Training Package for Land Management Tools Sponsored by the JFSP: Photo Series, FCCS, Consume 3.0 and FEPS

Final Report
Project: 04-4-1-19

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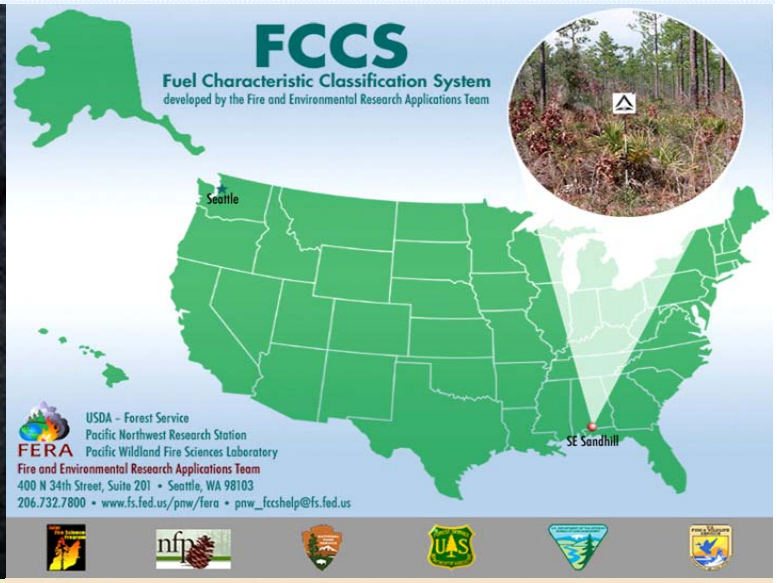
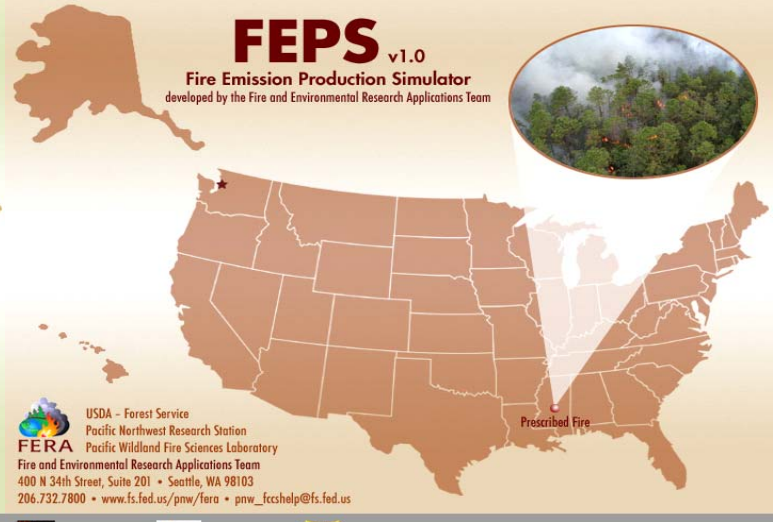




Training Package for Land Management Tools Sponsored by the JFSP: Photo Series, FCCS, Consume 3.0 and FEPS

Joint Fire Science Program Project: 04-4-1-19

Final Report to the Joint Fire Science Program

Roger D. Ottmar, Principal Investigator

June 28, 2006

ABSTRACT

The Fire and Environmental Research Applications team has completed a set of online tutorials, instructor's guides and student workbooks to help land managers use the Natural Fuels Photo Series, Fuel Characteristic Classification System (FCCS), Consume 3.0, and Fire Emissions Production System (FEPS). The tutorials provide technical background on how and why the four land management tools were developed, appropriate applications for each tool, and step-by-step instructions on how to use the software packages. In addition, each tutorial highlights case studies that detail sample applications of the software tools in the boreal, southern and western regions of the United States. Each case study is designed to demonstrate how the four land management tools can be used in tandem.

INTRODUCTION

The Fire and Environmental Research Applications (FERA) team has developed an online tutorial package that teaches land managers how to use the Natural Fuels Photo Series, Consume v 3.0, Fuel Characteristic Classification System (FCCS), and Fire Emissions Production Simulator (FEPS) for their everyday fuels and wildland fire planning. The web-based tutorials are user-friendly applications that can be viewed online or downloaded to a personal computer and viewed offline.

The four tutorials provide technical background on each land management tool, appropriate applications, and step-by-step instructions on how to use the software packages. Each tutorial contains case studies that provide sample applications in the boreal, southern and western regions of the United States. In addition to highlighting sample applications, each case study demonstrates how the four land management tools can be used in tandem.

An instructor's guide and student workbook associated with each tutorial is available for download. With the instructor's guide and student workbook, agencies can initiate a training program or add to an existing training curriculum. MS Powerpoint® presentations used in the Regional Workshops (JFSP Project 05-4-1-14) to demonstrate how to use the Natural Fuels Photo Series, FCCS, and Consume 3.0 have also been made available for download.

Background of Tools

The **Natural Fuels Photo Series** is a collection of data and photographs that collectively display a range of natural conditions and fuel loadings in a wide variety of ecosystem types throughout the United States. The development of the photo series has been supported in part by the Joint Fire Science Program. Fire managers are the primary target audience of the Natural Fuels Photo Series, although the data presented will also serve managers, scientists, and researchers in other natural resource fields. Many current users of the photo series do not understand the appropriate procedure to assess fuel characteristics using the photo series. The tutorial provides a straight-forward introduction to the Natural Fuels Photo Series and instructions for how to correctly and efficiently use this tool. They also introduce the Digital Photo Series (Wright, JFSP #04-4-1-02) and will provide basic instruction for using this online database upon its release.

The Fuel Characteristic Classification System (FCCS) is a software package that enables land managers, regulators, and scientists to create and catalogue fuelbeds and to classify those fuelbeds for their capacity to support fire and consume fuels. The fuelbed characteristics and fire classification from this tool will provide inputs for current and future sophisticated models for the quantification of fire behavior, fire effects, and carbon accounting and enable assessment of fuel treatment effectiveness. The system was designed from requirements of land managers, scientists and policy makers gathered through six regional workshops and support in part by the Joint Fire Science Program. The FCCS contains a set of fuelbeds representing the United States that were compiled from scientific literature, natural and activity fuels photo series, fuels data sets, and expert opinion. The system enables modification and enhancement of these fuelbeds to represent a particular scale of interest. The FCCS then reports assigned and calculated fuel characteristics for each existing fuelbed stratum including the canopy, shrubs, nonwoody, woody, litter/lichen/moss, and duff. Finally, the FCCS classifies each fuelbed by calculating fire potentials that provide an index of the intrinsic capacity of each fuelbed to support surface fire behavior, support crown fire, and provide fuels for flaming, smoldering, and residual consumption. The system is easy to use, but the tutorial shortens the learning curve and provides sample applications for using the FCCS.

Consume 3.0 is a user-friendly program designed for resource managers that predicts the amount of fuel consumption and emissions from the burning of logged units, piled debris, and natural fuels based on weather data, fuel moisture, fuel loadings, and a number of other factors. Consume 3.0 allows managers to determine when and where to conduct prescribed burns or manage for wildland fire to achieve desired effects while reducing impacts on other resources. This development of this new version of Consume was supported by the Joint Fire Science Program. It is more complicated than Consume 2.1, and a technology transfer package will assist users in learning how to use the program, interpreting the results, and applying Consume 3.0 to their specific applications.

The Fire Emissions Production Simulator (FEPS) is a software product that models the amounts and rates of fuel consumption and smoke production during wildland fire. FEPS generates heat release and emission rates for dispersion model inputs, emission inventories, and developing smoke management strategies. The FEPS development was supported by the Joint Fire Science Program. The FEPS tutorial provides users with clear instructions for how to use

the program and an understanding of default settings from which users customize wildland fire events.

OBJECTIVES

The Fire and Environmental Applications team is committed to delivering land management tools that are applicable to clients nationwide, user-friendly, and accompanied by accessible training materials and scientific documentation. Each software tool highlighted by the tutorials has a comprehensive user's guide with detailed scientific documentation. We also perceived the need to develop a set of training tools that could be used as stand-alone tutorials for individual use or within a larger training program such as the National Wildfire Coordinating Group (NWCG)/National Interagency Fire center (NIFC) sponsored Rx series.

The primary objective of this project was to develop self-taught, web-based tutorials with accompanying instructor guides and student workbooks for the technology transfer of four JFSP projects including the Natural Fuels Photo Series, FCCS, Consume 3.0, and FEPS.

To complete the training package, we undertook four tasks:

(1) Consultations with land managers and the National Training Center to design a training package in accordance with managers and NWCG/NIFC requirements.

(2) Development of the training package for the Natural Fuels Photo Series, FCCS, Consume 3.0, and FEPS.

(3) Testing and review of the training package by FERA team members and potential clients.

(4) Creation of a website from which to view the tutorials online or download them along with instructor's guides and student handbooks.

METHODS

This project was completed in four task-based phases. During the coordination phase, we assessed potential clients, including users, technology transfer specialists, and national training centers to acquire the framework for designing the technology transfer package. During the development phase, the tutorials, instructor guides, and student workbooks were drafted in-house by FERA team members. During the testing and review phase, we submitted the tutorials for internal and external testing and review. Finally, during the implementation phase, the tutorials were posted on a webpage with associated instructor guides and student handbooks available for download. The following sections detail methods involved in each phase.

Coordination Phase

To develop the framework for our technology transfer package, Ellen Eberhardt, technical information specialist for FERA and a principal investigator, reviewed various technology transfer products and evaluated their strengths and weaknesses. Various formats were considered

for their ability to (a) function easily and simply for learners, (b) be flexible enough for easy updating when the tools are upgraded, and (c) not exceed budgeted costs. Land managers from several agencies including the USDA Forest Service, NPS, BLM, and USFWS were contacted, and procedural requirements with the National Training Center were reviewed to determine the best approach for this transfer product. In addition, we discussed the tutorial design with several education and science delivery experts including the National Alliance for Computational Science and Engineering and technology transfer specialists including John Szymoniak (PSW), Paula Seamon (TNC), and Wayne Cook (RMRS).

Development Phase

The tutorials were designed and developed by FERA team members Susan Prichard and Paige Eagle. Dr. Susan Prichard is the past manager of the Consume 3.0 and FCCS development teams and author of the online help and user guides for both software applications. Paige Eagle is a research scientist with a strong background in database management and website development, including most recently, the Digital Photo Series. Ellen Eberhardt, technical information specialist with FERA, tested and reviewed the tutorials, and created the student workbooks. Other team members contributed to the creation and review of the tutorials including Dr. Cynthia Riccardi (manager of FCCS), Clint Wright (manager of the Digital Photo Series and Natural Fuels Photo Series author), and Bob Vihnanek (Natural Fuels Photo Series author).

Regional case studies are being developed using actual data collected in the regional workshops (JFSP #05-4-1-14). Each case study will highlight an example used in the regional workshops and follow the example through the four land management tools:

1. Natural Fuels Photo Series: Present photos and data collected at the regional workshop.
2. FCCS: Input data estimated using the Natural Fuels Photo Series and calculate fuel characteristics and fire potentials for the custom fuelbed.
3. Consume 3.0: Import fuel loadings from the custom FCCS fueld and calculate fuel consumption and emissions.
4. FEPS: Input total fuel consumption from Consume 3.0 into FEPS, and estimate emissions and heat release rates for a custom fire event.

The Southern case study has been completed for the four tutorials; Boreal and Western regional case studies are pending completion of the workshops (August 15-17, 2006 for Fairbanks, Alaska; October for Flagstaff, Arizona; and May for Grand Rapids, Minnesota).

Testing and Review Phase

The tutorials and guides were tested and reviewed extensively by several FERA team members, by workshop participants (JFSP #05-4-1-14), and by several land managers using the tutorials to learn the software. The tutorials have also been sent to John Szymoniak and Wayne Cook for assessment. Although the comments from these technology transfer specialists have not yet been

received, we would like to assure the JFSP that their comments will be taken into consideration the tutorials will be updated immediately.

Implementation Phase

The final tutorial and instruction guide package is available on the FERA website at http://www.fs.fed.us/pnw/fera/products/tutorials/. The package will be sent to the major land management agency training centers for distribution and to FRAMES, a technology transfer clearing house for products developed with support from the JFSP. We will also make the training package available on compact discs for distribution upon request.

The tutorials, instructor guides, and student workbooks will be updated over the next 6 months to address client feedback, add a section on how to use the Digital Photo Series upon its release, and to complete the Boreal and Western case studies upon completion of the Fairbanks, AK workshop.

DELIVERABLES

The primary deliverable product for this project is the online tutorials available for downloading and/or viewing at http://www.fs.fed.us/pnw/fera/products/tutorials/. Instructor's guides and student workbooks are available for downloading to be used in workshops and trainings that involve one or more of the land management tools. We also have made available MS Powerpoint® presentations that provide step-by-step instructions for how to use the Natural Fuels Photo Series, FCCS, and Consume 3.0. **Table 1** summarizes the deliverables, including additional products that were not included in our proposal.

Table 1. Comparison of proposed and actual deliverables.

Proposed for Delivery	Delivered	Status
Natural Fuels Photo Series tutorial, instructor guide and student workbook	Available for download on May 1, 2006 on FERA's website: http://www.fs.fed.us/pnw/fera/products/tutorials/	Done
FCCS tutorial, instructor guide and student workbook	Available for download on May 1, 2006 on FERA's website: http://www.fs.fed.us/pnw/fera/products/tutorials/	Done
Consume 3.0 tutorial, instructor guide and student workbook	Available for download on April 1, 2006 on FERA's website: http://www.fs.fed.us/pnw/fera/products/tutorials/	Done
FEPS tutorial, instructor guide and student workbook	Available for download on April 1, 2006 on FERA's website: http://www.fs.fed.us/pnw/fera/products/tutorials/	Done
Progress report	One progress report was delivered August 2005.	Done
Testing and review	Tested and reviewed extensively by several FERA team members, workshop participants, and by several land managers. The tutorials have also been sent to John Szymoniak and Wayne Cook for assessment.	In progress (expected completion date)
Transfer to regional training centers	Demonstrate and distribution of the training package at 2 Rx 310 fire effects National training classes and 7 Rx 410, Smoke Management Training Classes	Done
	Demonstration and distribution of the training package at Technical Fire Management Fire Ecology Module, May 3, 2006, Bothell, WA	Done
Not Originally Proposed	*FCCS Demonstration (PowerPoint Presentation). Available for download on April 1, 2006 on FERA's website: http://www.fs.fed.us/pnw/fera/products/tutorials/*	*Done*
	Consume 3.0 Demonstration (PowerPoint Presentation). Available for download on April 1, 2006 on FERA's website: http://www.fs.fed.us/pnw/fera/products/tutorials/	*Done*
	Distribution at the IAWF 1st Fire Behavior and Fuels Conference, March 27, 2006, Portland, OR.	*Done*
	Demonstrate and distribution of the training package at 2 Rx 310 fire effects National training classes and 7 Rx 410, Smoke Management Training Classes	*Done*

	Demonstration and distribution of the training package at Technical Fire Management Fire Ecology Module, May 3, 2006, Bothell, WA	*Done*
	Demonstration and distribution of the training package at 3 completed regional fuels workshops (Ichauway, GA, Hilo, HI, and Sunriver, OR). The training package will also be distributed at the remaining 3 workshops (Fairbanks, AK, San Diego, CA, Grand Rapids, MN) (JFSP #05-4-1-14)	*In progress (expected completion date)*

Demonstrations

Demonstrate and distribution of the training package at 2 Rx 310 fire effects National training classes and 7 Rx 410, Smoke Management Training Classes

International Association for Wildland Fire 1st Fire Behavior and Fuels Conference: Fuels Management -- How to Measure Success

Demonstration and distribution of the training package at Technical Fire Management Fire Ecology Module, May 3, 2006, Bothell, WA

The FCCS, photo series, Consume and FEPS tutorials will be distributed as part of the RX 410 (Smoke Management) and RX 310 (Fire effects) training packages as well as with the Technical Fire Management Ecology and Fuels modules.

The Natural Fuel Photo Series, FCCS and Consume 3.0, and FEPS tutorials will be presented and distributed as part of the on-going regional workshops in Fairbanks, AK, San Diego, CA, and Grand Rapids, MN. (JFSP #05-4-1-14).

APPENDIX A

Outlines for Photo Series, FCCS, Consume 3.0, and FEPS Tutorials

Photo Series Student Workbook Outline

Fuel Characteristic Classification System Student Workbook Outline

Fire Emission Production Simulator (FEPS) Student Workbook Outline

Appendix B

Instructor and Student Guides for the Photo Series, FCCS, Consume 3.0, and FEPS Tutorials

Appendix C

Fact Sheets for the Photo Series, FCCS, Consume 3.0, and FEPS

The Natural Fuels Photo Series

FERA
Fire and Environmental Research Applications

http://www.fs.fed.us/pnw/fera

Introduction

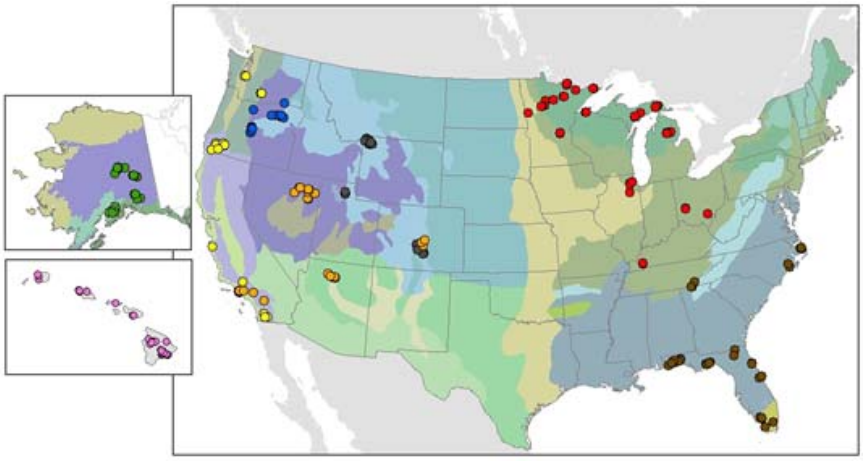
Ground inventory procedures that directly measure site conditions such as fuel loading and arrangement, vegetation structure, and composition exist for most ecosystem types and are useful when a high degree of accuracy is required. However, ground inventory is time consuming and expensive. Photo series can be used to make quick, easy, and inexpensive determinations of fuel quantities and stand conditions when less precise estimates are acceptable.

About The Natural Fuels Photo Series

The Natural Fuels Photo Series currently includes eleven volumes representing various regions of the United States and one volume from Brazil. There are one to four series in each volume, each having four to 17 sites. Sites include standard, wide-angle, and stereo-pair photographs. Each group of photos includes inventory data summarizing vegetation composition, structure, and loading; woody material loading; density by size class, forest floor depth, and loading; and various site characteristics.

Completed Volumes	Region	Fuelbed Types
Volume I	Pacific Northwest	Mixed-conifer with mortality, western juniper, sagebrush, grass
Volume II	Alaska	Black and white spruce
Volume IIa	Alaska	Hardwoods with spruce
Volume III	Rocky Mountains	Lodgepole pine, quaking aspen, Gambel oak
Volume IV	Southwest	Pinyon-juniper, sagebrush, chaparral
Volume V	Midwest	Red and white pine, northern tallgrass prairie, mixed oak
Volume Va	Lake States	Jack pine
Volume VI	Southeast	Longleaf pine, pocosin, marshgrass
Volume VIa	Southeast	Sand hill, sand pine scrub, hardwood with white pine
Volume VII	West Coast	Oregon white oak, California deciduous oak, mixed-conifer with shrubs
Hawaii	Hawaii	Grassland, shrubland, woodland, forest
Brazil	Brazil	Cerrado fuels
Future Volumes	**Region**	**Fuelbed Types**
	Northeast	Red spruce and balsam fir, pitch pine, pitch pine scrub, mixed hardwoods
	Southwest	Juniper and oak woodlands of the borderland region
	Montana	Juniper and shrublands of the Missouri Breaks region
	Mexico	Pine and oak

These photo series are important land management tools that can be used to ecologically assess landscapes through appraisal of living and dead woody material and vegetation biomass (that is, fuels) and stand characteristics. Once an ecological assessment has been completed, stand treatment options such as prescribed fire or harvesting can be planned and implemented to better achieve desired effects while minimizing negative impacts on other resources.



The photo series is useful in several branches of natural resource science and management. Inventory data such as these can be used as inputs for evaluating animal and insect habitat, nutrient cycling, and microclimate. Fire managers will find these data useful for predicting fuel consumption, smoke production, fire behavior, and fire effects during wildfires and prescribed fires. In addition, the photo series can be used to appraise carbon sequestration, an important factor in predictions of future climate, and to link remotely sensed signatures to live and dead fuels on the ground. The Natural Fuels Photo Series continues to evolve and grow as land managers, researchers, and policy-makers identify ecosystems for which vegetation and fuel inventory data are needed.

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Visit the Photo Series Website at:

http://www.fs.fed.us/pnw/fera/photoseries.html

Last Updated March 20, 2006

The Fuel Characteristic Classification System (FCCS)

FERA
Fire and Environmental Research Applications

http://www.fs.fed.us/pnw/fera

Introduction

Ongoing development of more sophisticated fire behavior and fire effects software, along with the implementation of wildland fire emission inventory and large landscape fuel and carbon assessments, has occurred during the past several years. These efforts have demonstrated the need for a comprehensive software system to quantify, classify, and create fuelbeds. The system needs to accurately capture the structural complexity and geographical diversity of fuel components across landscapes and provide the ability to assess elements 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 Pacific Wildland Fire Sciences Laboratory, U.S. Department of Agriculture, Forest Service, has developed a National System of Fuel Characteristic Classification (FCCS) to meet this need.

About FCCS

The FCCS user can access a fuelbed from the national fuelbed database within FCCS that was compiled from published and unpublished literature, fuels photo series, fuels data sets and expert opinion. Alternatively, the user can modify existing descriptions to create a set of customized fuelbeds representing a particular scale of interest. When the user has completed editing the fuelbed data, FCCS reports the assigned and calculated fuel characteristics for each existing fuelbed component, including the trees, shrubs, grasses, woody fuels, litter, and duff (Figure 1). The system will also calculate surface fire behavior, crown fire, and available fuel potential indices on a scale from 0 - 9 for each FCCS national 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

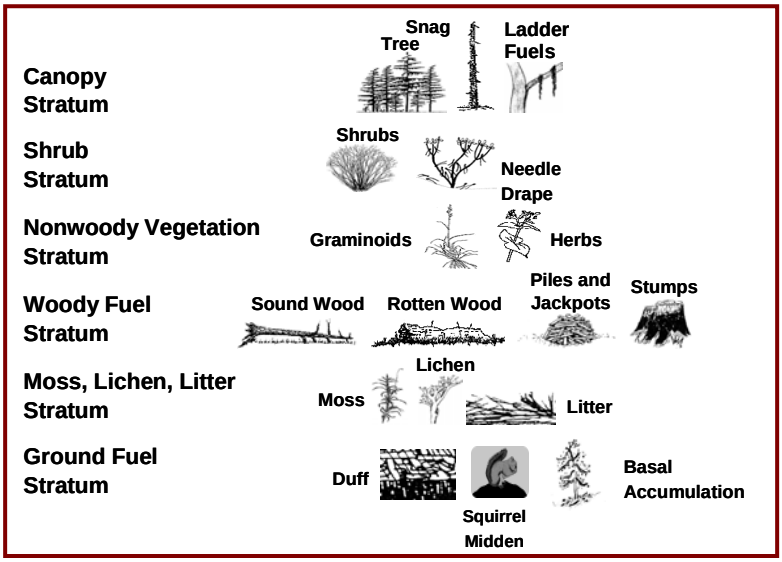

Figure 1. A FCCS fuelbed includes all fuels that have the potential to be consumed during a fire. A fuelbed is stratified into six horizontal layers that represent unique combustion environments. Each fuelbed stratum is further broken down into one or more fuelbed categories with common combustion characteristics.

associated predicted surface fire behavior, crown fire, and available fuel potential. It also provides the necessary inputs to run current fuel consumption and emission production models, such as Consume 3.0 and the Fire Emissions Production Simulator (FEPS), that provide regional and national smoke inventories for wildland fires.

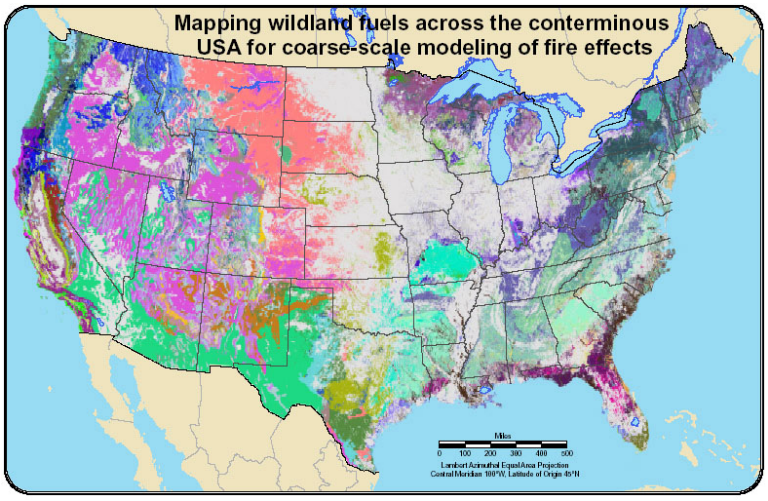

Figure 2. FCCS fuelbeds mapped at a 1-km resolution across the conterminous United States.

The FCCS software is available for download from the FERA website (http://www.fs.fed.us/pnw/fera/fccs/). The system is currently being showcased as a tool to map fuelbeds and fire hazard, enabling managers to maximize fuel treatment effectiveness on the Okanogan and Wenatchee National Forests, and on the Deschutes National Forest. FERA will also demonstrate 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.

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CONSUME v. 3.0

FERA
Fire and Environmental Research Applications

http://www.fs.fed.us/pnw/fera

Introduction

Fire is a natural process in many ecosystems, and managers are increasingly expected to use fire as a landscape-level fuel treatment to improve ecosystem health and reduce the likelihood of catastrophic fires. Fuel consumption is the key variable in the modeling of fire effects. It is one of the most critical attributes for understanding when and how fire should be applied to meet site and landscape objectives, and assessing wildland fire consequences.

Research has provided a wealth of information on fuel consumption, however, the emphasis has been on forested landscapes and little effort has been directed toward the non-forested fuel types such as chaparral, sagebrush, grasses, and palmetto/gallberry types in the West, Hawaii and South; pinyon-juniper in the Southwest; Alaska boreal forest types; and hardwood types in the East and South. Additionally, relatively little work has been accomplished to characterize long duration fuel consumption from the burning of large, rotten logs, stumps, or deep concentrations of organic material such as duff or moss, often prevalent in forested areas where natural fire has been eliminated for the past 80 to 100 years. Fire is becoming an important landscape-level fuel treatment tool in these fuel types. In order for managers to develop improved wildland fire plans that meet specific land management objectives, research is required to better characterize both the fuel loading and fuel consumed during wildland fires in these fuel types.

Fuel Consumption Research

Seventy-one sites have been inventoried and burned in black and white spruce/hardwood forests (Alaska), chaparral (California), ponderosa

pine/mixed-conifer forests (Oregon), and pine/hardwood forests (South Carolina, Tennessee, and Florida). Additionally, thirty-five sites were inventoried and burned in sagebrush on BLM, National Park Service, and U.S. Fish and Wildlife Service lands in eastern Oregon, Nevada, Wyoming, Utah, and California. Data from all burns have been compiled and analyzed. Consumption models have been built for fuel categories within the following fuelbed types: black and white spruce/hardwoods; longleaf and loblolly pine; ponderosa pine; grass; and sagebrush.

CONSUME Software

CONSUME is a user-friendly software application designed for resource managers with some working knowledge of Microsoft Windows® applications. Land managers and researchers input fuel characteristics, lighting patterns, fuel conditions, and meteorological attributes, then CONSUME outputs fuel consumption and emissions by combustion phase and by fuelbed category. CONSUME 3.0 is designed to import data directly from the Fuel Characteristic Classification System (FCCS), and the output is formatted to feed other models and provide usable outputs for burn plan preparation and smoke management requirements. Additionally, training and a user's manual are available. CONSUME can be used for most forest, shrub and grasslands in North America. CONSUME 2.1 is currently available for use, and CONSUME 3.0 will be released in November 2006.

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Visit the CONSUME Website at:

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Last Updated: March 20, 2006

The Fire Emission Production Simulator (FEPS)

FERA
Fire and Environmental Research Applications

http://www.fs.fed.us/pnw/fera

About FEPS

The Fire Emission Production Simulator (FEPS) is a user-friendly computer program designed for scientists and resource managers. The software manages data concerning consumption, emissions, and heat release characteristics of prescribed burns and wildland fires. The original Emissions Production Model (EPM) was designed to help managers estimate and mitigate the rates of heat, particles, and carbon gas emissions from controlled burns of harvest-slash residue in Northwest forests. In updating EPM, a significant number of improvements were made to the usability, applicability, and accuracy of the model. The calculation approach was redesigned, and the model has been renamed FEPS. The most recent FEPS update, version 1.1, includes the fuels data from the most popular fuelbeds in the Fuel Characteristic Classification System and produces hourly emission and heat release data for prescribed and wildland fires. It now also accepts data imported from FOFEM, Consume 2.1, and Consume 3.0.

FEPS can be used for most forest, shrub and grassland types in North America and the world. The program allows users to produce reasonable results with very little information by providing default values and calculations; advanced users can customize the data they provide to produce very refined results.

Total burn consumption values are distributed over the life of the burn to generate hourly emission and release information. Data managed includes the amount and fuel moisture of various fuel strata, hourly weather, and a number of other factors. FEPS can be used for most forest, shrub, and grassland types in North America and the world. The program allows users to produce reasonable results with very little information by providing default values and calculations, and advanced users can customize the data they provide to produce very refined results.

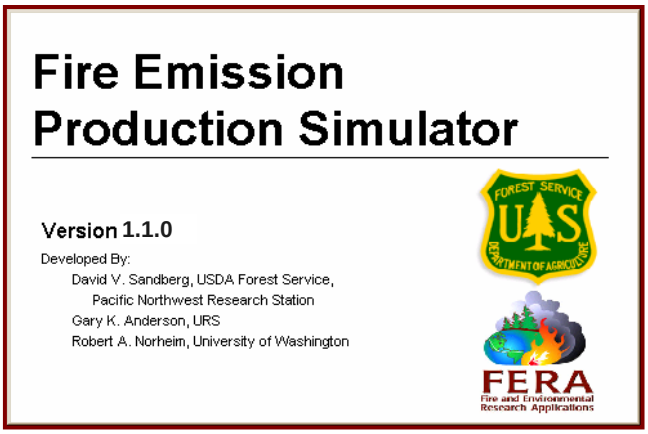
Using FEPS

FEPS version 1.1 produces hourly emission and heat release data for prescribed and wildland fires. You start with a description of an Event. This description includes the name, location, start date, end date, and other properties. Then, for a given Event, you may specify up to five unique fuel profiles. Each profile includes fuel loading and fuel moisture information. Based on these data, FEPS will calculate total fuel consumption for each profile. FEPS then determines flaming, short-term smoldering (< 2 hrs), and long-term smoldering involvement and consumption. Finally, you indicate how the Event behaves over time. FEPS uses hourly data on fire size and local weather conditions to calculate emissions and heat release parameters on an hourly basis. Fuel characteristics for each hour are managed by distributing the fire across the five user-specified fuel profiles.

FEPS Events

In order to use FEPS efficiently, it is important to understand how FEPS manages Events. In FEPS, individual studies are called Events. An Event stores information about and calculates emission and release information for an entire burn (either a prescribed fire or a wildland fire) at a single location.

Because of the relative complexity of the data necessary to define an Event, users are not allowed to create one from blank input screens. All Events are created from existing Events, or System or User Defaults (templates). This approach helps the user make sure that an Event dataset is complete. However, it is incumbent on the user to review all of the supplied data, and revise it as necessary to make sure that they are correct. This procedure allows a user with less specific knowledge of a fire to accept the data in a System Default as a starting point and get reasonable results, and also allows users with more specific knowledge of a fire to completely customize the data used to compute emissions.



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Visit the FEPS Website at:

http://www.fs.fed.us/pnw/fera/feps/index.html

Last Updated March 20, 2006

Appendix D

Table of Contents for the CD

Tutorial_final_report.doc

Tutorial_instruction.doc

ps_tutorial.zip

ps_student_workbook.pdf

ps_instructor_guidebook.pdf

fccs_tutorial.zip

fccs_student_workbook.pdf

fccs_instructor_guidebook.pdf

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