

Understanding a LANDFIRE Model in ST-Sim

Background

This tutorial is designed to provide the information necessary to understand a LANDFIRE models in ST-Sim. It is intended as an overview for users who are new to state-and-transition modeling or new to the ST-Sim software. Other LANDFIRE tutorials and the [Getting Started Tutorial](#) found on the [ST-Sim Wiki](#) provide additional information and can be used to supplement this overview.

Open ST-Sim

1. From the Windows **Start** menu, Select **SynchroSim**

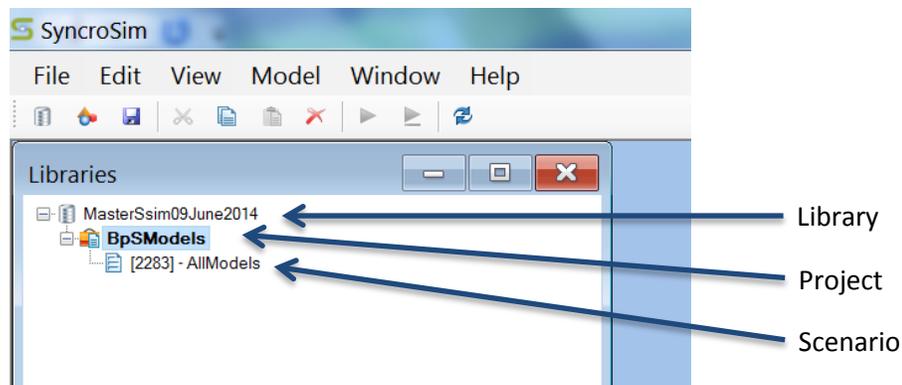
Note: ST-Sim is a module that runs within the SynchroSim modeling framework.

Open the LANDFIRE .sim library

1. From the **File** menu select **Open Library**
2. Navigate to where you saved the LANDFIRE library, select it and click **Open**

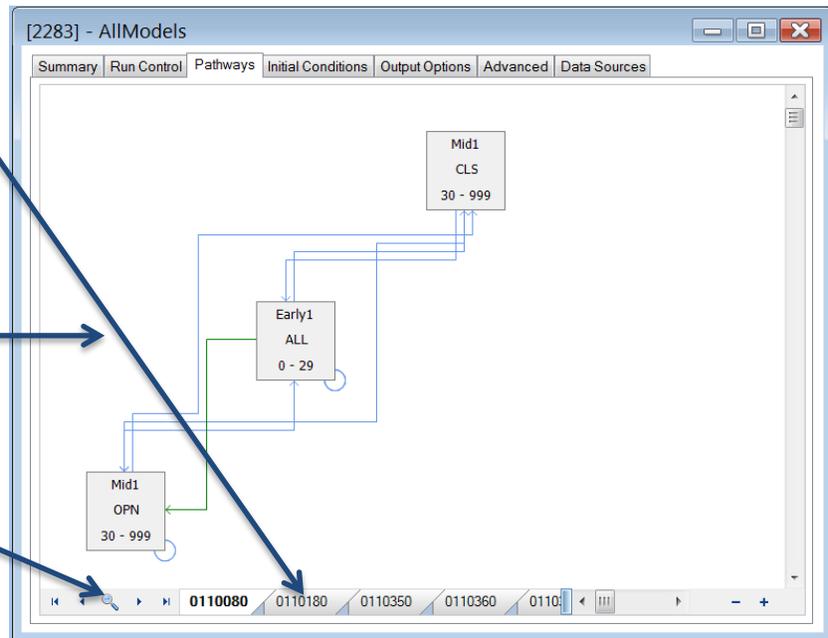
Open an individual BpS model

1. Click the plus sign to the left of the Library to expand the BpSModels Project
1. Click the plus sign to the left of the Project to expand the AllModels Scenario
2. Double click **AllModels** to open the Scenario Editor
3. Open the **Pathways** tab



Understanding the Pathways Tab

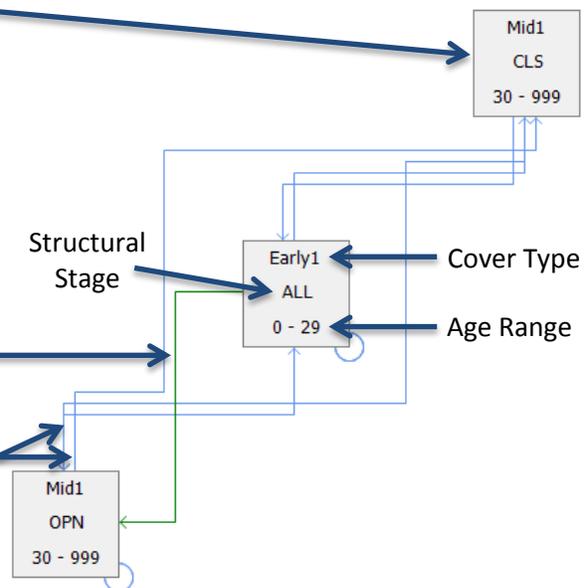
- A separate tab for each BpS (called a Stratum in ST-Sim) is found at the bottom of the Pathways screen.
- When you select a BpS its **box-and-arrow diagram** is displayed.
- Use the arrows to scroll between BpS or click on the **Select Vegetation Type** tool to choose a BpS from a complete list of LANDFIRE models.



Note: The tutorial **How to find a BpS** explains the use of the Select Vegetation Type tool. For help understanding the BpS codes, read the tutorial **Deciphering the BpS Code**.

Understanding the box-and-arrow diagram

- **Boxes** represent the classes (also called seral stages or s-classes). In LANDFIRE models, a class or box is used to describe a state of maturity. It is described by its **cover** (early, mid or late), **structure** (open, closed or all) and **age** (in years).
- **Arrows** represent transitions between classes. **Deterministic transitions** (green arrows) are typically used to represent growth or succession pathways. **Probabilistic transitions** (blue arrows) are typically used to represent disturbance pathways.



Understanding the Class Properties

- Double click a class (box) in the box-and-arrow diagram to view its properties.
- **Deterministic Transitions** are used to represent growth pathways. A class begins when its minimum age (**AgeMin**) is reached. A transition to a new class (**ToClass**) occurs when the class maximum age (**AgeMax**) is reached. A class can have only one deterministic transition.
- **Probabilistic Transitions** are used to represent disturbance pathways. All probabilistic transitions are defined by the starting class (**From Class**), the destination class (**ToClass**), the **Transition Type** and the Probability (**Prob**). A class can have many deterministic transitions.

[2283] - AllModels - Early1:ALL					
Deterministic Transitions					
From Class	To Class	Age Min	Age Max	Location	
Early1:ALL	Mid1:OPN	0	29	B2	

Probabilistic Transitions						
From Class	To Class	Transition Type	Prob	Age Shift	TST Min	
Early1:ALL	Early1:ALL	MixedFire	0.0800	0	0	
Early1:ALL	Early1:ALL	ReplacementFire	0.0050	-29	0	
Early1:ALL	Early1:ALL	SurfaceFire	0.0200	0	0	
Early1:ALL	Mid1:CLS	AltSuccession	1.0000	0	28	

Note: One divided by the transition probability equals the transition return interval.

Note: the screen capture above may be slightly different than what you see in ST-Sim. There are typically additional fields in the Probabilistic Transitions table (e.g. Proportion, Age Min, Age Max, etc.), but because these fields are not used in LANDIFIRE models, they are not shown here.

- LANDFIRE models may also use the **AgeShift** and **TST Min** functions.
 - The **AgeShift** function specifies the change in age after a transition occurs. For LANDFIRE AgeShift is only used in the initial class (usually Early1) for disturbances that reset the class age to 0. The AgeShift value is the inverse of the maximum class age (AgeMax). As used here AgeShift will reset the class age to age 0 if replacement fire occurs.
 - The Time-Since-Transition (TST) function makes a transition contingent on the time since some other transition has occurred. As used here **TST Min** indicates that the AltSuccession pathway will occur if at least 28 years have passed since the last fire. In other words, without fire this class will transition to a closed pathway (Mid1:CLS) rather than the open class (Mid1:OPN) specified by the deterministic transition. For LANDFIRE models, time-since-transition:
 - Can only be used with alternative succession (AltSuccession);

- Is always dependent on fire disturbances (Surface, Mixed and Replacement); and
- Always has a probability of 1.

Note: There are additional settings for TST that must be set before a model is run. The tutorial **How to Run a LANDFIRE Model in ST-Sim** explains these settings.

Linking an ST-Sim Model with its Description

- Every LANDFIRE BpS has a description document and an ST-Sim model.
- The description provides additional information about the geographic range, species composition, disturbance regime and successional dynamics of the BpS.
- The Succession Class section of the description links most closely with the ST-Sim model. This section provides information about each class in the model such as class cover and height ranges, indicator species and transitions.
- The tutorial **How to link the BpS model and description** demonstrates how to connect the two model components.

Note: To link models with spatial data, use the tutorial **How to link the BpS model with the spatial data**.