The Fuel Characteristic Classification System (FCCS v1.1)

Introduction

Ongoing development of complex fire behavior and fire effects software and the implementation of wildland fire emissions and carbon assessments have demonstrated the need for a system to quantify and classify wildland fuels. Fuelbeds vary widely in their physical attributes, potential fire behavior, and fire effects. A comprehensive software system is needed to accurately capture the structural complexity and geographical diversity of fuel components across landscapes and provide the ability to assess factors of human change (e.g., logging slash) and natural change (e.g., insect and disease).

The Fire and Environmental Research Applications team (FERA) of the Pacific Northwest Research Station's Pacific Wildland Fire Sciences Laboratory, U.S. Department of Agriculture, Forest Service, has developed a national system of Fuel Characteristic Classification System (FCCS) to meet this need.

About FCCS

FCCS is a user-friendly software program that allows users to access fuelbeds from a nation-wide library or create their own custom fuelbeds. The FCCS Fuelbeds were compiled from published and unpublished literature, fuels photo series, fuels data sets and expert opinion. Users can modify the FCCS Fuelbeds to create a set of customized fuelbeds representing a particular scale of interest.
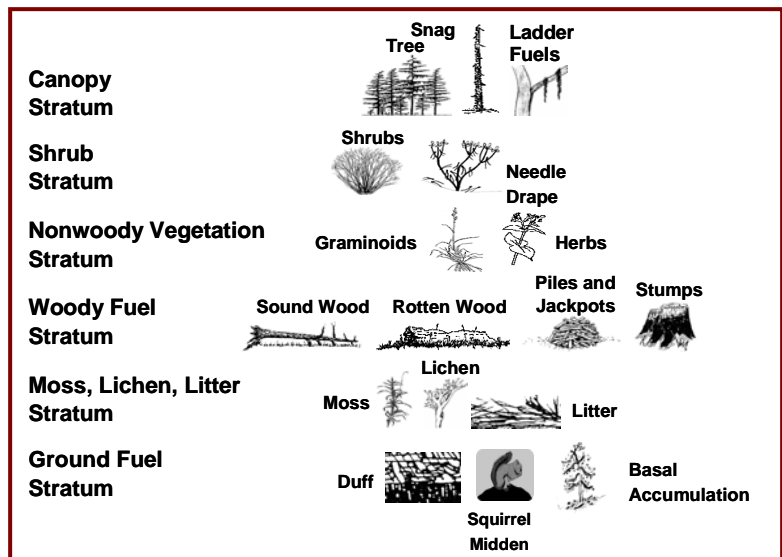

Figure 1. A FCCS fuelbed includes all fuels that have the potential to be consumed during a fire. A fuelbed is stratified into six horizontal layers that represent unique combustion environments. Each fuelbed stratum is further broken down into one or more fuelbed categories with common combustion characteristics.

When a user has completed editing fuelbed data, FCCS reports assigned and calculated fuel characteristics for each existing fuelbed component, including trees, shrubs, grasses, woody fuels, litter, and duff (Figure 1). FCCS also calculates surface fire behavior, crown fire, and available fuel potential indices on a scale from 0 - 9 for each FCCS or customized fuelbed. These FCCS fire potentials facilitate communication of fire hazard among users and provide an indexed representation of the intrinsic capacity of each fuelbed for surface fire behavior, crown fire and available consumption of fuels.

FCCS facilitates the mapping of fuelbed characteristics and fire hazard assessment (Figure 2; http://www.fs.fed.us/pnw/fera/fccs/), by providing fuelbeds, fuelbed characteristics, and associated predicted surface fire behavior, crown fire, and available fuel potentials. It also provides the necessary inputs to run fuel consumption and emission production models, such as Consume 3.0 and the Fire Emissions Production Simulator (FEPS).

The FCCS software is available for download from the FERA website (http://www.fs.fed.us/pnw/fera/fccs/). An overview of the FCCS has been accepted by the Canadian Journal of Forest Research. A copy of the manuscript is available at: http://www.fs.fed.us/pnw/fera/fccs/draft_papers.shtml .
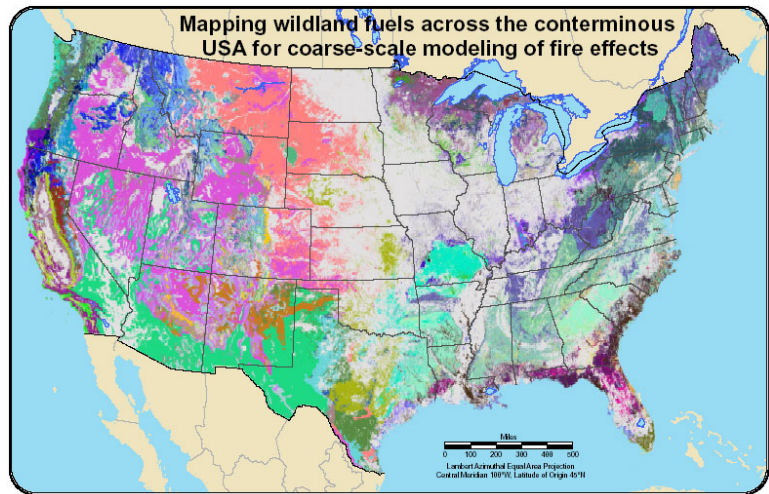

Figure 2. FCCS fuelbeds mapped at a 1-km resolution across the conterminous United States.

The system is currently being showcased as a tool to map fuelbeds and fire hazard, which allows managers to maximize fuel treatment effectiveness on the Okanogan and Wenatchee National Forests, and on the Deschutes National Forest. FERA has also demonstrated the use of FCCS as the basis for a national air pollutant and carbon emission inventory, in cooperation with the U.S. Environmental Protection Agency.

FCCS v 1.1 was released in February 2007 and contains the following modifications: (1) The program now reports predicted surface fire behavior, including reaction intensity (BTU ft^{-2} min^{-1}), flame length (ft), and rate of spread (ft min^{-1}), under benchmark environmental conditions (no slope, 4 mph windspeed, and dry fuel conditions); (2) FCCS suggests crosswalks from reported fuelbeds to the original 13 surface fire behavior fuel models and the 40 standard fuel models (Scott and Burgan 2005); and (3) the FCCS webpage now includes references in pdf format for each of the FCCS fuelbeds.

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