The Fuel Characteristic Classification System (FCCS)

Introduction

Fuelbeds vary widely in their physical attributes, potential fire behavior, and fire effects. As models that predict fire behavior, fire effects, and carbon cycling become more sophisticated and widely used, there is an increasing need to accurately quantify and classify the structural and geographical diversity of wildland fuels. The Fuel Characteristic Classification System (FCCS) was designed to represent the diversity of fuels found throughout North America and predict their relative fire hazard. FCCS also predicts surface fire behavior and quantifies carbon stores for each calculated fuelbed.

About FCCS

FCCS is a user-friendly software program that allows users to access fuelbeds from a fuelbed library or create their own custom fuelbeds. FCCS fuelbeds represent fuels throughout much of North America and were compiled from published literature, fuels photo series, fuels data sets and expert opinion. Users can modify the FCCS fuelbeds to create a set of customized fuelbeds representing any scale of interest.

Figure 1: Fuel strata and categories in the FCCS.

When a user has completed editing fuelbed data, FCCS reports input and calculated fuel characteristics for each existing fuelbed component, from canopy fuels to ground fuels (Figure 1). FCCS also calculates the relative fire hazard of each fuelbed, including surface fire behavior, crown fire, and available fuel potentials, scaled on an index from 0 to 9. These FCCS fire potentials facilitate communication of fire hazard among users and provide an index of the intrinsic capacity of each fuelbed for surface fire behavior, crown fire and available consumption of fuels under dry benchmark environmental conditions (no slope, 4 mph midflame wind speed, and dry fuel moistures).

FCCS predicts surface fire behavior, including reaction intensity (BTU ft^{-2} min^{-1}), flame length (ft), and rate of spread (ft min^{-1}) based benchmark and user-specified environmental conditions. By comparing predicted flame length and rate of spread, FCCS provides a crosswalk to one of the original 13 Fire Behavior Prediction System fuel models and one of the 40 standard fuel models (Scott and Burgan 2005). FCCS also reports carbon storage by fuelbed category and subcategory and predicts the amount of combustible carbon in each category and subcategory based on selected fuel moisture scenarios. The FCCS has been

recoded as a calculator module that can be run as a batch mode or as an option in the Fuel and Fire Tools application.

Applications

The FCCS facilitates the mapping of fuelbed characteristics and fire hazard assessment (Figure 2), by providing fuelbeds, fuelbed characteristics, and associated predicted surface fire behavior, crown fire, and available fuel potentials. FCCS also provides the necessary inputs to run fuel consumption and emission production models, such as Consume and the Fire Emissions Production Simulator (FEPS).
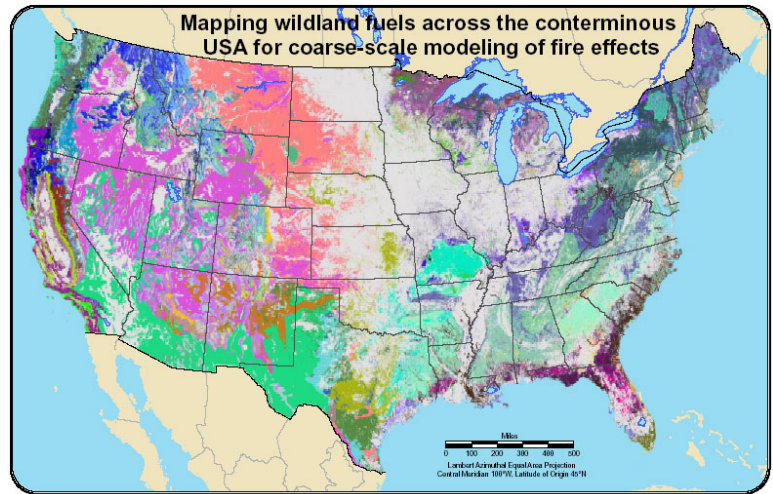
The system is currently being showcased as a tool to map fuelbeds and fire hazard, which allows managers to maximize fuel treatment effectiveness on the Okanogan and Wenatchee National Forests and the Lake Tahoe Basin. FERA has also demonstrated the use of FCCS as the basis for a national air pollutant and carbon emission inventory, in cooperation with the U.S. Environmental Protection Agency. LANDFIRE has currently developing a map layer of the FCCS fuelbeds throughout the United States.

FCCS software, is currently built into the Fuel and Fire Tools (FFT) application. The FCCS has been transferred to managers and scientists during 20 national and regional workshops and through eight published papers in a special section of the Canadian Journal of Forest Research (CJFR) and a General Technical Report.

For More Information Contact:

Roger Ottmar
Fire and Environmental Research Applications Team
USDA Forest Service Pacific Wildland Fire Sciences Lab
400 North 34th Street, Suite 201
Seattle, Washington 98103
Office phone: (206) 732-7826
Cell phone: (206) 849-3172
E-mail: rottmar@fs.fed.us

Susan Prichard
Fire and Environemntal Research Applications Team
Office and cell phone: (509) 341-4493