when they are better understood.

The black carbon pool represents stable carbon resulting from incomplete combustion during fire. By default, no allocations are made to the black carbon pool following fire disturbances since research to understand carbon transfers of this nature is in progress. However, the user can make allocations to the black carbon pool in the fire disturbance matrices by means of the Disturbance Matrix Editor (section 6.3)

The Stock Changes category of output variables contains information on changes in carbon stocks, reported in tonnes of carbon for each year for the area selected by the user. At present, only stock changes in total biomass (Total Delta Biomass), total DOM (Total Delta DOM) and total ecosystem pools (Total Delta Ecosystem) are stored in the database. Queries for each individual pool will be available in a later version of the model.

The Ecosystem Indicators category of output variables contains ecological information that is primarily of scientific interest, including measures of ecosystem productivity such as Net Primary Productivity (NPP) and Net Ecosystem Productivity (NEP). Both NPP and NEP are estimated for the entire ecosystem of the area within the administrative and ecological boundaries defined by the user. A positive value indicates an increase in carbon stocks and a negative value, a decrease. All values are expressed in tonnes of carbon for each year for the area selected by the user. NPP is defined as the sum of all biomass production during a year and is calculated as the sum of all biomass increments minus all losses due to litterfall, biomass turnover, disturbances, and harvesting. NEP is defined as NPP minus all decomposition losses.

The Ecosystem Indicators category of output variables includes a number of additional indicators. Net Growth is the net biomass increment before losses from disturbances. Total Litterfall is the sum of all inputs of biomass to DOM pools through litterfall, turnover, and mortality, but does not include transfers resulting from disturbances. Decomposition Releases is the sum of all releases to the atmosphere through decomposition, not counting direct losses because of disturbances. Net Litterfall is Total Litterfall minus Decomposition Releases (again, not counting losses due to disturbances).

The Ecosystem Transfers category of output variables contains information on transfers of carbon from the ecosystem to the forest product sector, transfers from the ecosystem to the atmosphere, and transfers from biomass to dead organic matter (DOM). The latter transfers are primarily of scientific interest. The total harvest (in tonnes of carbon for each year) is represented by the variable Total Harvest (Biomass+Snags). Other ecosystem to forest product sector variables include Total Harvest (Biomass), Total Harvest (Snags), Softwood Harvest (Biomass), Softwood Harvest (Snags), Hardwood Harvest (Biomass), and Hardwood Harvest (Snags). The decomposition-related releases from 15 pools to the atmosphere are also accessible to the user. All decomposition losses are assumed to occur as carbon dioxide and are reported in tonnes of carbon for each year. The biomass transfers to dead organic matter are summarized by biomass pool of origin (except for black carbon) and are reported for each biomass pool of origin as annual transfers without the impacts of disturbances.

The Emissions category of output variables contains annual process-related emissions to the atmosphere and emissions related to disturbances or other activities that are summarized in four ways: by source (total, total biomass, and total DOM pools), by gas (carbon dioxide, carbon monoxide, and methane), by gas from biomass, and by gas from DOM pools. All output is reported in tonnes of carbon for each year. This information can be further filtered, for example, by disturbance type, to separate out emissions from slash burning and wildfire.

The Disturbed Area category contains one output variable, representing the area affected annually by disturbances, management actions, and annual processes (e.g., natural stand dynamics). The user must choose "AreaDisturbed" and then filter by the disturbance type. The results consist of the area disturbed, in hectares, in each year of the simulation.

The Age Classes category of output variables contains information on the area (hectares), the total biomass carbon stocks (tonnes), the total DOM carbon stocks (tonnes), and the average age (years) of each age class range. Graphs are displayed as bar charts. The user must first select the variable of interest and then select a filter for the age class ranges in which the information should be displayed. For example, a graph of area by age class would present the age class information by age class range.

The Age Classes by Time Step category of output variables also contains information on the area (hectares), the total biomass carbon stocks (tonnes), the total DOM carbon stocks (tonnes), and the average age (years) of each age class range. Graphs are displayed as bar charts. The user must first select the variable of interest and then select a filter for the age class ranges in which this information should be displayed. For example, a graph of area by age class in time step zero would show the age class information at the beginning of the simulation.

The Disturbance Transfers category of output variables contains information about carbon (tonnes) as it relates to disturbance losses to the atmosphere, transfers from biomass to the soil, and Net Biome Productivity (NBP). NBP is defined as NEP minus losses from harvesting and disturbances. NBP is equivalent to the annual total ecosystem carbon stock change. Disturbance losses are the losses from biomass and DOM stocks resulting from disturbances. "Bio to Soil from Disturbances" reports the total transfer of biomass to the DOM pools resulting from disturbances.

The Unrealized Disturbance category of output variables contains information about the area (hectares) not affected by disturbance.

After clicking on the name of one of the output variable categories, the user will be able to select from one or more lists of variables to be graphed from that category. The variables, grouped by category, are described in Table 8-1.

Table 8-1. View Editor categories and their associated variable names and descriptions (units in parentheses)

Category name	Variable name	Variable description
Stocks (t C)	Total Ecosystem	Carbon in Biomass and DOM pools
	Biomass	Carbon in the aboveground and belowground biomass pools
	Aboveground Biomass	Carbon in all aboveground biomass pools
	Belowground Biomass	Carbon in all belowground biomass pools (coarse plus fine roots)
	DOM[a]	Carbon in all DOM pools
	Aboveground DOM	Carbon in DOM pools above the mineral soil
	Belowground DOM	Carbon in DOM pools in the mineral soil
	Softwood Merchantable	Carbon in merchantable softwood stemwood
	Softwood Submerchantable	Carbon in submerchantable softwood stemwood; currently disabled
	Softwood Other	Carbon in softwood sapling stemwood, merchantable stem bark, branches, tops, and stumps
	Softwood Foliage	Carbon in softwood foliage
	Softwood Fine Roots	Carbon in softwood fine roots
	Softwood Coarse Roots	Carbon in softwood coarse roots
	Hardwood Merchantable	Carbon in merchantable hardwood stemwood
	Hardwood Submerchantable	Carbon in submerchantable hardwood stemwood; currently disabled
	Hardwood Other	Carbon in hardwood sapling stemwood, merchantable stem bark, branches, tops, and stumps
	Hardwood Foliage	Carbon in hardwood foliage
	Hardwood Fine Roots	Carbon in hardwood fine roots
	Hardwood Coarse Roots	Carbon in hardwood coarse roots
	Deadwood	Carbon in aboveground fast, belowground fast, medium, softwood and hardwood stem snag, and softwood and hardwood branch snag pools
	Litter	Carbon in very fast aboveground and slow aboveground pools
	Soil C	Carbon in very fast belowground, slow belowground, and black carbon pools
	Aboveground Very Fast DOM	Carbon in DOM with input from foliage biomass and fine roots in the forest floor; very fast turnover rate

Table 8-1. Continued

Category Name	Variable Name	Variable Description
Stocks (t C)	Belowground Very Fast DOM	Carbon in DOM with input from fine root biomass in the mineral soil; very fast turnover rate
	Aboveground Fast DOM	Carbon in DOM with input from branches, tops, stumps and submerchantable trees; fast turnover rate
	Belowground Fast DOM	Carbon in DOM with input from coarse roots; fast turnover rate
	Medium DOM	Carbon in DOM with input from merchantable stemwood and/or stem snags; medium turnover rate
	Aboveground Slow DOM	Carbon in DOM with input from Aboveground Very Fast, Fast, and Medium DOM pools; slow turnover rate
	Belowground Slow DOM	Carbon in DOM with input from Belowground Very Fast and Fast DOM pools; slow turnover rate
	Softwood Stem Snag	Carbon in DOM with input from the Softwood Merchantable biomass pool; default decay rate is half the default decay rate for the medium pool to the softwood stem snag pool
	Softwood Branch Snag	Carbon in DOM with input from the Softwood Other biomass pool; default decay rate is half the default decay rate for the fast pool to the softwood branch snag pool
	Hardwood Stem Snag	Carbon in DOM with input from the Hardwood Merchantable biomass pool; default decay rate is half the default decay rate for the medium pool to the hardwood stem snag pool
	Hardwood Branch Snag	Carbon in DOM with input from the Hardwood Other biomass pool; default decay rate is half the default decay rate for the fast pool
	Black Carbon	Stable carbon from incomplete combustion after fire; currently not included in calculations
	Peat	Carbon in peat; currently not included in calculations
Stock Changes (t yr^{-1})	Delta Total Ecosystem	Change in Total Ecosystem carbon stocks
	Delta Total Biomass	Change in Biomass carbon stocks
	Delta Aboveground Biomass	Change in Aboveground Biomass carbon stocks

Table 8-1. Continued

Category Name	Variable Name	Variable Description
Stock Changes ($t\ yr^{-1}$)	Delta Belowground Biomass	Change in Belowground Biomass carbon stocks
	Delta Total DOM	Change in DOM carbon stocks
	Delta Aboveground DOM	Change in Aboveground DOM carbon stocks
	Delta Belowground DOM	Change in Belowground DOM carbon stocks
	Delta Merch	Change in Softwood Merchantable and Hardwood Merchantable carbon stocks
	Delta Submerch	Change in Softwood Submerchantable and Hardwood Submerchantable carbon stocks; currently disabled
	Delta Foliage	Change in Softwood Foliage and Hardwood Foliage carbon stocks
	Delta Other	Change in Softwood Other and Hardwood Other carbon stocks
	Delta Coarse Root	Change in Softwood Coarse Roots and Hardwood Coarse Roots carbon stocks
	Delta Fine Root	Change in Softwood Fine Roots and Hardwood Fine Roots carbon stocks
	Delta Deadwood	Change in Deadwood carbon stocks
	Delta Litter	Change in Litter carbon stocks
	Delta Soil C	Change in Soil C and Black Carbon stocks
	Delta Aboveground Very Fast DOM	Change in Aboveground Very Fast DOM carbon stocks
	Delta Belowground Very Fast DOM	Change in Belowground Very Fast DOM carbon stocks
	Delta Aboveground Fast DOM	Change in Aboveground Fast DOM carbon stocks
	Delta Belowground Fast DOM	Change in Belowground Fast DOM carbon stocks
	Delta Medium DOM	Change in Medium DOM carbon stocks
	Delta Aboveground Slow DOM	Change in Aboveground Slow DOM carbon stocks
	Delta Belowground Slow DOM	Change in Belowground Slow DOM carbon stocks
	Delta Softwood Stem Snag	Change in Softwood Stem Snag carbon stocks
	Delta Hardwood Stem Snag	Change in Hardwood Stem Snag carbon stocks
	Delta Softwood Branch Snag	Change in Softwood Branch Snag carbon stocks
	Delta Hardwood Branch Snag	Change in Hardwood Branch Snag carbon stocks

Table 8-1. Continued

Category Name	Variable Name	Variable Description
Stock Changes ($t\ yr^{-1}$)	Delta Black Carbon	Change in Black Carbon stocks
	Delta Peat	Change in Peat carbon stocks; currently disabled
Ecosystem Indicators ($t\ yr^{-1}$)	Net Primary Productivity (NPP)	Sum of all biomass carbon production during a year
	Net Ecosystem Productivity (NEP)	NPP minus all losses of carbon due to decomposition
	Net Growth	Net biomass increment before losses from disturbances
	Net Litterfall	Total litterfall minus loss of litter carbon due to decomposition
	Total Litterfall	Sum of litterfall and litter decomposition inputs to DOM pools
	Decomposition Releases	Sum of all carbon released to the atmosphere due to decomposition and excluding direct losses from disturbance
Ecosystem Transfers ($t\ yr^{-1}$)	Total Harvest (Biomass+ Snags)	Total transfer of carbon from the ecosystem pools to the forest product sector
	Total Harvest (Biomass)	Total transfer of carbon from the biomass pools to the forest product sector
	Total Harvest (Snags)	Total transfer of carbon from the snag pools to the forest product sector
	Softwood Harvest (Biomass)	Transfer of carbon from the softwood biomass pools to the forest product sector
	Hardwood Harvest (Biomass)	Transfer of carbon from the hardwood biomass pools to the forest product sector
	Softwood Harvest (Snags)	Transfer of carbon from the softwood snag pools to the forest product sector
	Hardwood Harvest (Snags)	Transfer of carbon from the hardwood snag pools to the forest product sector
	Deadwood	Transfer of carbon from the deadwood stocks pools to the atmosphere
	Litter	Transfer of carbon from the litter stocks pools to the atmosphere
	Soil C	Transfer of carbon from the soil carbon stocks pools to the atmosphere
	Belowground Very Fast DOM	Transfer of carbon from the Belowground Very Fast DOM pool to the atmosphere
	Aboveground Very Fast DOM	Transfer of carbon from the Aboveground Very Fast DOM pool to the atmosphere
	Belowground Fast DOM	Transfer of carbon from the Belowground Fast DOM pool to the atmosphere

Table 8-1. Continued

Category Name	Variable Name	Variable Description
Ecosystem Transfers (t yr^{-1})	Aboveground Fast DOM	Transfer of carbon from the Aboveground Fast DOM pool to the atmosphere
	Medium DOM	Transfer of carbon from the Medium DOM pool to the atmosphere
	Belowground Slow DOM	Transfer of carbon from the Belowground Slow DOM pool to the atmosphere
	Aboveground Slow DOM	Transfer of carbon from the Aboveground Slow DOM pool to the atmosphere
	Softwood Stem Snag	Transfer of carbon from the softwood stem pool to the softwood stem snag pool
	Softwood Branch Snag	Transfer of carbon from the softwood branch pool to the softwood branch snag pool
	Hardwood Stem Snag	Transfer of carbon from the hardwood stem pool to the hardwood stem snag pool
	Hardwood Branch Snag	Transfer of carbon from the hardwood branch pool to the hardwood branch snag pool
	Black Carbon	Transfer of carbon from various pools to the black carbon pool associated with disturbances; currently disabled
	Peat	Transfer of carbon from the peat pool to the atmosphere; currently disabled
	Biomass	Total transfer of carbon from all biomass pools to all DOM pools due to disturbances
	Merchantable	Transfer of carbon Softwood Merchantable and Hardwood Merchantable pools to DOM pools
	Submerchantable	Transfer of carbon from Softwood Submerchantable and Hardwood Submerchantable pools to DOM pools; currently disabled
	Other	Transfer of carbon from the Softwood Other and Hardwood Other pools to DOM pools
	Foliage	Transfer of carbon from the Softwood Foliage and Hardwood Foliage pools to DOM pools
	Fine Root	Transfer of carbon from Softwood Fine Roots and Hardwood Fine Roots to DOM pools
	Coarse Root	Transfer of carbon from Softwood Coarse Roots and Hardwood Coarse Roots pools to DOM pools

Table 8-1. Concluded

Category Name	Variable Name	Variable Description
Emissions (t yr^{-1})	Total	Total carbon emissions from all ecosystem components (DOM + Biomass)
	Total Biomass	Total emissions from all biomass components
	Total DOM	Total emissions from all DOM pools
	Total CO_2	Total carbon dioxide emissions
	Total CO	Total carbon monoxide emissions
	Total CH_4	Total methane emissions
	Bio CO_2	Carbon dioxide emissions from all biomass pools
	Bio CO	Carbon monoxide emissions from all biomass pools
	Bio CH_4	Methane emissions from all biomass pools
	DOM CO_2	Carbon dioxide emissions from all DOM pools
	DOM CO	Carbon monoxide emissions from all DOM pools
	DOM CH_4	Methane emissions from all DOM pools
Disturbed Area (ha yr^{-1})	Area Disturbed	Area disturbed annually by fire, insects, or management activities
Age Classes	Area (ha)	Area of the forest in a particular age class
	Biomass (t)	Total biomass carbon by 20-year age classes
	DOM (t)	DOM carbon by age class
	Average Age (years)	Average age of each age class
Age Classes by Timestep	Area (ha)	Area by age-class reported by time step
	Biomass (t)	Total biomass carbon by age-class for each time step
	DOM (t)	Total DOM carbon by age-class for each time step
	Average Age (years)	Average age of an age-class
Disturbance Transfers (t yr^{-1})	Disturbance Losses	Carbon losses from biomass and DOM stocks due to disturbance
	Bio to Soil from Disturbances	Total transfer of biomass to DOM pools due to disturbance
	Net Biome Productivity (NBP)	NEP minus losses of carbon due to harvesting and disturbances
Unrealized Disturbance (ha)	Unrealized Disturbed Area	Area allocated for disturbances that could not be disturbed in the model run because of insufficient eligible area

[a]DOM = dead organic matter.

8.4.2 Creating a View

To create a view in the directory tree in the "Views" box in the "Results Explorer" window (Figure 8-1)

1. **Make sure the "Same Grid" check box in the "Views" box is not checked**
2. **Click on the name of a folder in the directory tree in the "Views" box**
3. **Right-click and select "New View" from the menu that appears**

   or

   Click on the "New View" icon on the Results Explorer icon toolbar (Figure 8-2)

The "View Editor" window (Figure 8-7) will pop up. Using this editor, the user can create a desired view based on any of a wide range of output variables.

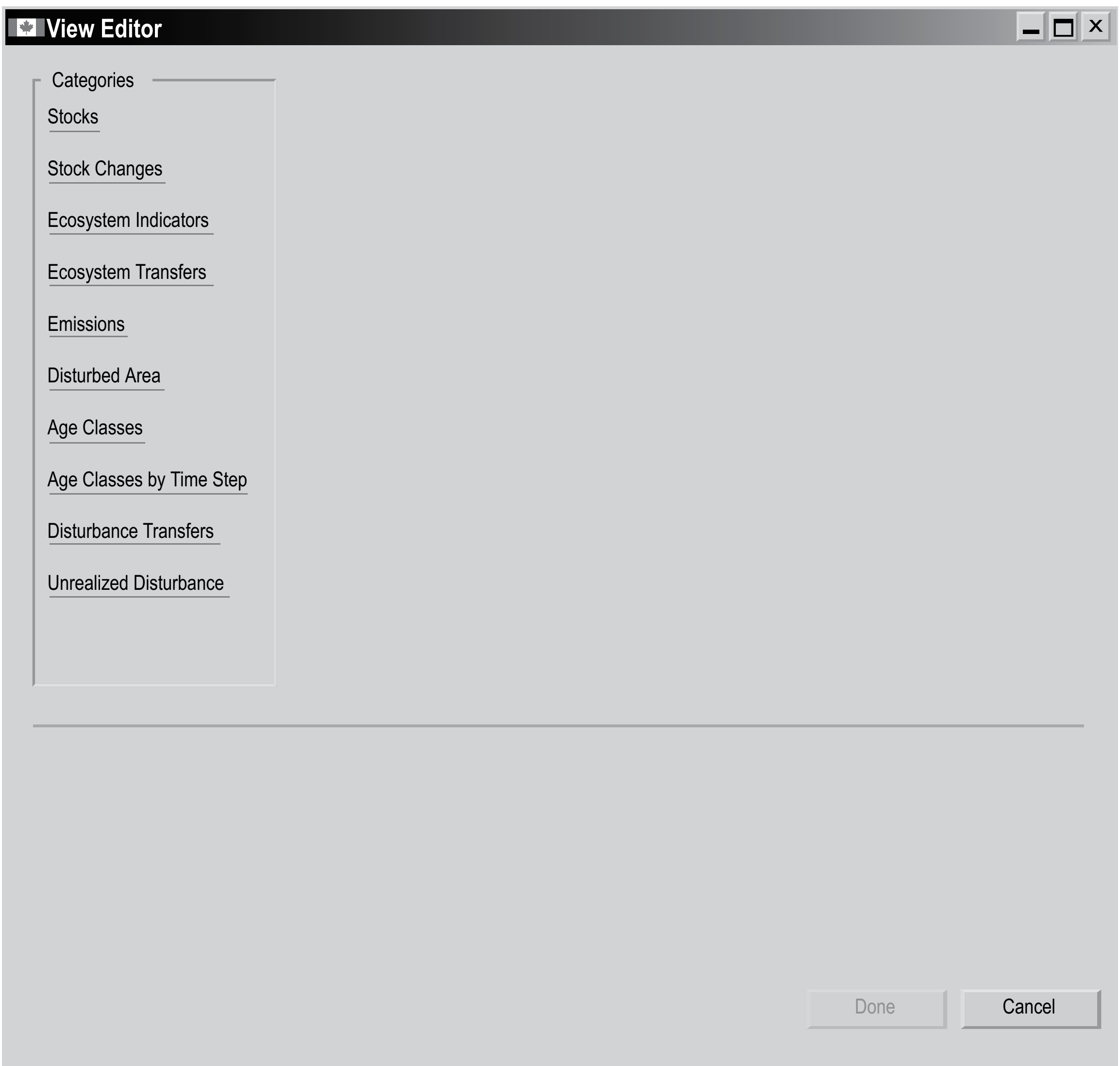


Figure 8-7. The "View Editor" window.

To select a view category and begin creating a view

4. **Click on a category name in the "Categories" box of the "View Editor" window**

A box with the name of the selected category ("Age Classes" in Figure 8-8) will pop up, with the "Queries" tab selected. Next, the user can choose (optional) a simulation results database containing the filter values to be selected while creating the view.

Different simulation results databases may have different filter values depending on the project in which they originate. For example, one project might have fire and insects as disturbance filter values, whereas another project might have harvesting as its only disturbance.

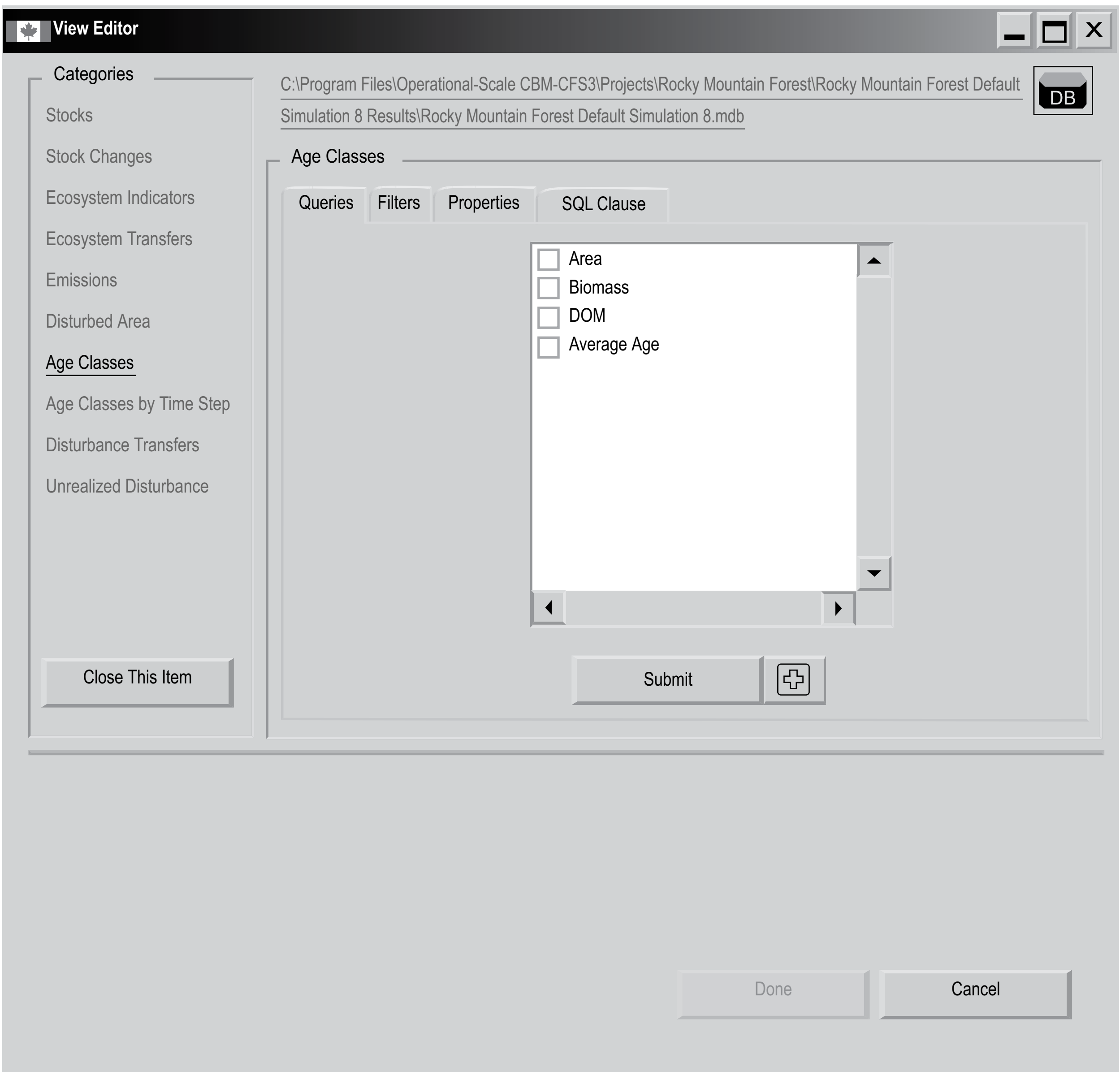


Figure 8-8. The "View Editor" window displaying the "Age Classes" box with the "Queries" tab selected.

Above the box named for the user-selected category ("Age Classes" in Figure 8-8), a link, with the path and name of a simulation results database, will appear (provided that a database was opened in the "Results" box of the "Result Explorer" window; Figure 8-1), as well as a "DB" button.

To create new views using the simulation results database (path) displayed, proceed to the next section, "Selecting View Query Variables." To change or select a simulation results database

5. **Click on the link or the "DB" button**

The "Results for Filter Values" window (Figure 8-9) will pop up. This window allows the user to select a simulation results database to be used for creating new views. To cancel any task and exit this window, click on the "Cancel" button. To select a simulation results database to create new views

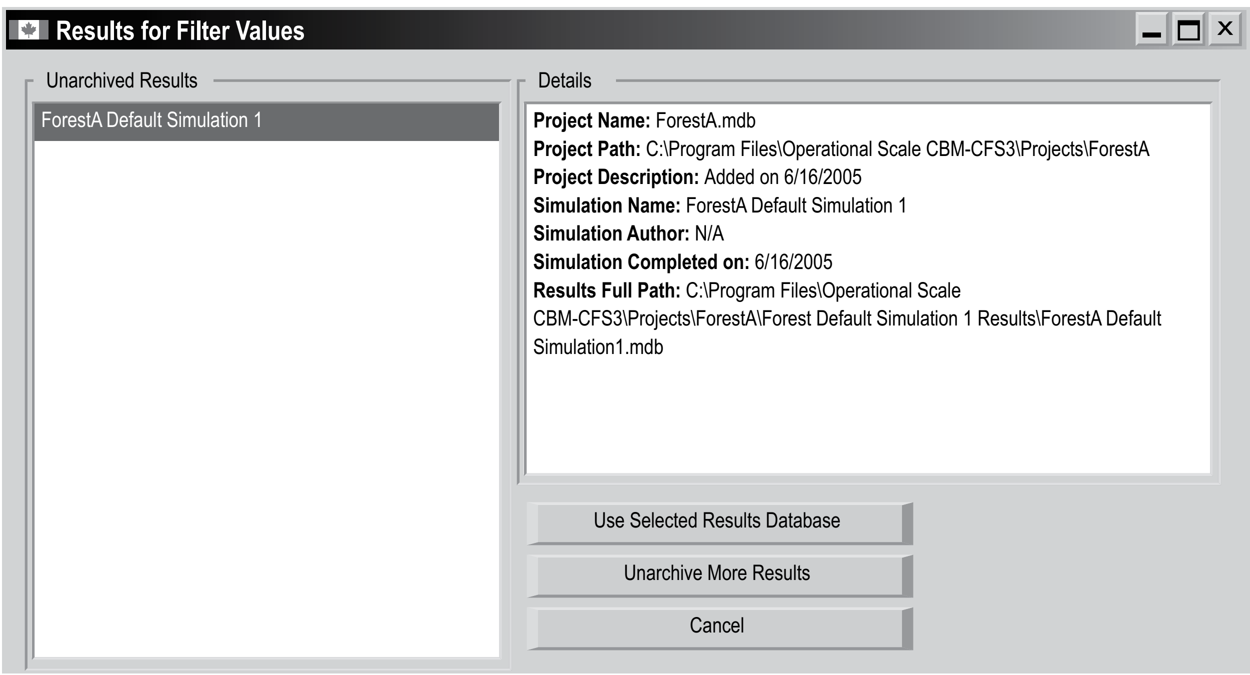


Figure 8-9. The "Results for Filter Values" window.

6. **Click on the name of a simulation results database in the "Unarchived Results" box**
7. **Click on the "Use Selected Results Database" button to proceed**

   or

   Click on the "Cancel" button to terminate the process

If the user clicks on the "Use Selected Results-Database" button, the link will be made and the "Results for Filter Values" window will close.

Note: Using the "Results for Filter Values" window to unarchive databases

To unarchive other simulation results databases while in the "Results for Filter Values" window (optional)

Click on the "Unarchive More Results" button

The "Simulation Results" window (Figure 8-3) will pop up. To learn how to use this window, consult section 8.1.1. Once the user has added a simulation results database through the "Simulation Results" window and has clicked on the "Done" button, the window will close and the user will again have access to the "Results for Filter Values" window and will be able to select the newly unarchived simulation results database.

To continue creating a new view, the user must select view query variables.

Selecting View Query Variables

Although no SQL knowledge is required to create a view, the "SQL Clause" tab (Figure 8-10) allows the user to write view scripts or display the SQL programming behind the views created with the other tabs; the user can thus learn how to write view scripts if desired. No instructions for writing SQL scripts for views are provided in this guide. To create a view without using SQL

1. **On the "Queries" tab, click on the check box next to each variable to be graphed (Figure 8-8)**

☞ *Tip: Scrolling for variable options*

If the desired variable is not automatically displayed in the box on the "Queries" tab, the user can use the scroll bar at the side of the box to view any undisplayed variables.

2. **Click on the "Submit" button**

☞ *Tip: Adding multiple query variables*

The user has another option for adding multiple query variables to a view. To see the sum of two variables graphed in a view (as opposed to displaying the data for each separately in a single view) click on the "+" button instead of the "Submit" button after selecting the variables to be graphed. Note that only variables measured in the same units can be summed in this way. If it is not possible to sum the selected variables, a "Post Processor Visualization" window will pop up, stating that the selected queries will generate a unit conflict. If this window pops up

Click on the "OK" button

Reselect the query variables for the view

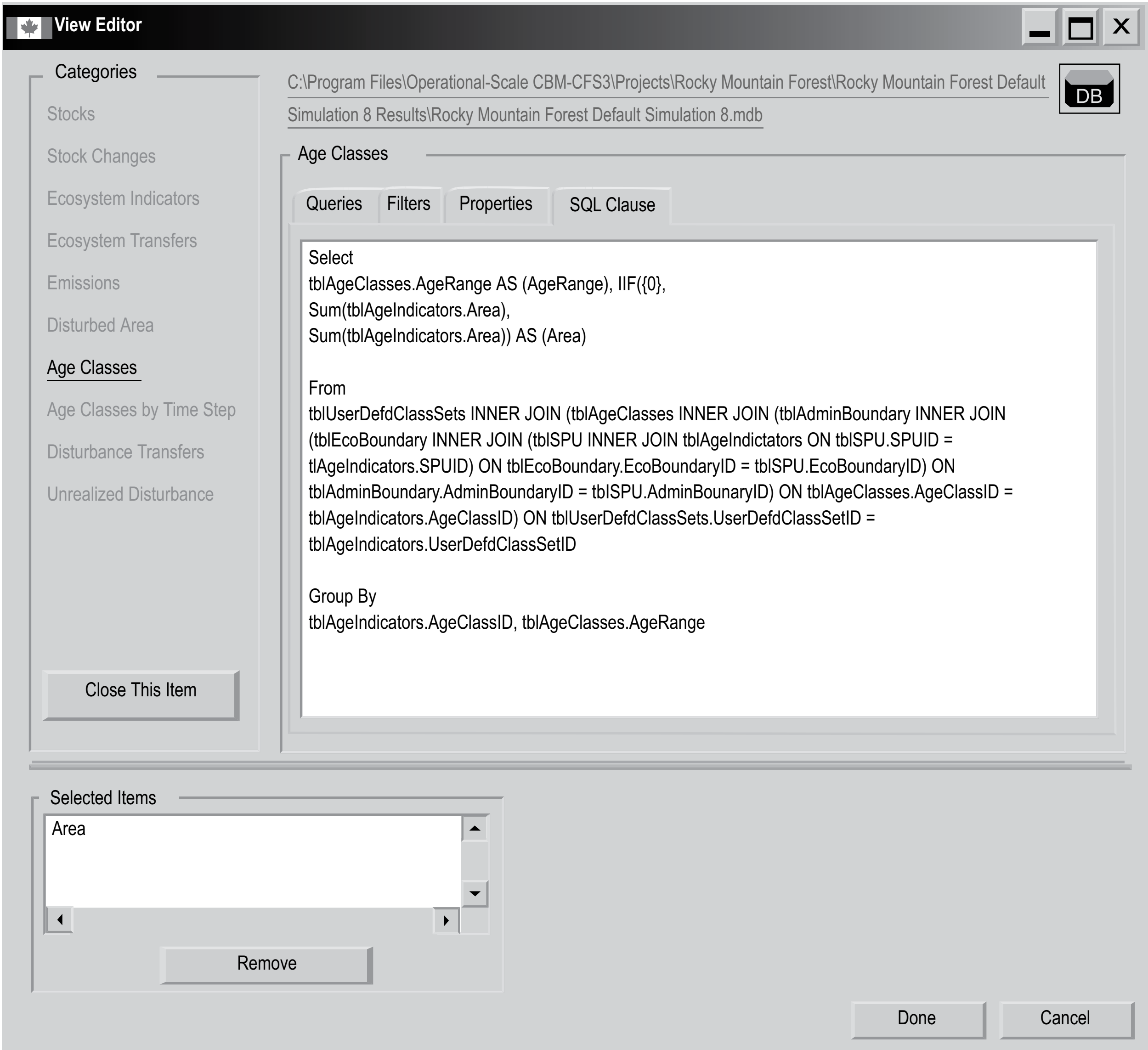


Figure 8-10. The "View Editor" window displaying the "Age Classes" box with the "SQL Clause" tab selected. SQL = Structured Query Language.

The selected query items will appear in a "Selected Items" box in the "View Editor" window (see example in Figure 8-11). If the user submits a query for any variable in the Age Classes category, the "Instruction" window (Figure 8-12) will pop up, with instructions on creating a proper view for this category. The user should read the contents of the window and then

Click on the "OK" button to close the "Instruction" window

To remove a variable that has been added to the "Selected Items" box of the "View Editor" window (Figure 8-11)

Click on the variable in the "Selected Items" box

Click on the "Remove" button

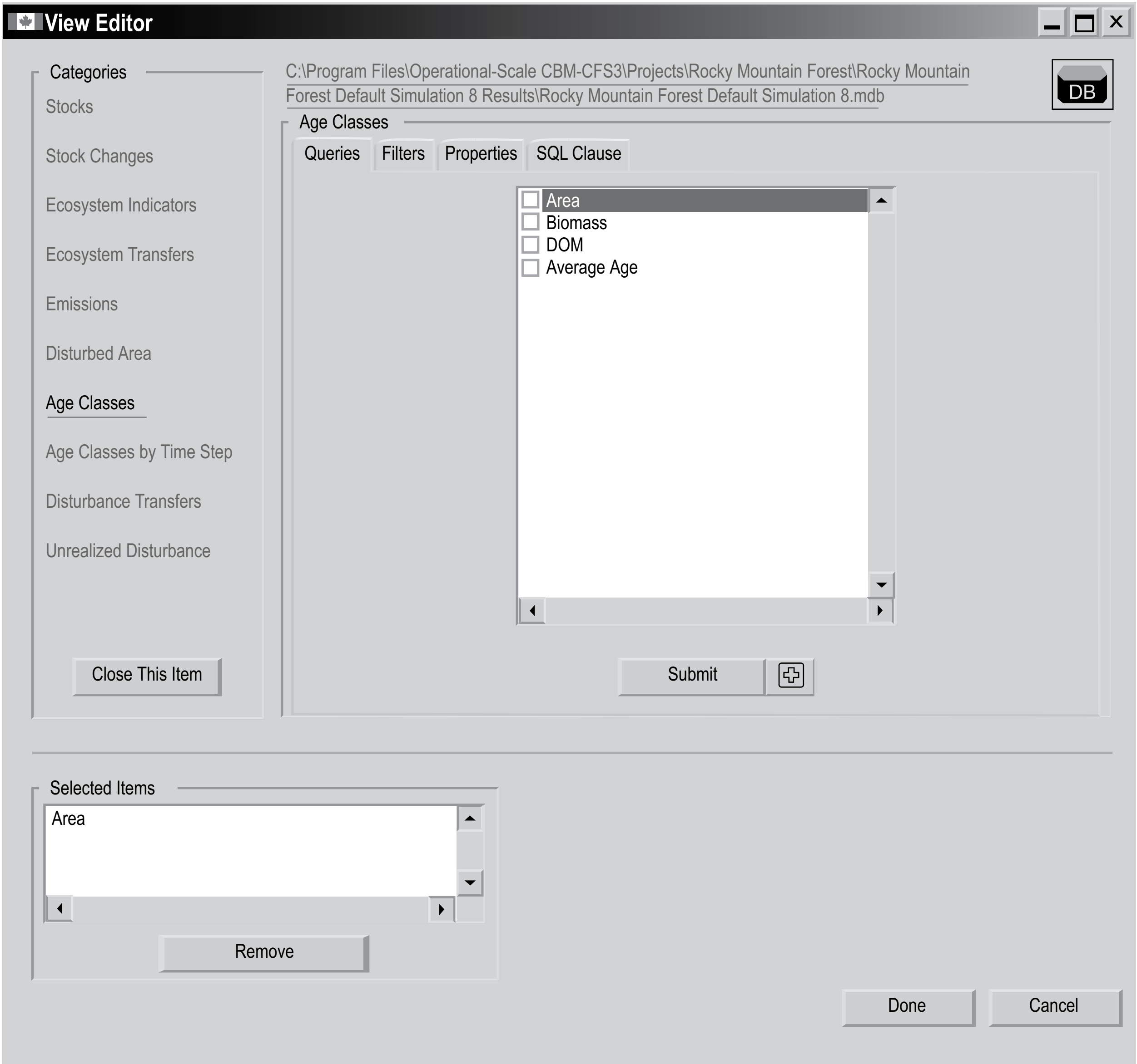


Figure 8-11. The "View Editor" window displaying the "Age Classes" box with the "Queries" tab selected and the "Selected Items" box displayed.

Before clicking on the "Done" button, the user can make further modifications to the new view, including selecting filters and setting properties. The application of filters to views is sometimes optional and sometimes required, depending on the view category and variables chosen for display. If application of filters is required, the "Instruction" window (Figure 8-12) will pop up after variables for a view have been submitted.

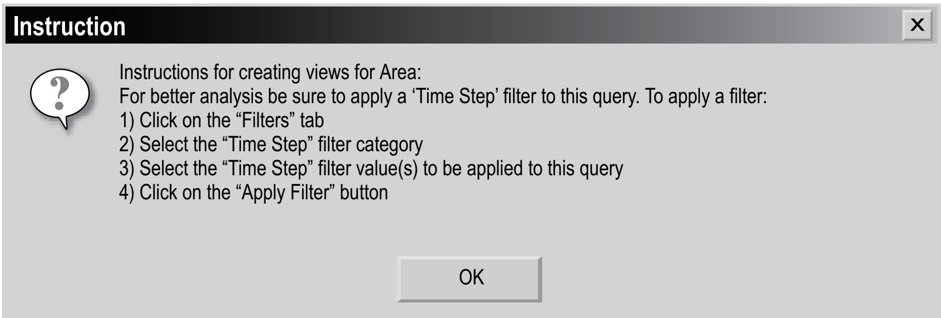


Figure 8-12. The "Instruction" window displaying instructions to create a view for the "Area" variable.

The user must follow the instructions provided in the "Instruction" window to create proper views for that category. If the "Instruction" window does not pop up, the application of filters (discussed later in this section) is optional. Setting properties for views is always optional; the CBM-CFS3 will apply defaults and make the view available to all simulation results databases. If no filters are selected and no properties are set

2. **Click on the "Done" button**

If the user clicks on the "Done" button, the "View Editor" window will close and the name of the new view will be displayed in the "Results Explorer" window (Figure 8-1), in the directory tree linked to the folder originally selected in the "Views" box.

Selecting View Filter Options

Once the query variables to be viewed have been selected on the "Query" tab, the user can select filters for the view. To apply filters

1. **Click on the "Filters" tab (Figure 8-13)**

Each view category will display different filter options.

2. **Click on the "Filter Categories" box and select a category name from the drop list that appears**
3. **Click on the check boxes in the filter box to select the category filters to be used**

Tip: "Select All" and "Not" check boxes

The "Select All" and "Not" check boxes can also be used to select the appropriate filter variables in a filter category. Clicking on the "Select All" check box allows all of the filter variable check boxes to be checked or unchecked at once. To exclude a few of the filter variables for a filter category, click on the check boxes of the filter variables to be excluded and then click on the "Not" check box. Filters will be applied to all of the filter variables except the ones that have been checked.

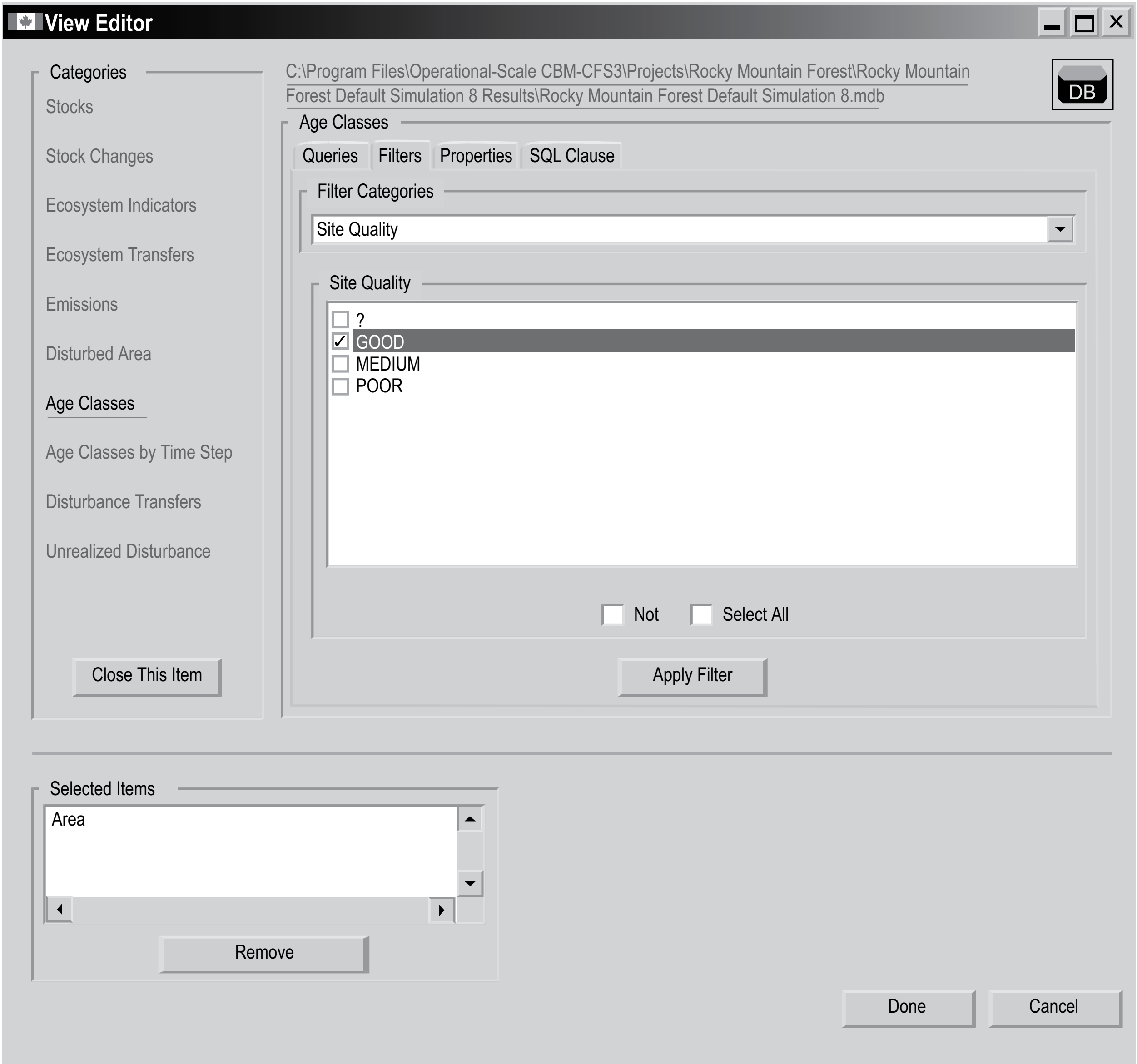


Figure 8-13. The "View Editor" window displaying the "Age Classes" box with the "Filters" tab selected and the category options for the "Site Quality" filter displayed.

Note: Creating an "Emissions" category view

When creating an "Emissions" category view, the user must select filters appropriately to either display emissions from disturbances and other activities or display emissions resulting from annual processes (uptake from growth and decomposition).

To display only emissions from disturbances and other activities

1. **Select "Dist Type" from the "Filter Categories" drop list box**
2. **Click on the "Annual Processes" check box in the "Dist Type" box**
3. **Click on the "Not" check box**

To display only emissions from annual processes

Note: Continued

1. **Select "Dist Type" from the "Filter Categories" drop list box**
2. **Click on the "Annual Processes" check box in the "Dist Type" box**

When creating an "Age Classes" category view, the user should filter by a specific time step; otherwise, the view will display the sum of all areas in every time step for the simulation, by age class.

4. **Click on the "Apply Filter" button**

The "Filters" box (Figure 8-14) will appear, displaying the SQL for the filters used to create the new view.

To remove a filter, the user can simply click on the SQL for the filter in the "Filters" box and click on the "Remove" button.

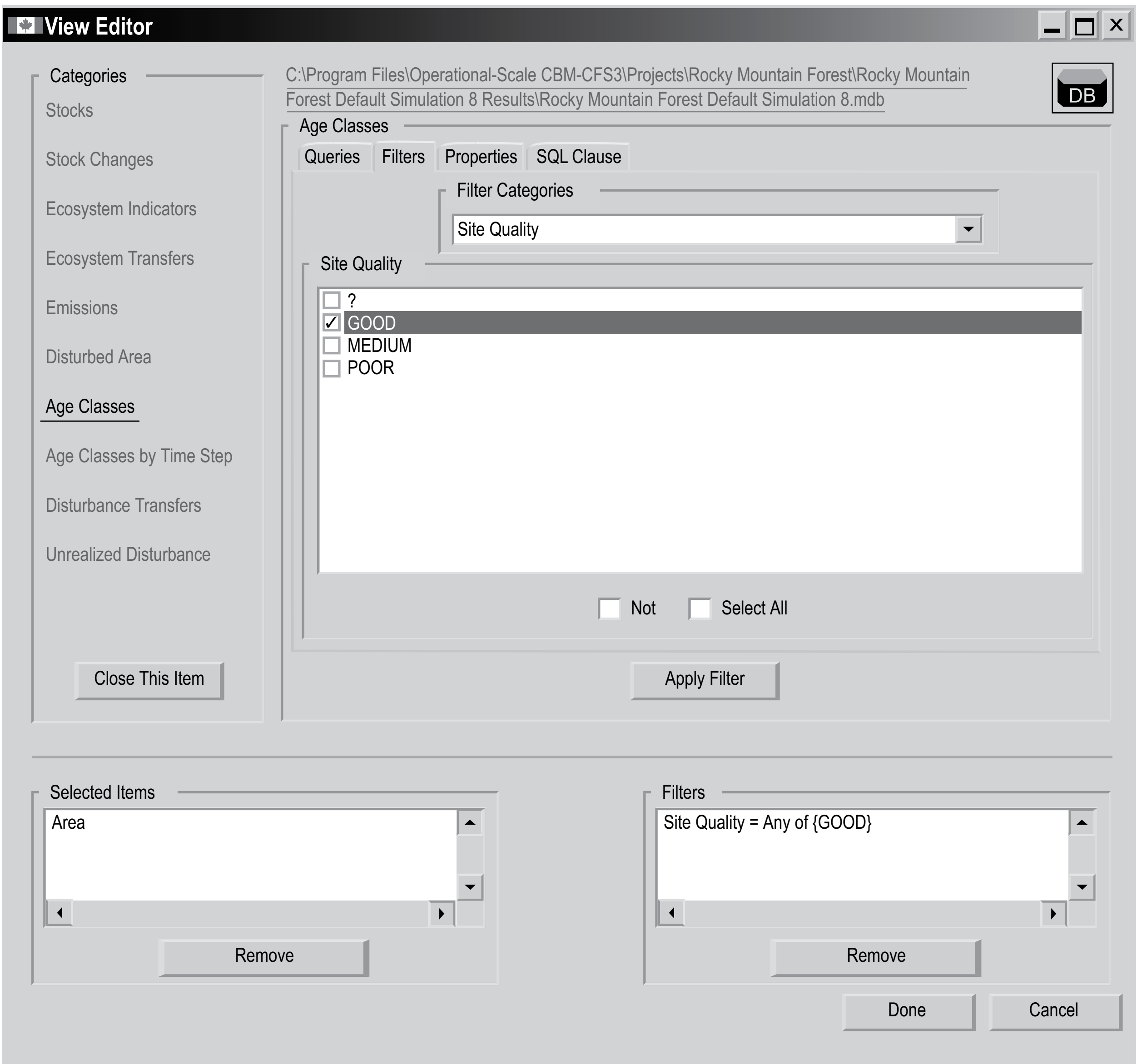


Figure 8-14. The "View Editor" window displaying the "Age Classes" box with the "Filters" tab selected and the "Filters" box displayed.

Note: Applying the same filter to different projects

Use caution with regard to filters. When filters are applied to a view, the values stored in the queries are the pointers to the classifiers used in the database for which the views were developed. Applying a view template from one analysis or project to another region can create problems if the values of the classifiers in the forest inventories of the two regions differ. For example, in Forest X, the classifier for site class has six possible values, with 1 being the poorest site class and 6 the best. A view can be created to filter the results for areas with site class 6 only. If this view is later applied to another analysis area, for example, Forest Y, in which the inventory contains three possible values for site class (good, medium and poor) an error will occur because site class 6 does not exist for Forest Y. Perhaps of greater concern are situations in which no error occurs but the model compiles data for the wrong strata. Therefore, before using views containing filters developed for one analysis area in another area, the user must ensure that the classifier structure and definitions are the same for both areas. Views without filters can be applied to other projects.

Next, the user has the option of setting view properties for the view that is being created. Setting view properties is optional, as the CBM-CFS3 will apply defaults and make the view available to all simulation results databases. To skip setting properties

5. **Click on the "Done" button**

If the user clicks on the "Done" button, the "View Editor" window will close and the name of the new view will be displayed in the "Results Explorer" window (Figure 8-1), in the directory tree linked to the folder originally selected in the "Views" box.

Selecting View Properties

View properties are the graph title, graph type, *x*-axis title, *y*-axis title, and description. The user can also choose whether to make the view applicable to one simulation results database only or to all simulation results databases that will be created. To set view properties

1. **Click on the "Properties" tab (Figure 8-15)**
2. **Click on the "Graph Title" box and enter a title for the graph**
3. **Click on the "Graph Type" box and select an option from the drop list that appears**
4. **Click on the "x Axis Title" box and enter a title for the *x*-axis**
5. **Click on the "y Axis Title" box and enter a title for the *y*-axis**

In the "Would you like to apply this view on all other projects too?" box

6. **Click on the "No" radio button to make the view applicable only to the current project**

   or

   Click on the "Yes" radio button to make the view applicable to all projects

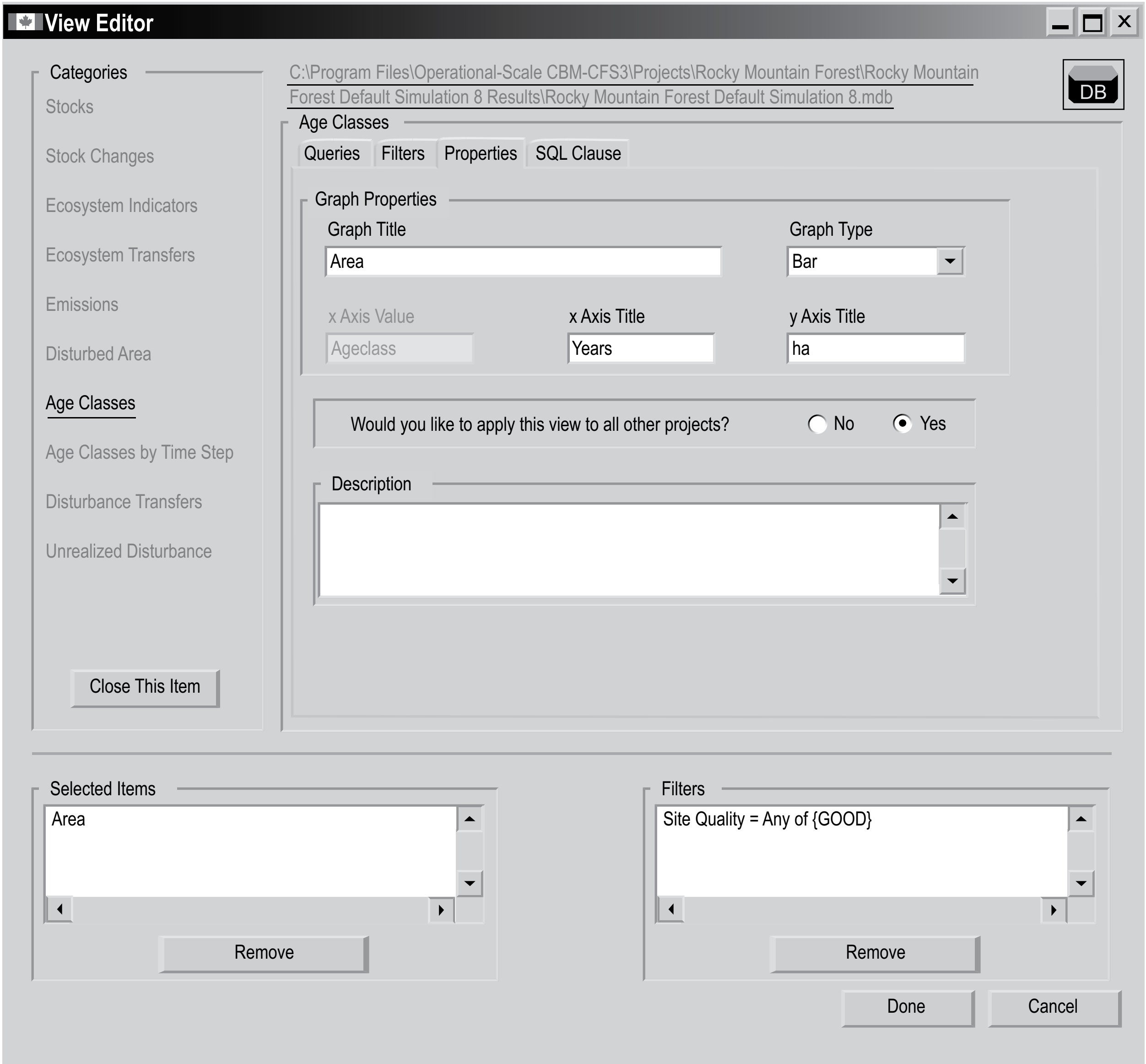


Figure 8-15. The "View Editor" window displaying the "Age Classes" box with the "Properties" tab selected.

Note:

If the user applies filters in the creation of a view, it is not possible to make the view applicable to all simulation results databases.

7. **Enter a description in the "Description" box**

Once the view properties are acceptable

8. **Click on the "Done" button to complete the view creation process**

   or

   Click on the "Cancel" button to terminate the view creation process

If the user clicks on the "Done" button, the "View Editor" window will close and the name of the new view will be displayed in the "Views" box in the "Results Explorer" window (Figure 8-1), in the directory tree linked to the folder originally selected.

8.5 Editing a View

To edit an existing view displayed in the directory tree in the "Views" box in the "Results Explorer" window (Figure 8-1)

1. **Make sure the "Same Grid" check box in the "Views" box is not checked**
2. **In the directory tree in the "Views" box, click on the name of the view to be edited**
3. **Right-click and select "Edit" from the menu that appears**

   or

   Click on the "Edit" icon on the Results Explorer icon toolbar (Figure 8-2)

The "View Editor" (Figure 8-14) will pop up with the view-related category open and ready to edit.

4. **Make the necessary changes to the view (see section 8.4)**
5. **Click on the "Done" button to save the edits**

   or

   Click on the "Cancel" button to cancel the edits

8.6 Displaying, Exporting, Saving, and Opening Views

In the "Results Explorer" window (Figure 8-1), simulation results can be displayed in a variety of ways: as one view for one simulation results database, as one view combining results from multiple simulation results databases, as multiple views in one for one simulation results database, or as multiple views in one for multiple simulation results databases.

Once a view is displayed in the "Results" window, the user can view the display in a combined graph and table (Figure 8-16) by clicking on the "Graph" radio button, in a table (Figure 8-17) by clicking on the "Table" radio button, or in a report (Figure 8-18) by clicking on the "Report" radio button.

The combined graph and table format displays the graph view of the results along with a scrollable table of the data displayed in the graph. If the user places the cursor over a data point in the graph, an information box will appear displaying the name of the data type and the *x* and *y* values of that data point. At the same time, the data for the point will be highlighted in the table below the graph. If the user holds the cursor over a variable in the legend, the data for that variable will be highlighted in the graph and in the table.

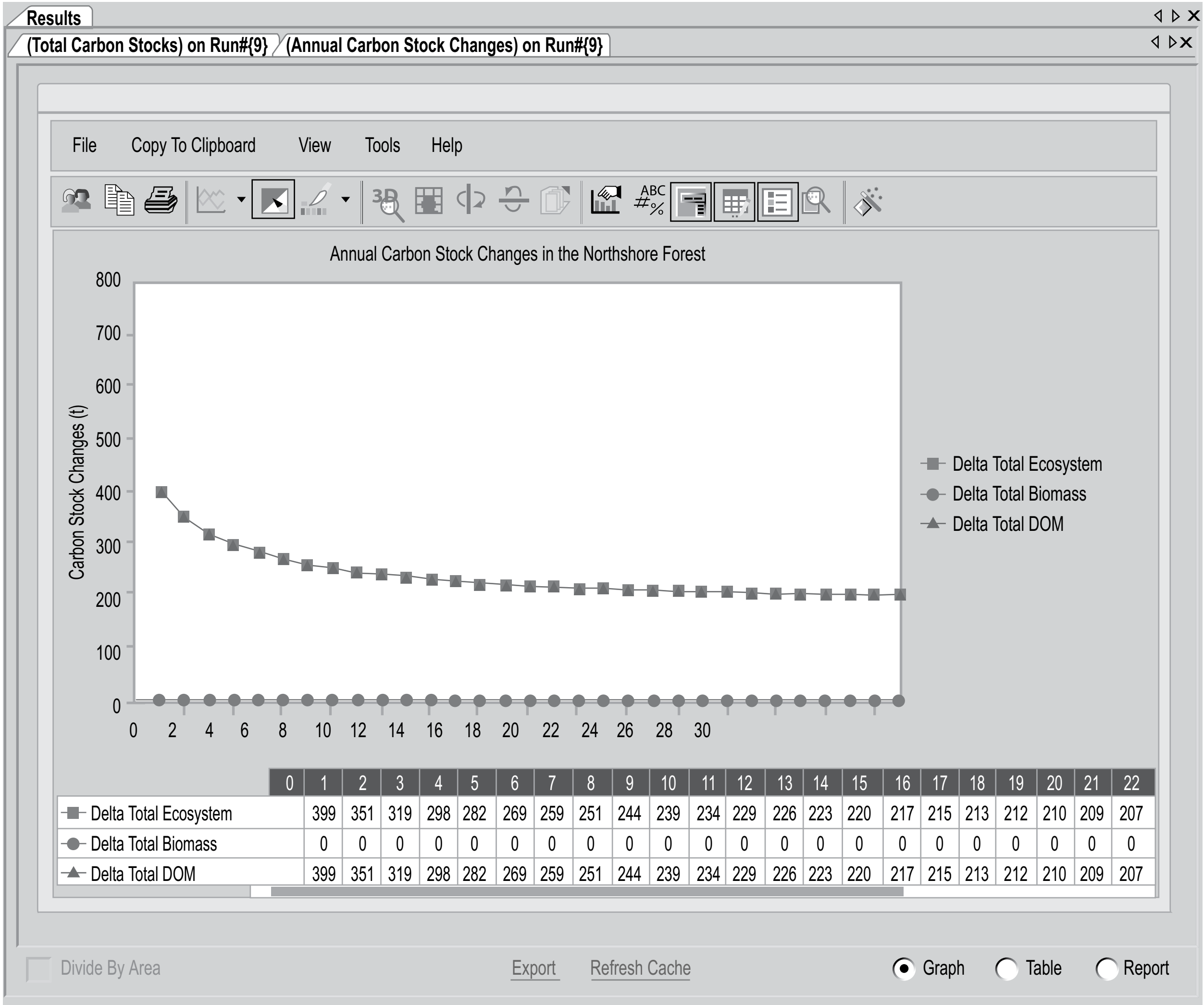
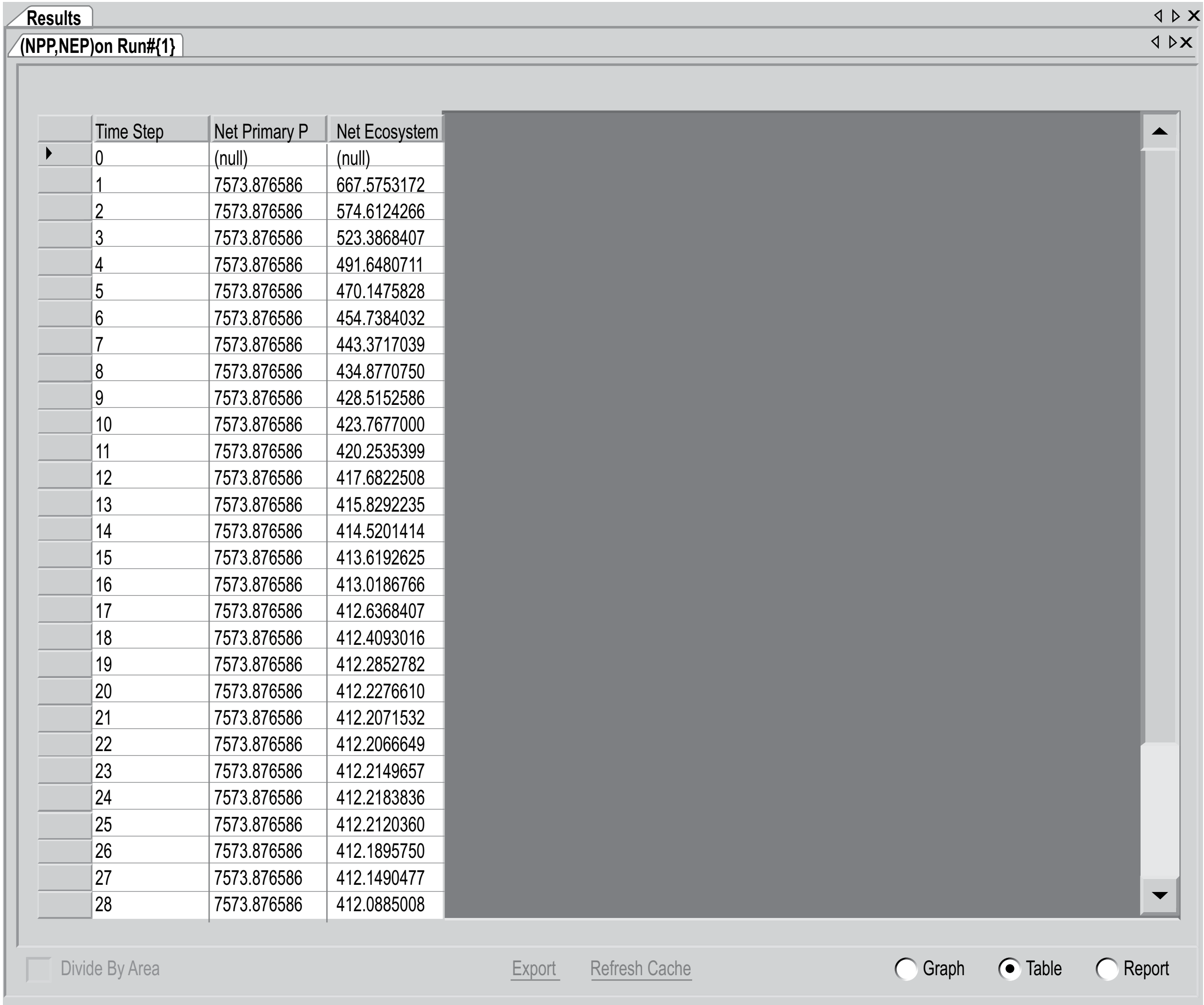


Figure 8-16. The "Results" window with a "Graph" display selected for the "Annual Carbon Stock Changes" view.

☞ ***Tip: Viewing results per hectare***

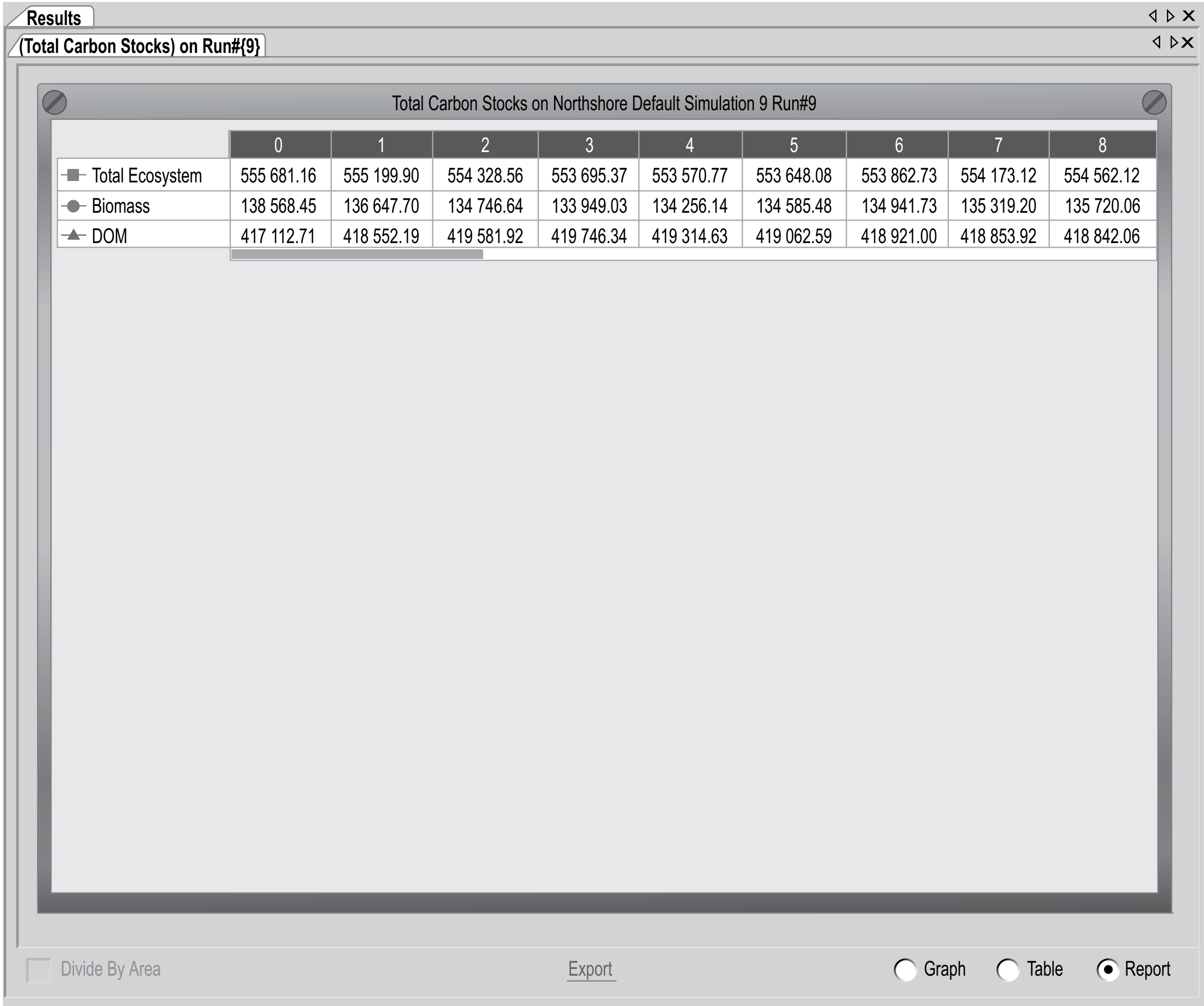
To view *y*-axis results on a per-hectare basis in a graph, table, or report, click on the "Divide by Area" check box in the appropriate "Results" window.

The user can modify the combined graph and table view display and properties directly using graph tool icons, indirectly by right-clicking over the graph and table display and clicking on any of the menu options that appear, or by selecting "Tools" on the graph and table menu bar displayed (see Chapter 9). The user can load, save, copy, or print graphs (see Chapter 9). A graph, table, or report can be exported as a text file or a Microsoft Excel file. A directory of views in the "Views" box in the "Results Explorer" window (Figure 8-1) can be saved, and a saved view directory can be opened.



Time Step	Net Primary P	Net Ecosystem
0	(null)	(null)
1	7573.876586	667.5753172
2	7573.876586	574.6124266
3	7573.876586	523.3868407
4	7573.876586	491.6480711
5	7573.876586	470.1475828
6	7573.876586	454.7384032
7	7573.876586	443.3717039
8	7573.876586	434.8770750
9	7573.876586	428.5152586
10	7573.876586	423.7677000
11	7573.876586	420.2535399
12	7573.876586	417.6822508
13	7573.876586	415.8292235
14	7573.876586	414.5201414
15	7573.876586	413.6192625
16	7573.876586	413.0186766
17	7573.876586	412.6368407
18	7573.876586	412.4093016
19	7573.876586	412.2852782
20	7573.876586	412.2276610
21	7573.876586	412.2071532
22	7573.876586	412.2066649
23	7573.876586	412.2149657
24	7573.876586	412.2183836
25	7573.876586	412.2120360
26	7573.876586	412.1895750
27	7573.876586	412.1490477
28	7573.876586	412.0885008

Figure 8-17. The "Results" window with the "Table" display selected for the "NPP, NEP" view.



	0	1	2	3	4	5	6	7	8
Total Ecosystem	555 681.16	555 199.90	554 328.56	553 695.37	553 570.77	553 648.08	553 862.73	554 173.12	554 562.12
Biomass	138 568.45	136 647.70	134 746.64	133 949.03	134 256.14	134 585.48	134 941.73	135 319.20	135 720.06
DOM	417 112.71	418 552.19	419 581.92	419 746.34	419 314.63	419 062.59	418 921.00	418 853.92	418 842.06

Figure 8-18. The "Results" window with the "Report" display selected for the "Total Carbon Stocks" view.

8.6.1 Displaying One View for One Simulation Results Database

To display one view for one simulation results database

1. **Click on the name of the simulation results database of interest in the "Results" box (Figure 8-1) so that a check mark appears beside it**

Should the user forget the details of the simulation that produced the simulation results database, holding the cursor over the name of the simulation results database will cause an information box to appear, displaying the simulation identification number, the simulation name, the project author, the date when the simulation was performed, and the description of the simulation.

2. **Click on the name of a view in the directory tree in the "Views" box and click on the "Graph" icon on the Results Explorer icon toolbar (Figure 8-2)**

   or

   Click on the name of a view in the directory tree in the "Views" box, right-click, and select "Display" from the menu that appears

   or

   Double-click on the name of a view in the directory tree in the "Views" box

A "Results" window (Figure 8-16) will open, displaying a combined graph and table of the view using data from the selected simulation results database.

Note: Refreshing cached views

When the user pairs a view with a simulation results database for display, the CBM-CFS3 caches this link in local memory to allow quick access when it is selected for display again. However, if the user edits the view after displaying it and then tries to view it again with the same project database, the old cached view will be displayed, not the updated view. In this circumstance, to update the cache

Click on the "Refresh Cache" link in the "Results" window (Figure 8-16)

8.6.2 Displaying One View for Multiple Simulation Results Databases

To compare the results for two or more simulation results databases in one view

1. **Click on the "Same Grid" check box in the "Results" box (Figure 8-1)**
2. **Click on the names of two or more simulation results databases in the "Results" box so that a check mark appears beside each database of interest**

Should the user forget the details of the simulation that produced a simulation results database, holding the cursor over the name of the simulation results database will cause an information box to appear, displaying the simulation identification number, the simulation name, the project author, the date when the simulation was performed, and the description of the simulation.

3. **Click on the name of a view in the directory tree in the "Views" box and click on the "Graph" icon on the Results Explorer icon toolbar (Figure 8-2)**

   or

   Click on the name of a view in the directory tree in the "Views" box, right-click,

and select "Display" from the menu that appears

or

Double-click on the name of a view in the directory tree in the "Views" box

A "Results" window (Figure 8-16) will open, displaying a combined graph and table of the view using data from the selected simulation results databases.

Note: Refreshing cached views

When the user pairs a view with a simulation results database for display, the CBM-CFS3 caches this link in local memory to allow quick access when it is selected for display again. However, if the user edits the view after displaying it and then tries to view it again with the same project database, the old cached view will be displayed, not the updated view. In this circumstance, to update the cache

Click on the "Refresh Cache" link in the "Results" window (Figure 8-16)

8.6.3 Displaying Multiple Views in One for One Simulation Results Database

To see the results of two or more views in one display for one simulation results database

1. **Click on the name of the simulation results database of interest in the "Results" box (Figure 8-1) so that a check mark appears beside it**

Should the user forget the details of the simulation that produced the simulation results database, holding the cursor over the name of the simulation results database will cause an information box to appear, displaying the simulation identification number, the simulation name, the project author, the date when the simulation was performed, and the description of the simulation.

2. **Click on the "Same Grid" check box in the "Views" box**
3. **Click on the names of multiple views in the directory tree in the "Views" box and click on the "Graph" icon on the Results Explorer icon toolbar (Figure 8-2)**

   or

   Click on the names of multiple views in the directory tree in the "Views" box, right-click, and select "Display" from the menu that appears

   or

   Double-click on the names of multiple views in the directory tree in the "Views" box

A "Results" window (Figure 8-16) will open displaying a combined graph and table of the view using data from the selected simulation results database.

> **Note: Refreshing cached views**
>
> When the user pairs a view with a simulation results database for display, the CBM-CFS3 caches this link in local memory to allow quick access when it is selected for display again. However, if the user edits the view after displaying it and then tries to view it again with the same project database, the old cached view will be displayed, not the updated view. In this circumstance, to update the cache
>
> **Click on the "Refresh Cache" link in the "Results" window (Figure 8-16)**

8.6.4 Displaying Multiple Views in One for Multiple Simulation Results Databases

To display multiple views in one for multiple simulation results databases

1. **Click on the "Same Grid" check box in the "Results" box (Figure 8-1)**
2. **Click on the names of multiple simulation results databases in the "Results" box (Figure 8-1) so that a check mark appears beside each database of interest**

Should the user forget the details of the simulation that produced the simulation results database, holding the cursor over the name of the simulation results database will cause an information box to appear, displaying the simulation identification number, the simulation name, the project author, the date when the simulation was performed, and the description of the simulation.

3. **Click on the "Same Grid" check box in the "View" box**
4. **Click on the names of multiple views in the directory tree in the "Views" box and click on the "Graph" icon on the Results Explorer icon toolbar (Figure 8-2)**

   or

   Click on the names of multiple views in the directory tree in the "Views" box, right-click, and select "Display" from the menu that appears

   or

   Double-click on the names of multiple views in the directory tree in the "Views" box

A "Results" window (Figure 8-16) will open displaying a combined graph and table of the view using data from the selected simulation results databases.

> **Note: Refreshing cached views**
>
> When the user pairs a view with a simulation results database for display, the CBM-CFS3 caches this link in local memory to allow quick access when it is selected for display again. However, if the user edits the view after displaying it and then tries to view it again with the same project database, the old cached view will be displayed, not the updated view. In this circumstance, to update the cache
>
> **Click on the "Refresh Cache" link in the "Results" window (Figure 8-16)**

8.6.5 Exporting a Graph, Table, or Report

To export a graph, table, or report for a view displayed in the "Results" window (Figure 8-16)

1. **Click on the "Export" link**

The "Export" window (Figure 8-19) will pop up.

2. **Click on either the "Text File" radio button or the "Excel File" radio button, depending on the desired file format**

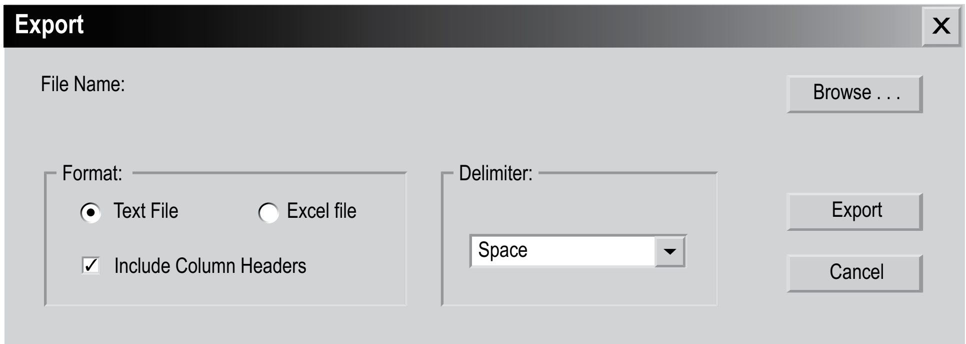


Figure 8-19. The "Export" window.

Note: Exporting Results to Microsoft Excel

At this time, the maximum number of results columns that can be exported to a Microsoft Excel file is 256. Should the user try to export more than 256 results columns to a Microsoft Excel file, an error message will pop up.

3. **If the "Text File" option has been selected, click on the "Include Column Headers" check box to either include (checked) or exclude (unchecked) column headers**
4. **If the "Text File" option has been selected, select a data delimiter option (space, colon, semicolon, other) from the drop list in the "Delimiter" box**
5. **Click on the "Browse" button**

A "Save As" window will pop up.

6. **Select a directory and enter a file name in the "File Name" box**
7. **Click on the "Save" button**
8. **Click on the "Export" button in the "Export" window to complete the exporting process**

   or

   Click on the "Cancel" button to cancel the process

8.6.6 Saving Views

The user has the option of saving all folders and views appearing in the directory tree in the "Views" box in the "Results Explorer" window (Figure 8-1) as a .dat file in any accessible drive directory. Should the user try to close the "Results Explorer" window after creating or editing views, a prompt to save the directory of views will appear. Users who create numerous groups of views can store them when not in use and reopen them when required. To save a directory tree and its folder and view contents to a storage file

1. **Make sure the "Same Grid" check box in the "Views" box is not checked**

2. **Right-click over a view or folder in the "Views" box and click on "Save" on the menu that appears**

   or

   Click on the "Save this set of views" icon on the Results Explorer icon toolbar (Figure 8-2)

A "Save As" window (Figure 8-6) will pop up.

3. **Click on the "Save in" box and point to the appropriate folder or drive where the data should be stored**
4. **Enter a name for the file in the "File name" box**
5. **Click on the "Save" button to proceed**

   or

   Click on the "Cancel" button to terminate the process

If the user clicks on the "Save" button, the "Success!" window will pop up, notifying the user that the views were successfully saved to the selected directory.

6. **Click on the "OK" button**

8.6.7 Opening Saved Views

To use the "Results Explorer" window (Figure 8-1) to open a directory tree containing views and folders previously saved and stored as a .dat file

1. **Make sure the "Same Grid" check box in the "Views" box is not checked**

Note: Opening saved views

Opening a directory tree containing views that were previously saved as a .dat file will cause the current directory tree and views displayed in the "Views" box to be replaced by those in the saved .dat file that is being opened.

2. **Right-click over a view or folder in the "Views" box and select "Open" from the menu that appears**

   or

   Click on the "Open another set of views" icon on the Results Explorer icon toolbar (Figure 8-2)

A "Confirm" window will pop up warning the user that the current views will be replaced by those in the .dat file that is being opened.

3. **Click on the "Yes" button to proceed**

   or

   Click on the "No" button to cancel the process

If the user clicks on the "Yes" button, the "Open" window (Figure 8-20) will pop up.

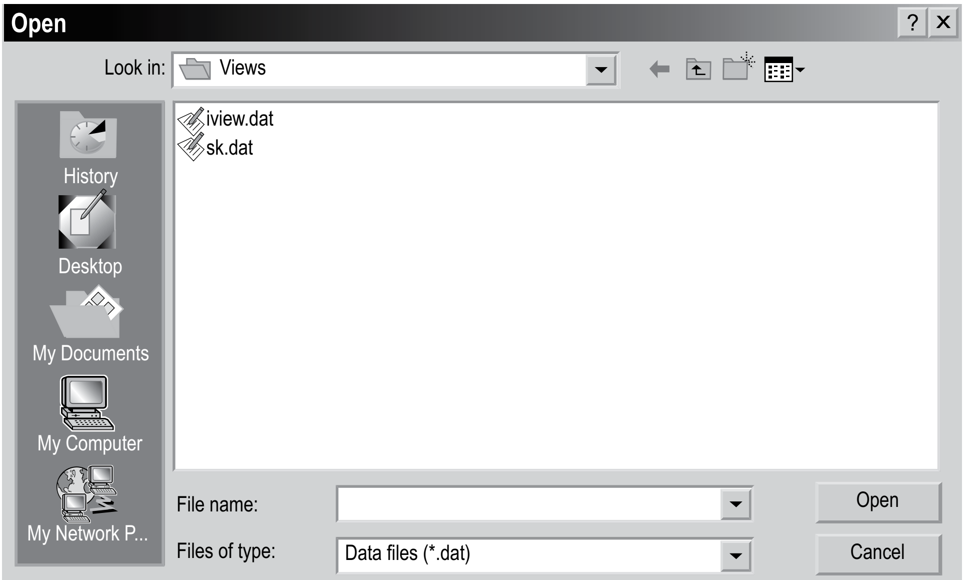


Figure 8-20. The "Open" window.

4. **Click on the "Look in" box and point to the directory containing the previously saved .dat file**

In the box containing the directory tree of folders and files

5. **Click on the name of the file to be opened**
6. **Click on the "Open" button to proceed**

   or

   Click on the "Cancel" button to terminate the process

If the user clicks on the "Open" button, the chosen directory tree, views, and folders will appear in the "Views" box in the "Results Explorer" window.

CHAPTER 9

MANAGING GRAPHS

This chapter introduces the user to the various options for managing graphic displays in the CBM-CFS3. These include options for editing, saving, loading, copying, and printing. Graphs in the Stand-Level Project Creator (Figure 3-54), Disturbance Events Editor (Figure 6-7), Growth Curve Editor (Figures 6-23 and 6-24), Inventory Editor (Figure 6-25), and Results Explorer (Figure 8-16) can be managed with these options.

9.1 Editing a Graph

The user can edit a number of graph display features including the title, data table, data points, graph properties, and axes.

9.1.1 Editing a Graph Title

To edit the main title or the title of one of the axes (if any) in a graph

1. **Right-click over the title**
2. **Click on "Edit Title" to change the wording of the title**

   or

   Click on "Text Color" to change the text color of the title

   or

   Click on "Font" to change the text fonts in the title

If "Edit Title" is selected, the user must

1. **Click in the title box and enter a new title**
2. **Click anywhere on the graph outside of the title box to exit the title box**

If the user clicks on "Text Color," a color palette will appear. To change text color

Click on a color for the text

If the user clicks on "Font," the "Font" window (Figure 9-1) will appear. In this window

Select the desired font, font style, size, effects, or script

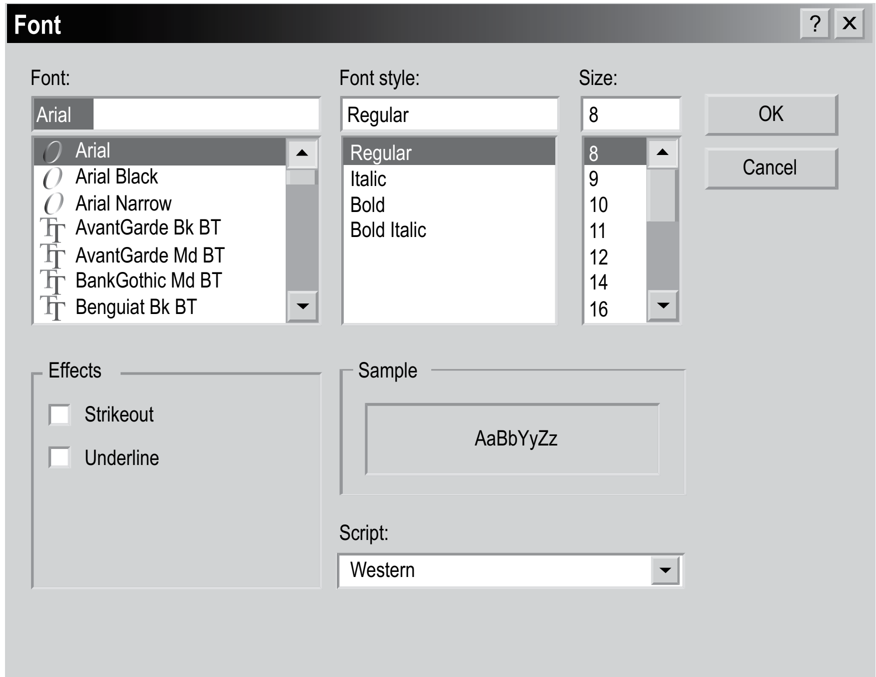


Figure 9-1. The "Font" window.

Once modifications are complete

Click on the "OK" button to save the changes

or

Click on the "Cancel" button to cancel the changes

9.1.2 Editing a Graph Data Table

To edit the data table

1. **Right-click over the data table**
2. **Select one of the location options (Left, Top, Right, Bottom) to relocate the table**

   or

   Select "Font" to change the font used in the table

If the user selects one of the location options, the data table will move to that position in the graph display. If the user selects "Font", the "Font" window (Figure 9-1) will pop up. In this window

Select the desired font, font style, size, effects or script

Once modifications are complete

Click on the "OK" button to save the changes

or

Click on the "Cancel" button to cancel the changes

9.1.3 Editing Graph Data Points

To edit the display of the data points

1. **Right-click over a data point in the graph**
2. **Select "Gallery" to change the graph type**

   or

   Select "Color" to change the color of the data points

   or

   Select "Point Labels" to add or remove data labels on the points

   or

   Select "Properties" to change the properties of the graph display

If "Gallery" is selected, the user must then select one of the graph type options that will be displayed. If the user selects "Color," a color palette will appear and the user must select a color for the data points. If the user selects "Properties," the "Properties" window (Figure 9-2) will pop up. In this window

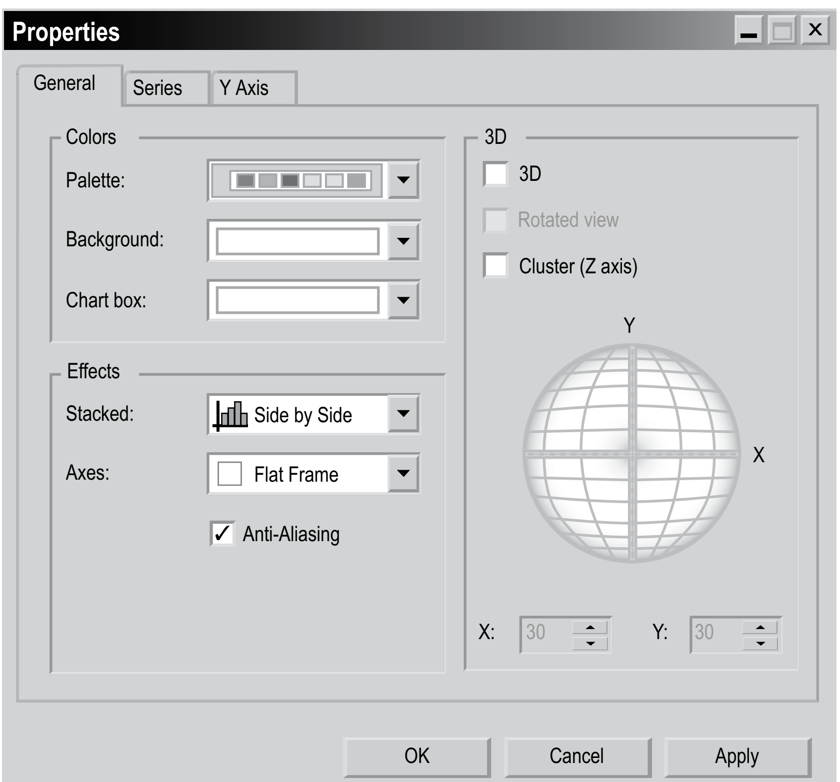


Figure 9-2. The "Properties" window with the "General" tab selected.

3. **Click on the "General" tab to modify colors, effects, and 3D presentation**

   or

   Click on the "Series" tab to modify the gallery, marker, fill, or border

   or

   Click on the "Y Axis" tab to modify the scale, labels, gridlines, or tickmarks
4. **Click on the "OK" button to save the changes**

   or

   Click on the "Cancel" button to cancel the changes

   or

   Click on the "Apply" button to apply the changes without closing the "Properties" window so that other changes can be made

9.1.4 Editing Graph Properties

The user has three options for accessing tools for editing graph properties: by displaying and using the Graph icon toolbar (Figure 9-3), which has icons for various graph tools; indirectly by right-clicking over the graph (not on a data point, axis, title box, or in the data table); or by displaying and using the Graph menu bar (Figure 9-4).

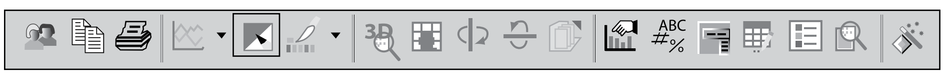


Figure 9-3. The Graph icon toolbar.

Figure 9-4. The Graph menu bar.

Editing with the Graph Icon Toolbar

The user can modify the physical appearance of a graph or table view using the icons in the Graph icon toolbar (Figure 9-3). To add or remove the toolbar of graph tool icons

Right-click over an open space (not on a data point, axis, title box, or in the data table) in the graph display area

Select "Toolbar" from the drop list that appears

When the Graph icon toolbar is displayed, the user can determine the tool that a particular icon represents by placing the cursor over the icon. An information box stating the tool represented by the icon will pop up.

The "Menu" icon  is used to display or hide the Graph menu bar (Figure 9-4). To use this icon

Click on the "Menu" icon

The "Gallery" icon  is used to select the type of graph displayed (line graph, histogram, pie chart, etc.). To use this tool

Click on the "Gallery" icon

Select a graph type from the image menu that appears

The "Anti-Aliasing" icon is used to smooth jagged distortions in curves and diagonal lines. To use this tool

Click on the "Anti-Aliasing" icon

The "Palette Selector" icon is used to select general color schemes to be applied to the entire graph. To use this tool

Click on the "Palette Selector" tool icon

Select a color palette from the image menu that appears

The "3D/2D" icon is used to display a graph in two or three dimensions. To use this tool

Click on the "3D/2D" icon

The "Rotated View" icon is used to rotate the graph along the x-axis or y-axis in a 3D display. To use this tool

Click on the "Rotated View" icon

Click on the "Rotate Around X Axis" icon ,

or

Click on the "Rotate Around Y Axis" icon

The "Clustered (Z-Axis)" icon is used to display z-axis data in the third dimension. To use this tool

Click on the "Clustered (Z-Axis)" icon

The "Axis Settings" icon is used to modify x-axis and y-axis display properties. To use this tool

Click on the "Axis Settings" icon

On the menu of options that appears

Select "Grid" (for gridlines) or "Interlaced" (for interlaced lines) for the y-axis

or

Select "Grid" (for gridlines) or "Vertical Labels" (to turn labels on their sides) or "Staggered" (to display each successive label higher or lower than the preceeding label) or "Show Labels" (to display or remove labels) for the x-axis

or

Select "Options"

If the user selects "Options," the "Properties" window (Figure 9-2) will pop up (this can also be accessed by clicking the "Properties" icon on the Graph icon toolbar). For details on options and functions of the "Properties" window, see section 9.1.3, "Editing Graph Data Points."

The "Point Labels" icon is used to add point labels to a graph. To use this tool

Click on the "Point Labels" icon

The "Data Grid" icon is used to add or remove the data table at the bottom of a displayed graph. To use this tool

Click on the "Data Grid" icon

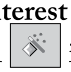
The "Legend Box" icon  is used to add or remove the legend displayed with a graph. To use this tool

Click on the "Legend Box" icon

The "Zoom" icon  is used to zoom in on a portion of the graph displayed. To use this tool

Click on the "Zoom" icon

Click and drag a box that will appear over the area of the graph to zoom in on the area of interest

The "Properties" icon  is used to modify graph properties. To do this

Click on the "Properties" icon

The "Properties" window (Figure 9-2) will pop up. For details on the options and functions of the "Properties" window, see section 9.1.3, "Editing Graph Data Points."

Indirect Editing

The user can make modifications similar to those available with the tool icons (described in the previous section) through other, indirect means. To use the indirect method

Right-click over an open space (not on a data point, axis, title box, or in the data table) in the graph display area

A drop list menu will appear. The drop list menu options are adding or removing the menu bar (Menu), adding or removing the toolbar (Toolbar), adding or removing the table displayed (Data Grid), adding or removing the legend (Legend Box), changing the graph type (Gallery), changing the graph color (Color), changing the graph title (Edit Title), adding or removing point labels (Point Labels), or changing the graph properties (Properties). The use of each of these tools is discussed in the preceding subsections of section 9.1, "Editing a Graph".

Editing Using the Menu Bar

Users who want to edit a graph displayed in the "Results" window (Figure 8-16) can use tool features available under the "View" and "Tools" options on the Graph menu bar (Figure 9-4) displayed at the top of a graph or table.

To use the tools available under "View" on the Graph menu bar

Click on "View" on the Graph menu bar

On the menu that appears

Select "3D/2D"

or

Select "Clustered (Z-Axis)"

or

Select "Properties"

All of these menu options and their functions are described in section 9.1.4, "Editing Graph Properties."

To use the tools available under "Tools" on the Graph menu bar

Click on "Tools" on the Graph menu bar

On the menu that appears

Select "Series Legend" to add or remove the graph legend

or

Select "Data Grid" to add or remove the data table portion of the graph display

or

Select "Toolbar" to add or remove the toolbar in the "Results" window (Figure 8-16)

or

Select "Menu" to add or remove the menu bar in the "Results" window (Figure 8-16)

9.1.5 Editing Graph Axes

To edit the axes of a graph

1. **Right-click over an axis**

On the drop list that appears

2. **Select "Text Color" to change the axis text color**

   or

   Select "Font" to change the text font on the axis

   or

   Select "Edit Title" to change the axis title

   or

   Select "Staggered" to stagger the axis display

   or

   Select "Vertical Labels" to make the graph labels display vertically or horizontally

   or

   Select "Grid" to add or remove grid lines in the graph

   or

   Select "Interlaced" to add or remove interlaced bars in the graph

   or

   Select "Properties" to change the graph display properties

Clicking on "Text Color" allows the user to select a text color. To proceed

Click on a color in the palette that appears

If the user clicks on "Font," the "Font" window (Figure 9-1) will pop up. Features and functions for this window are described in section 9.1.1, "Editing a Graph Title."

If the user clicks on "Edit Title" the title box will open for editing.

Enter a new axis title in the title box

Click outside the title box to save the changes

If the user clicks on "Properties," the "Properties" window (Figure 9-2) will pop up. In this window

Click on the "General" tab and modify colors, effects, and 3D

or

Click on the "Series" tab and modify the gallery, marker, fill, and border

or

Click on the "Y Axis" tab and modify the scale, labels, gridlines, or tickmarks

The user can then

Click on the "OK" button to save the changes

or

Click on the "Cancel" button to cancel the changes

or

Click on the "Apply" button to apply the changes without closing the "Properties" window so that other changes can be made

9.2 Saving a Graph

To save a graph the user can

1. **Click on the "Personalized Charts" icon on the Graph icon toolbar (Figure 9-3)**
2. **Click on "Save My Chart" on the menu that appears (currently disabled)**

Alternatively, the user can

1. **Click on "File" on the Graph menu bar (Figure 9-4)**
2. **Click on "Save Chart" on the menu that appears**

The "Save As" window (Figure 8-6) will pop up. In this window

3. **Click on the "Save in" box and point to the appropriate folder in which to save the graph**
4. **Enter a name for the graph, table, or report in the "File name" box**
5. **Click on the "Save" button to proceed**

   or

   Click on the "Cancel" button to terminate the process

9.3 Loading a Graph

To load a graph that was previously created and saved, the user can

1. **Click on the "Personalized Charts" icon on the Graph icon toolbar (Figure 9-3)**
2. **Click on "Load My Chart" on the menu that appears (currently disabled)**

Alternatively, the user can

1. **Click on "File" on the Graph menu bar (Figure 9-4)**
2. **Click on "Open Chart" on the menu that appears**

The "Open" window (Figure 8-20) will pop up. In this window

3. **Click on the "Look in" box and point to the appropriate folder in which the graph was saved**
4. **Click on the graph, table, or report name**
5. **Click on the "Open" button to proceed**

   or

   Click on the "Cancel" button to terminate the process

9.4 Copying a Graph to a Clipboard

Users have the option of copying a graph to a clipboard in various formats. To do this

1. **Click on the "Copy to Clipboard" icon**  **on the Graph icon toolbar (Figure 9-3)**
2. **Click on the desired file format on the menu that appears ("As a Bitmap," "As a Metafile," or "As Text (data only)")**

Alternatively, the user can

1. **Click on "Copy to Clipboard" on the Graph menu bar (Figure 9-4)**
2. **Click on the desired file format on the menu that appears ("As a Bitmap," "As a Metafile," or "As Text (data only)")**

9.5 Printing a Graph

To print a graph

1. **Click on the "Print" icon**  **on the Graph icon toolbar (Figure 9-3)**

The "Print" window (Figure 9-5) will pop up.

2. **Select the appropriate printer, print range, and number of copies**
3. **Click on the "OK" button to proceed**

   or

   Click on the "Cancel" button to cancel the print process

Alternatively, the user can

1. **Click on "File" on the Graph menu bar (Figure 9-4)**
2. **Click on "Print" on the menu that appears**

The "Print" window will pop up.

3. **Select the appropriate printer, print range, and number of copies**
4. **Click on the "OK" button to proceed**

   or

   Click on the "Cancel" button to cancel the print process

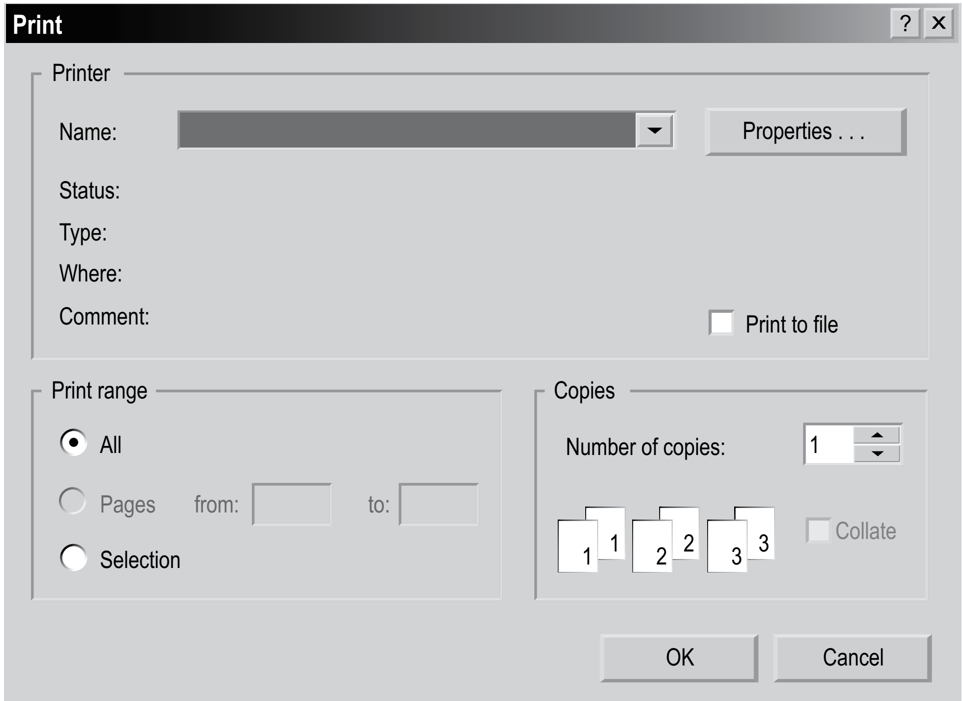


Figure 9-5. The "Print" window.

Tip: Page Setup and Access to Print Preview

The user can also access setup options for printing (Page Setup) and preview before printing (Print Preview) by clicking on "File" on the Graph menu bar (Figure 9-4).

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APPENDIX 1

Abbreviations

AG – Aboveground

BG – Belowground

CACTuS – Case Analysis Comparison Tool for users of the SFMM

CanFI – Canadian Forest Inventory

CBM-CFS2 – Carbon Budget Model of the Canadian Forest Sector (research version)

CBM-CFS3 – Carbon Budget Model of the Canadian Forest Sector (operational-scale version)

CFS – Canadian Forest Service

CFS-CAT – the carbon accounting team of Natural Resources Canada's Canadian Forest Service

DM – disturbance matrix

DOM – dead organic matter

HW – hardwood

NFCMARS – National Forest Carbon Monitoring, Accounting and Reporting System

NFIS – National Forest Information System

SFMM – Strategic Forest Management Model

SPU – spatial unit

SQL – structured query language

SW – softwood

UNFCCC – United Nations Framework Convention on Climate Change

APPENDIX 2

Merchantable softwood and hardwood proportions (by province and territory) used in the CBM-CFS3

Appendix 2. Merchantable softwood and hardwood proportions (by province and territory) used in the CBM-CFS3

	CanFI[a]			Softwood				Hardwood			
Province or territory[b]	Stump height (cm)	Top Diameter (cm)	Minimum DBH[c] (cm)	% tops	% stumps	% merchantable stem	Average DBH at harvest (cm)	% tops	% stumps	% merchantable stem	Average DBH at harvest (cm)
Newfoundland and Labrador	15	7.6	9.0	2.851	2.807	94.342	15	4.453	2.875	92.673	20
Nova Scotia	15	7.0	9.0	2.132	2.807	95.061	15	3.477	2.875	93.649	20
Prince Edward Island	15	8.0	9.0	3.418	2.807	93.776	15	5.196	2.875	91.929	20
New Brunswick	15	8.0	9.1	3.418	2.807	93.776	15	5.196	2.875	91.929	20
Quebec	15	9.0	9.0	5.183	2.807	92.011	15	7.406	2.875	89.719	20
Ontario	30	7.0	9.0	2.132	5.39	92.478	30	3.477	5.52	91.003	20
Manitoba	30	7.6	9.1	2.851	5.39	91.759	30	4.453	5.52	90.027	20
Saskatchewan	30	7.0	7.0	2.132	5.39	92.478	30	3.477	5.52	91.003	20
Alberta	30	7.0	13.0	2.132	5.39	92.478	30	3.477	5.52	91.003	20
British Columbia (coast)	30	10.0	17.5	1.794	5.39	92.816	30	3.002	5.52	91.478	30
British Columbia (interior)	30	10.0	12.5	1.794	5.39	92.816	30	3.002	5.52	91.478	30
Yukon Territory	30	10.0	15.0	7.521	5.39	87.089	30	10.169	5.52	84.311	20
Northwest Territories	30	10.2	10.2	8.067	5.39	86.543	30	10.169	5.52	83.687	20

[a]CanFI = Canadian Forest Inventory.
[b]Values for Nunavut have not been included because a forest inventory for this territory is presently not available.
[c]DBH = diameter at breast height.

APPENDIX 3

Canadian forest inventory (CanFI) codes for tree species

Appendix 3. Canadian Forest Inventory (CanFI) codes for tree species

Common name	Scientific name	CanFI code
Spruce	*Picea* spp.	100
Black spruce	*Picea mariana* (Mill.) BSP	101
Red spruce	*Picea rubens* Sarg.	102
Norway spruce	*Picea abies* (L.) Karst.	103
Engelmann spruce	*Picea engelmannii* Parry ex Engelm.	104
White spruce	*Picea glauca* (Moench) Voss	105
Sitka spruce	*Picea sitchensis* (Bong.) Carrière	106
Black and red spruce	*Picea mariana* (Mill.) BSP and *Picea rubens* Sarg.	107
Red and white spruce	*Picea rubens* Sarg. and *Picea glauca* (Moench) Voss	108
Other spruce	*Picea* spp.	109
Pine	*Pinus* spp.	200
Western white pine	*Pinus monticola* Dougl. ex D. Don	201
Eastern white pine	*Pinus strobus* L.	202
Jack pine	*Pinus banksiana* Lamb.	203
Lodgepole pine	*Pinus contorta* Dougl. ex Loud. var. *latifolia* Engelm.	204
Shore pine	*Pinus contorta* Dougl. ex Loud. var. *contorta*	205
Whitebark pine	*Pinus albicaulis* Engelm.	206
Austrian pine	*Pinus nigra* Arnold	207
Ponderosa pine	*Pinus ponderosa* Dougl. ex P. & C. Laws.	208
Red pine	*Pinus resinosa* Ait.	209
Pitch pine	*Pinus rigida* Mill.	210
Scots pine	*Pinus sylvestris* L.	211
Mugho pine	*Pinus mugo* Turra	212
Limber pine	*Pinus flexilis* James	213
Jack, lodgepole, and shore pine	*Pinus banksiana* Lamb., *Pinus contorta* Dougl. ex Loud. var. *latifolia* Engelm., and *Pinus contorta* Dougl. ex Loud. var. *contorta*	214
Other pine	*Pinus* spp.	215
Fir	*Abies* spp.	300
Amabilis fir	*Abies amabilis* (Dougl. ex Loud.) Dougl. ex J. Forbes	301
Balsam fir	*Abies balsamea* (L.) Mill.	302
Grand fir	*Abies grandis* (Dougl. ex D. Don) Lindl.	303
Subalpine fir (or alpine fir)	*Abies lasiocarpa* (Hook.) Nutt.	304
Balsam and subalpine fir	*Abies balsamea* (L.) Mill. and *Abies lasiocarpa* (Hook.) Nutt.	305
Alpine, amabilis and grand fir	*Abies lasiocarpa*, *Abies amabilis,* and *Abies grandis*	306
Spruce and balsam fir	*Picea* spp. and *Abies balsamea* (L.) Mill.	320
Balsam fir and spruce	*Abies balsamea* (L.) Mill. and *Picea* spp.	321
Hemlock	*Tsuga* spp.	400
Eastern hemlock	*Tsuga canadensis* (L.) Carrière	401
Western hemlock	*Tsuga heterophylla* (Raf.) Sarg.	402
Mountain hemlock	*Tsuga mertensiana* (Bong.) Carrière	403
Western and mountain hemlock	*Tsuga heterophylla* (Raf.) Sarg. and *Tsuga mertensiana* (Bong.) Carrière	404

Appendix 3. Continued

Common name	Scientific name	CanFI code
Douglas-fir and Rocky Mountain Douglas-fir	*Pseudotsuga menziesii* (Mirb.) Franco var. *menziesii* and *Pseudotsuga menziesii* var. *glauca* (Beissn.) Franco	500
Tamarack/larch	*Larix laricina* (Du Roi) K. Koch	600
European larch	*Larix decidua* Mill.	601
Tamarack	*Larix laricina* (Du Roi) K. Koch	602
Western larch	*Larix occidentalis* Nutt.	603
Subalpine larch	*Larix lyallii* Parl.	604
Japanese larch	*Larix kaempferi* (Lamb.) Carrière	605
Cedar	*Thuja* spp.	700
Eastern white-cedar	*Thuja occidentalis* L.	701
Western redcedar	*Thuja plicata* Donn ex D. Don	702
Cedar and other conifers	*Thuja* spp. (and other conifers)	703
Juniper	*Juniperus* spp.	800
Eastern redcedar	*Juniperus virginiana* L.	801
Rocky Mountain juniper	*Juniperus scopulorum* Sarg.	802
Yew	*Taxus* spp.	900
Western Yew	*Taxus brevifolia* Nutt.	901
Cypress	*Chamaecyparis* spp.	1000
Yellow-cypress	*Chamaecyparis nootkatensis* (D. Don) Spach	1001
Other softwoods		1100
Tamarack and cedar	*Larix* spp. and *Thuja* spp.	1110
Unspecified softwood species		1150
Poplar/aspen	*Populus* spp.	1200
Trembling aspen	*Populus tremuloides* Michx.	1201
European white poplar	*Populus alba* L.	1202
Balsam poplar	*Populus balsamifera* L.	1203
Black cottonwood	*Populus trichocarpa* Torr. & A. Gray	1204
Eastern cottonwood	*Populus deltoides* Bartr. ex. Marsh. ssp. *deltoides*	1205
Largetooth aspen	*Populus grandidentata* Michx.	1206
Carolina poplar	*Populus* x *canadensis* Moench cv. Eugenei	1207
Lombardy poplar	*Populus nigra* L. cv. Italica	1208
Hybrid poplar	*Populus* spp.	1209
Other poplar	*Populus* spp.	1210
Birch	*Betula* spp.	1300
Yellow birch	*Betula alleghaniensis* Britt.	1301
Cherry birch	*Betula lenta* L.	1302
White birch	*Betula papyrifera* Marsh.	1303
Gray birch	*Betula populifolia* Marsh.	1304
Alaska paper birch	*Betula neoalaskana* Sarg.	1305
Mountain paper birch	*Betula cordifolia* Regel.	1306
Other birch	*Betula* spp.	1307
Maple	*Acer* spp.	1400
Sugar maple	*Acer saccharum* Marsh.	1401

Appendix 3. Concluded

Common name	Scientific name	CanFI code
Black maple	*Acer nigrum* Michx.	1402
Bigleaf maple	*Acer macrophyllum* Pursh	1403
Manitoba maple	*Acer negundo* L.	1404
Red maple	*Acer rubrum* L.	1405
Silver maple	*Acer saccharinum* L.	1406
Norway maple	*Acer platanoides* L.	1407
Sugar and black maple	*Acer saccharum* Marsh. and *Acer nigrum* Michx.	1408
Other maple	*Acer* spp.	1409
Striped maple	*Acer pensylvanicum* L.	1410
Mountain maple	*Acer spicatum* Lamb.	1411
Other hardwoods		1500
Unspecified hardwood species		1550
Hickory	*Carya* spp.	1600
Bitternut hickory	*Carya cordiformis* (Wangenh.) K. Koch	1601
Red hickory	*Carya glabra* (Mill.) Sweet var. *odorata* (Marsh.) Little	1602
Shagbark hickory	*Carya ovata* (Mill.) K. Koch	1603
Shellbark hickory	*Carya laciniosa* Michx. f.	1604
Walnut	*Juglans* spp.	1700
Butternut	*Juglans cinerea* L.	1701
Black walnut	*Juglans nigra* L.	1702
Alder	*Alnus* spp.	1800
Sitka alder	*Alnus viridis* ssp. *sinuata* (Regel) Á. Löve & D. Löve	1801
Red alder	*Alnus rubra* Bong.	1802
Ironwood	*Ostrya virginiana* (Mill.) K. Koch	1900
Blue-beech	*Carpinus caroliniana* Walt.	1950
Beech	*Fagus grandifolia*	2000
Oak	*Quercus* spp.	2100
White oak	*Quercus alba* L.	2101
Swamp white oak	*Quercus bicolor* Willd.	2102
Garry oak	*Quercus garryana* Dougl.	2103
Bur oak	*Quercus macrocarpa* Michx.	2104
Pin oak	*Quercus palustris* Muenchh.	2105
Chinquapin oak	*Quercus muehlenbergii* Engelm.	2106
Chestnut oak	*Quercus montana* Willd.	2107
Red oak	*Quercus rubra* L.	2108
Black oak	*Quercus velutina* Lam.	2109
Northern pin oak	*Quercus ellipsoidalis* E.J. Hill	2110
Shumard oak	*Quercus shumardii* Buckl.	2111

APPENDIX 4

Glossary of terms

Administrative boundary – A Canadian provincial or territorial boundary.

Afforestation – The conversion of land that has not been forested for a certain period of time (50 years in the Kyoto Protocol) to forested land through human activities such as planting and seeding.

Archive Index Database – A CBM-CFS3 database that tracks the relations between model input and the simulation results databases (i.e., projects and their results) that the user has created.

Assumption composers – CBM-CFS3 tools that allow the user to view, edit, copy, delete, or create assumptions for simulations, stand initialization, model runs, disturbance and management activities, growth and yield, climate, biomass turnover, DOM turnover, disturbance matrices, or volume-to-biomass parameters.

Biomass – The mass of living forest vegetation represented in the CBM-CFS3. Forest vegetation includes trees of merchantable size, and below merchantable size, broken down by components: merchantable stemwood, foliage, coarse and fine roots, and other (treetops, stumps, and trees of submerchantable size).

Biomass-to-carbon parameters – Editable parameters in the CBM-CFS3 for the conversion of biomass to carbon, linked to a Volume-to-Biomass Assumption in the Volume-to-Biomass Assumption Composer.

Biomass Turnover Assumption – A CBM-CFS3 model assumption containing specific biomass turnover parameters for softwood and hardwood species that can be linked to one or more Stand Initialization or CBM Run Assumptions.

Biomass turnover parameters – Editable parameters in the CBM-CFS3 for biomass turnover by tree species, linked to a Biomass Turnover Assumption in the Biomass Turnover Assumption Composer.

CACTuS – The Case Analysis Comparison Tool for users of the SFMM, which allows users to import SFMM export files and summarize, graph, and complete a case analysis that is currently unavailable in SFMM and which allows the user to create a database import file for the CBM-CFS3 SFMM Import Tool.

CanFI 2001 – The 2001 version of the Canadian Forest Inventory.

Carbon cycle – The term used to describe the flow of carbon through a system. The forest carbon cycle refers to the flow of carbon through a forest ecosystem. The global carbon cycle refers to the flow of carbon through the earth's atmosphere, oceans, forests, and other terrestrial ecosystems.

Carbon dioxide (CO_2) – A naturally occurring gas that is also a by-product of burning fossil fuels, burning biomass, changes in land use, and other industrial processes. It is the principal greenhouse gas emitted as a result of human activities.

Carbon flux – The transfer of carbon from one carbon pool to another.

Carbon pool – A system component with the capacity to accumulate or release carbon. Examples of carbon pools are forest biomass, wood products, soils, and the atmosphere.

Carbon sequestration – The process of removing carbon from the atmosphere.

Carbon sink – A carbon pool that is increasing in size. A carbon pool can be a sink for atmospheric carbon if, during a given time interval, more carbon is flowing into it than out of it.

Carbon source – A carbon pool that is decreasing in size. A carbon pool can be a source for atmospheric carbon if, during a given time interval, more carbon is flowing out of it than into it.

Carbon stock – The absolute quantity of carbon held within a pool at a specified time.

CBM-CFS2 – The research version of the Carbon Budget Model of the Canadian Forest Sector.

CBM-CFS3 – The operational-scale version of the Carbon Budget Model of the Canadian Forest Sector.

CBM Run Assumption – A CBM-CFS3 model assumption that combines Biomass Turnover, Climate, DOM Turnover, Run Disturbance Matrix, Disturbance and Management, Run Growth, and Volume-to-Biomass Assumptions to define modeled forest ecosystem carbon dynamics that generate carbon pools.

CBM Standard Import Tool – A CBM-CFS3 data import tool used to import seven text or Microsoft Excel data files with specialized formats as outlined in the CBM-CFS3 User's Guide.

Climate – The prevailing environmental conditions resulting from the interactions of wind, water, and temperature.

Climate change – A statistically significant variation in either the average state of the climate or its variability, persisting for an extended period of time (decades or longer).

Climate Editor – A CBM-CFS3 data editor that allows the user to view, edit, delete, or add climate data for a project.

Connected project – A CBM-CFS3 project that has been connected to the Archive Index Database.

Data editors – CBM-CFS3 tools that allow the user to view, edit, or create data for climate, disturbance and management activities, disturbance matrices, growth and yield, inventory, and transition rules.

Dead organic matter (DOM) – A generic term for all dead organic compounds in the ecosystem, including standing dead trees, downed trees, coarse and fine woody debris, litter, soil carbon, and peat.

Default Input Data Editor – A CBM-CFS3 data editor that allows the user to view, edit, copy, or add default data about species or disturbance types to a project.

Deforestation – The conversion of forested land to nonforested land as a direct result of human activities.

Disconnected project – A CBM-CFS3 project not created with and thus not connected to the Archive Index Database of a particular running copy of the CBM-CFS3.

Disturbance and Management Assumption – A CBM-CFS3 model assumption containing one or more Disturbance Group Assumptions that can be linked to one or more CBM Run Assumptions.

Disturbance event – A managed or natural event resulting in the alteration of an existing forest type, which establishes a pattern for the future development of the forest type.

Disturbance Events Editor – A CBM-CFS3 data editor that allows the user to view, edit, delete, or add data for a single disturbance event in a project.

Disturbance Group Assumption – An assumption component of a Disturbance and Management Assumption linking a Transition Rule Assumption, spatial unit, and disturbance type.

Disturbance matrix – A matrix defining the proportion of each biomass and DOM pool that is transferred to other pools, the atmosphere, and the forest product sector at the time of a disturbance, according to disturbance type and terrestrial ecozone.

Disturbance Matrix Editor – A CBM-CFS3 data editor that allows the user to view, edit, delete, or add data to a specific disturbance matrix for a project.

Disturbance Rules Generator – Part of the Disturbance Events Editor that allows the user to add multiple disturbance events of the same type to a sequence of time steps.

DOM Assumption – A CBM-CFS3 model assumption containing specific DOM turnover parameters and DOM parameters that can be linked to one or more Stand Initialization or CBM Run Assumptions.

DOM parameters – Editable parameters for DOM by soil pool, linked to a DOM Assumption in the DOM Assumption Composer.

DOM turnover parameters – Editable parameters for DOM turnover by ecological boundary, linked to a DOM Assumption in the DOM Assumption Composer.

Ecological boundary – A Canadian terrestrial ecozone.

Forest – A vegetation type dominated by trees. Many definitions of the term "forest" are used throughout the world, but for the purposes of the Kyoto Protocol, a nation must define a forest as any land area covering at least 0.05–1.0 ha that has at least 10–30% tree crown cover and trees with the potential to reach 2–5 m height at maturity.

Forest stand – A community of trees, including aboveground and belowground biomass and soils, uniform in species composition, age, and management type.

Forest Inventory Definitions – A CBM-CFS3 tool that allows the user to view and edit imported data for their forest types, classifiers, disturbance types, spatial units and boundaries, and age classes.

Geographic information system – A computer-based system that allows the user to input, store, retrieve, manipulate, analyze, and output georeferenced data.

Greenhouse gases – Those gaseous constituents, both natural and anthropogenic, of the earth's atmosphere that absorb infrared radiation emitted from the earth's surface, the atmosphere, and clouds. By absorbing infrared radiation, these gases trap energy in the earth's atmosphere and cause the greenhouse effect, the trapping of heat in the lower atmosphere, and influence the global climate. Water vapor (H_2O), carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) are the primary greenhouse gases in the earth's atmosphere.

Growth Curve Editor – A CBM-CFS3 data editor that allows the user to view, edit, delete, or create growth and yield data for a project.

Indicator – An ecological or socioeconomic criterion related to forests and forest management planning that can be identified, measured, and managed.

Individual Disturbance Events Editor – Part of the Disturbance Events Editor, which allows the user to view, edit, delete, or add data for a single disturbance event in a project.

Input Database – A CBM-CFS3 database where imported data are stored.

Invalid project – A CBM-CFS3 project that has become disconnected from the Archive Index Database because of an error in the project file.

Inventory Definition Editor – A CBM-CFS3 data editor that allows the user to view, edit, delete, or create age class, species type, classifier, disturbance type, forest type, spatial unit, and boundary data for imported project data.

Inventory Editor – A CBM-CFS3 data editor that allows the user to view, edit, delete, or create inventory data for a project.

Kyoto Protocol – The Kyoto Protocol to the United Nations Framework Convention on Climate Change. Contains legally binding commitments, whereby countries listed in Annex B of the Protocol, including Canada, have agreed to reduce their anthropogenic greenhouse gas emissions. Canada agreed to reduce its greenhouse gas emissions to 6% below 1990 levels.

Land cover – The observed physical and biological cover of the land as vegetation or man-made features.

Land-use change – A change in the use or management of land by humans, which may lead to a change in land cover.

Mitigation – A human intervention to reduce the sources or enhance the sinks of greenhouse gases.

Postdisturbance Forest Type – The forest type created as a result of a specific disturbance type disturbing a Target Forest Type, as defined in a transition rule.

Project Explorer – A CBM-CFS3 window displaying and allowing quick access to the Assumption Composer Tools, the user's assumptions, Forest Inventory Definitions, and the user's raw inventory.

Project Manager – A CBM-CFS3 tool used to create, open, copy, delete, validate, locate, connect, or disconnect projects.

Reforestation – The conversion of nonforested land to forested land through human activities, on land that was previously forested but was converted to nonforested land at some point.

Results Explorer – A CBM-CFS3 tool used to view and export results for one or more processed simulation assumptions attached to a project.

Run Climate Assumption – A CBM-CFS3 model assumption containing an SPU Group Climate Assumption linked to specific climate data, which can be linked to one or more Stand Initialization or CBM Run Assumptions.

Run Disturbance Matrix Assumption – A CBM-CFS3 model assumption containing one or more SPU Group Disturbance Matrix Assumptions, each linked to a specific disturbance matrix, which can be linked to one or more Stand Initialization or CBM Run Assumptions.

Run Growth Assumption – A CBM-CFS3 model assumption containing an SPU Group Growth Assumption linked to one or more growth curves, which can be linked to one or more Stand Initialization or CBM Run Assumptions.

SFMM Import Tool – A CBM-CFS3 data import tool used to import an SFMM input file and CACTuS database file for an Ontario forest management unit.

Simulation Assumption – A CBM-CFS3 model assumption that can be run in the Simulation Scheduler, which combines a Stand Initialization Assumption and a CBM Run Assumption to define modeled forest ecosystem carbon dynamics, which generate carbon pools.

Simulation Explorer – A CBM-CFS3 window displaying and allowing quick access to the Simulation Assumption Composer, the user's simulation assumptions, the Stand Initialization Assumption Composer, the user's stand initialization assumptions, the Run Assumption Composer, and the user's run assumptions.

Simulation Results Database – A CBM-CFS3 database named after a processed simulation assumption, where results are stored.

Simulation Scheduler – A CBM-CFS3 tool used to select and run one or more simulation assumptions.

Soil carbon – Carbon in soil, including various forms of organic and inorganic soil carbon and charcoal but excluding soil biomass, such as roots and living organisms.

Spatial unit – A forest management area defined by an administrative and an ecological boundary.

SPU Group – A spatial unit with an applied administrative and ecological boundary defined by the user.

SPU Group Climate Assumption – A CBM-CFS3 model assumption linked to specific climate data, which can be linked to one or more Run Climate Assumptions in the Climate Assumption Composer.

SPU Group Disturbance Matrix Assumption – A component assumption of a Run Disturbance Matrix Assumption in the Disturbance Matrix Assumption Composer, which links a specific disturbance matrix, SPU group, and disturbance type.

SPU Group Growth Assumption – A component assumption of a Run Growth Assumption linking an SPU group and growth and yield curves.

Stand Initialization Assumption – A CBM-CFS3 model assumption that combines Biomass Turnover, Climate, DOM Turnover, Run Disturbance Matrix, Run Growth, and Volume-to-Biomass Assumptions to define how the model should generate initial soil carbon pools.

Stand-Level Project Creator – A CBM-CFS3 project creation tool used to create a project with one or more stands from manual user input.

Strategic Forest Management Model (SFMM) – An interactive forest modeling system developed by the Ontario Ministry of Natural Resources and used for forest management planning in the province of Ontario.

Target Forest Type – The initial forest type as defined in a transition rule or disturbance event.

Transition age range – The age classes between and including a beginning and ending age class in which a forest type is eligible to be affected by a specific disturbance type.

Transition rule – A rule defining what the resulting forest type(s), reset age class, regeneration delay, management type, and proportion will be for a specific forest type following a specific disturbance event.

Transition Rule Assumption – An assumption component of a Disturbance Group Assumption linking a transition rule to a spatial unit, disturbance type, and forest type.

Transition Rules Editor – A CBM-CFS3 data editor that allows the user to view, edit, delete, or create transition rules for a particular combination of disturbance event and forest type.

Template – Created by a CBM-CFS3 user during import of data with an import tool, it stores predefined rules about importing, parsing, and converting the user's data, and can be used again to import more data into the same project.

View Editor – A CBM-CFS3 tool used for creating and editing results views in the Results Explorer.

Volume-to-Biomass Assumption – A CBM-CFS3 model assumption containing specific volume-to-biomass parameters and biomass-to-carbon parameters that can be linked to one or more Stand Initialization or CBM Run Assumptions.

Volume-to-biomass parameters – Editable parameters in the CBM-CFS3 for the conversion of volume to biomass by spatial unit and soil pool, linked to a Volume-to-Biomass Assumption in the Volume-to-Biomass Assumption Composer.

Woodstock Import Tool – A CBM-CFS3 data import tool used to import six tables (originating from use of the CBM Export feature in the Spatial Woodstock program) from a Microsoft Access database file.