Succession Class Mapping Rules Readme File
October 2019

Background

Succession class (also referred to as SCLASS or S-Class) characterizes current vegetation conditions with respect to cover and height ranges, and general vegetation composition of successional states occurring within each biophysical setting (BpS). Succession class can also represent uncharacteristic vegetation components, such as exotic species, that are not found within the compositional or structural variability of successional states defined for a BpS. Succession classes do not directly quantify fuel characteristics of the current vegetation, but rather represent vegetative states with unique succession or disturbance-related dynamics, such as structural development or fire frequency. LANDFIRE's succession class geospatial layer is used to quantify the current amount of the landscape in each class as of the most recent LANDFIRE version. This is compared to the reference amount in each class, which is estimated using the BpS state-and-transition models, to calculate [vegetation departure](#) and [vegetation condition class](#).

The reference succession classes for every BpS are described in the BpS description document. Classes are identified by the letters A-E and described by unique combinations of cover type and structural stage.

- → The **cover type** describes the age or maturity of the dominant vegetation in the class. Types are: Early Development 1, Early Development 2, Early Development 3, Mid Development 1, Mid Development 2, Mid Development 3, Late Development 1, Late Development 2, and Late Development 3.
- → The **structural stage** describes the structure of the upper layer lifeform for the class. Stages are: All Structures, Closed, and Open.
- → Different combinations of cover type and structural stage can be represented by the same letter for different BpS. For example, class A could represent Early 1 All in one BpS and Early 1 Open in another.
- → The cover type and structural stage link the succession class description to the corresponding class in the state-and-transition simulation model.
- → The class letter links the succession class description to the succession class layer.

Using the Rules Spreadsheet in Succession Class Mapping

Mapping succession classes utilizes a mutually exclusive ruleset covering all possible combinations of the input variables. The rules used by LANDFIRE are provided in the LANDFIRE Succession Class Mapping Rules spreadsheet; the process for creating the succession class layer is summarized below.

1. **Spatial overlay**. Succession class mapping begins with a spatial overlay (called a combine in ArcMap) of the BpS, existing vegetation type, existing vegetation cover, and existing vegetation height geospatial layers. This enables mappers to identify all possible combinations of the input variables that are used to classify succession classes.

2. **Non-Reference rules**. The second step in mapping succession class is to apply the non-reference rules found on the NONREFERENCE_RULES worksheet in the LANDFIRE Succession Class Mapping Rules spreadsheet. Non-reference rules are based on existing vegetation type and include the classes shown in the table below.

    Non-Reference Succession Classes

Succession Class
Barren
Burnable Agriculture
Burnable Urban
Non-burnable Agriculture
Non-burnable Urban
Snow/Ice
Sparsely Vegetated
Uncharacteristic Exotic Vegetation (UE)
Water

    Existing vegetations types with the words "introduced," "plantation," "modified/managed," or "ruderal" (excluding "developed ruderal") in their name, and types described as plantations or as having non-native species are classified as **Uncharacteristic Exotic** (UE). Modified/managed types are characterized by introduced species. Ruderal types apply to areas with a history of significant anthropogenic disturbance, such as abandoned agricultural fields, which typically have an unnatural combination of species (native and non-native), that are unlikely to succeed to a natural plant community.

3. **Reference rules**. For the BpS pixels that were not classified in step two, the final step is to apply the reference rules found on the REFERENCE_RULES worksheet in the LANDFIRE Succession Class Mapping Rules spreadsheet. These rules classify unique combinations of lifeform (mapped as an attribute in the Existing Vegetation Type layer), height (mapped in the Existing Vegetation Height layer) and canopy cover (mapped in the Existing Vegetation Cover layer) into the reference classes A-E (described in the description document), or as uncharacteristic native, not possible, or sparse. The reference classes are described in the table below.

Reference Succession Classes

Succession Class	Description
A	Succession class A
B	Succession class B
C	Succession class C
D	Succession class D
E	Succession class E
UN	Uncharacteristic Native
NP	Not Possible
Sparse	Sparse BpS

Leaf-form and **composition** attributes can further distinguish succession classes.
- → Some tree lifeform classes use leaf-form to distinguish succession classes when multiple classes have overlapping height and/or cover. If used, it will be noted in the Leaf Form column in the spreadsheet as: Brdlf (broadleaf), Con (conifer), or Mix (mixed conifer and broadleaf). The leaf-form is mapped from the Existing Vegetation Type layer as follows: Brdlf includes the "Hardwood," Con includes the "Conifer," and Mix includes the "Hardwood-Conifer," and "Conifer-Hardwood" map classes identified in the EVT_PHYS field of the value attribute table.
- → Composition is based on Existing Vegetation Type and is attributed in the Composition column in the spreadsheet. The Additional Rules column may contain additional information about the composition.

The reference rules table also identifies **uncharacteristic native** (UN), **not possible** (NP), and **sparse** conditions.
- → UN refers to a combination of height and cover that would not be expected under the reference condition.
- → NP refers to combinations of height and/or cover that are believed to be physiologically impossible for the BpS. For example, black spruce trees greater than 50m tall could be considered NP in Alaska. The NP designation is not intended to be mapped, but it can be used by LANDFIRE to identify possible problems with the mapping of succession class inputs, especially existing vegetation cover and existing vegetation height.
- → Sparse BpS do not have a BpS model or description and are automatically assigned to the sparse succession class.

Locally Calibrated Succession Class Mapping

These rules can be modified for local use. The guide [How to Map Successional Stages Using LANDFIRE Products](#) provides instructions for local mapping.

Questions and Suggestions

Questions about or suggestions for improving the succession class mapping rules can be sent to [helpdesk@landfire.gov.](mailto:helpdesk@landfire.gov)