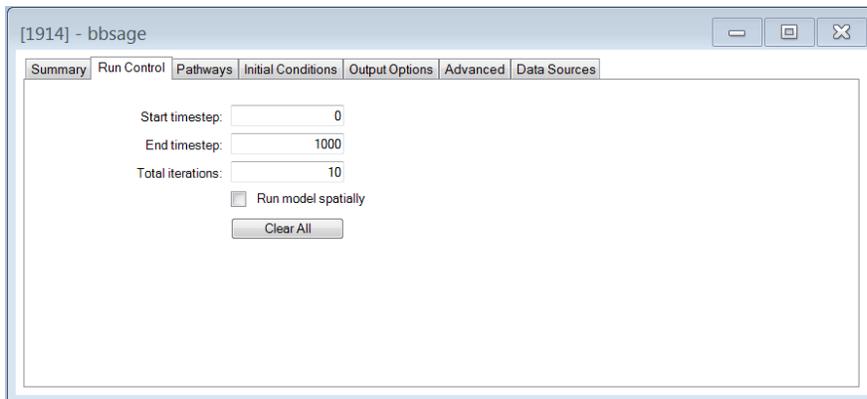# How to run a LANDFIRE model in ST-Sim

Background

To ensure consistency across the LANDFIRE model set, the Program uses a standard set of simulation settings and output options. These settings are frequently changed as models are developed and tested, but to obtain the final LANDFIRE model results, the following settings are recommended.

Run a LANDFIRE model

1. Attribute the **Run Control**, the **Initial Conditions**, the **Output Options** and the **Advanced** tabs as shown in the *Standard LANDFIRE Settings* section below.
2. Click the **Save** button
3. Right click the project you want to run and select **Set as Active Project**
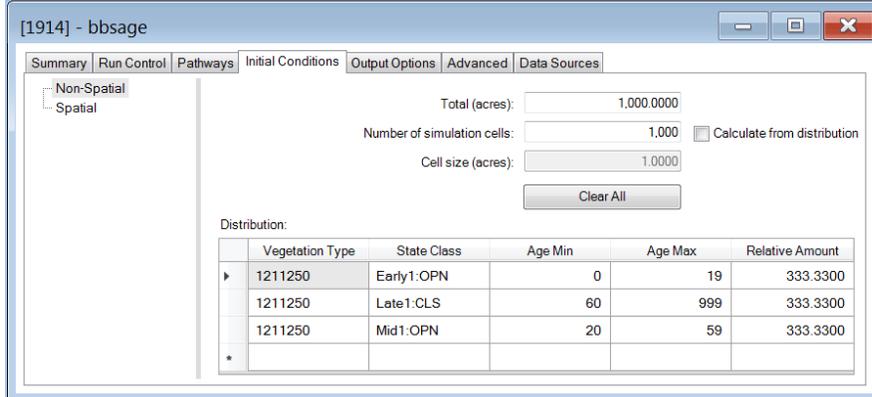4. Right click on the scenario you want to run and select **Run**

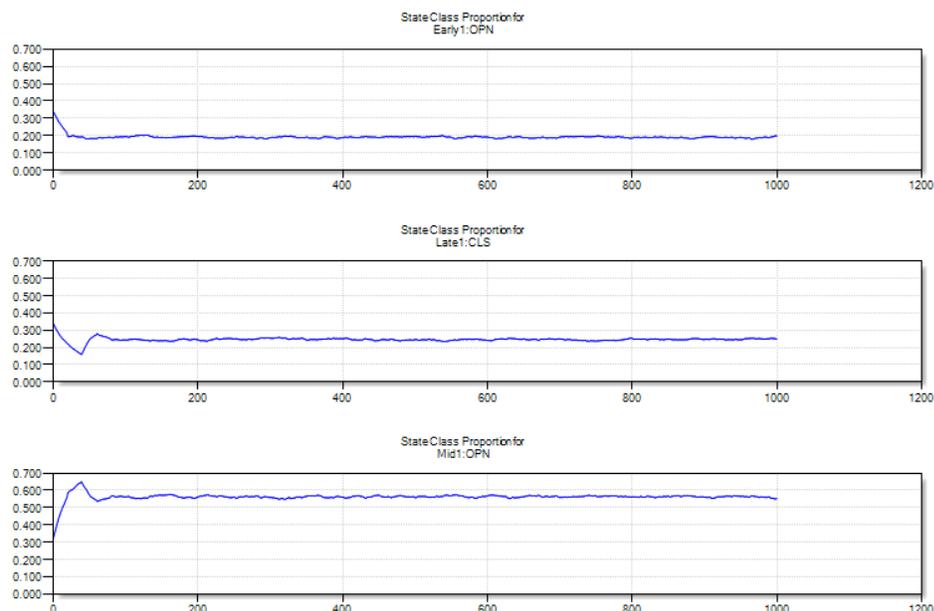**Standard LANDFIRE Settings**

Run Control Tab

- LANDFIRE models are run for 1,000 timesteps with a **Start timestep** of 0 and an **End timestep** of 1,000.
- Three **Total Iterations** are generally adequate for running a model to get quick results during model development, but 10 iterations are needed to obtain the final results.
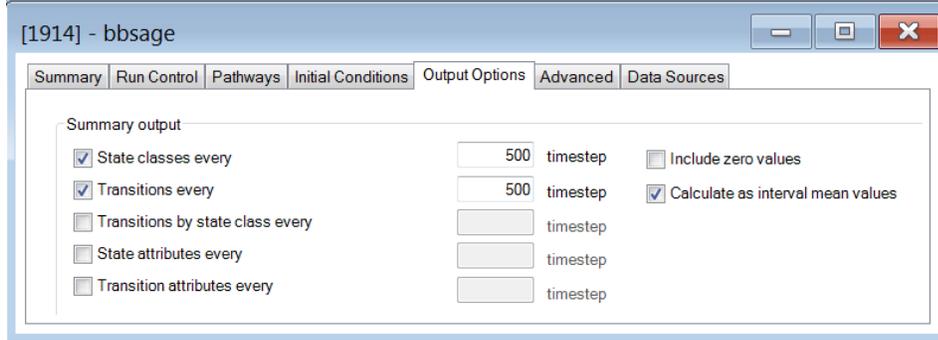
Initial Conditions Tab

- The **Total (acres)** and **Number of simulation cells** is set to 1,000.
- In the Distribution table, the **Relative Amount** is set so that there is an equal proportion of cells in each class. For model with five classes the relative amount in each class should be 200.
- A LANDFIRE model is initialized with equal proportions in all classes because for most landscapes and BpS we lack information about appropriate initial conditions. It typically takes a LANDFIRE model 100 to 300 timesteps or more to stabilize or overcome the effect of these initial conditions (see example below).

    Example: This graph shows the results of a three class model over a 1,000 timestep simulation. The number of timesteps is shown on the X-axis and the proportion is shown on the Y-axis. At timesep 0 each class has an equal proportion of cells. Within the first 50 timesteps the amount of cells in each class changes drastically, but after 100 years the amount of cells in each class stabilizes.

Output Options Tab

[1914] - bbsage

Summary | Run Control | Pathways | Initial Conditions | Output Options | Advanced | Data Sources

Summary output

☑ State classes every   500 timestep   ☐ Include zero values
☑ Transitions every   500 timestep   ☑ Calculate as interval mean values
☐ Transitions by state class every   timestep
☐ State attributes every   timestep
☐ Transition attributes every   timestep

- The summary output for **State classes** and **Transitions** is selected because LANDFIRE documentation requires the mean proportion of the BpS in each state class and the mean fire return interval for each fire severity type (i.e. replacement, mixed, surface).
- The number of **timesteps** is set to 500 indicating that over a 1,000 timestep simulation output will be summarized for two intervals: timesteps 0-500 and 501 to 1000. By selecting the **Calculate as interval mean values** option the output is averaged over these two intervals.
- Together these output settings allow the user to obtain the average succession class proportion and fire return intervals for the last half of a simulation. Results from the first half of the simulation are not used because they include the period of stabilization.

Advanced Tab
- The **Time-Since-Transition** or **TST** function is the only Advanced setting used in LANDFIRE models, but it is not used in all models.
- If used, TST will be associated with the Transition Type **AltSuccession** (alternative succession) and for the Transition Group **AllFire** (which includes surface, mixed and replacement severity fire transitions). For LANDFIRE the **Initial TST Max** value is set to the maximum **TST Min** value specified in the model. See example below.
- This setting is commonly used in dry forests and woodlands where fire maintains an open stand structure. The AltSuccession transition is used to allow for some portion of the BpS to transition to a closed stand structure in the absence of fire. In example below, AltSuccession is used to transition from the Mid and Late Open classes to the Mid and Late Closed classes respectively. The probability is set to 1.0 and the TST Min is set to 40 indicating that the transition will occur (probability of 1.0) if a pixel advances 40 timesteps (TST Min) without fire.

Example: If used, Time-Since-Transition is set on the Advanced tab and it is only used for the transition type AltSucession and the transition group AllFire. The Time-Since-Transition Randomize function is used to set the maximum allowable TST at the beginning of the simulation. Any AltSuccession transitions that use the TST function in the model will have their TST randomized between the specified Initial TST Max and 0 when the model starts (at timestep 0). The LANDFIRE standard is to set the Initial TST Max value to the maximum TST Min value specified in the model. In the example below, the maximum TST Min value is 40 and therefore the Initial TST Max is set to 40.

If a model uses TST, the TST Group and Randomize functions must be attributed on the Advanced tab.

TST is only used with the transition AltSuccession and is always associated with the AllFire Transition Group.

The Initial TST Max value is set to the maximum TST Min used in the model.