JFSP 2003 Principal Investigator Workshop

Project title: Photo Series for Major Natural Fuel Types of the United States—Phase II and III
Project location: Seattle Forestry Sciences Laboratory, 400 North 34th Street, Suite 201, Seattle, Washington 98103
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Description of project: To compile a sequence of single and stereo photos with accompanying vegetation characterization data that will provide a quick and easy means for quantifying and describing existing fuel properties for a minimum of 10 new fuel types for landscapes of the United States.

Status report: This project is on schedule and within budget.

Selected 11 fuel types for the natural fuels photo series development, part II and III. The fuel types include 1) aspen and birch (Alaska); 2) hardwood/conifer mix (SE); 3) jack pine (Midwest); 4) mixed conifer with a shrub understory (PNW); 5) oak savanna (PNW, SW); 6) long leaf pine/turkey oak/scrub (SE); 7) palmetto and marsh grass (SE); 8) pitch pine (NE); 9) mixed hardwood (NE); 10) spruce/balsam fir (NE); and 11) Douglas-fir/hem;ock (PNW). In addition to the eleven fuel types, the Department of Defense (Army) and USDA Forest Service Region 5 partially funded the development of a photo series for shrub and woodland fuel types of Hawaii, which will include types found in the National Parks and state lands on the islands of Hawaii. This photo series effort has greatly assisted our photo series and Fuel Characteristic Class system to be more robust and include most fuel types across the United States.

To date, 129 sites have been located, photographed, and inventoried. The Hawaii photo series has been published by the PNW Research Station and over 1,000 copies distributed. Manuscripts for the Alaska hardwood and North Central jack pine have been reviewed and sent to the Boise Publication Management System for printing. Manuscripts for hardwood/conifer (SE), sand hill pine (SE), marsh grass and pine/palmetto (SE), conifer/shrub (PNW), and oak/savanna (PNW/SW) fuel types have been completed and are being readied for review. Fifteen sites have been located and inventoried in the northeast for mixed hardwoods with twenty-eight sites located for the pitch pine and red spruce/balsam fir that are scheduled for inventory in 2003. Finally, sites in Douglas-fir hemlock fuelbed types will be located in 2003. Table 1 provides a progress summary. Variables selected to be measured for each site may include: (1) GPS location and magnetic locator; (2) SAF cover type and maybe a Fuel Characteristic Class; (3) brief fire history of site if known; (4) soil type; (5) woody loading by size class and rot class; (6) litter, duff, and moss depth; (7) mineral soil exposure; (8) fuel depth; (9) grass, herb, and shrub species and loading; (10) tree species; (11) tree diameter and height; (12) live and dead stems per acre; (13) seedling count/density; (14) percent canopy closure; (15) number of canopy layers; (16) height to live crown; (17) ladder fuel height; (18) live crown height; and (19) crown bulk density. Photographs include a wide-angle, regular, and stereo pair. The product will be stand-alone photo series. The NWCG Prescribed Fire Working Team will sponsor the printing of the series through the Publication Management System at the NIFC Boise Cache. The volumes will be available in stages for distribution beginning in FY 2002 through 2005.

Table 1. Fuel types, location, and progress of the JFSP photo series phase II and III projects.

Fuel Type	Location	Total sites located and inventoried in FY 1999-2002	Review manuscript complete	Published	Expected Publication
Aspen/birch (II)	Alaska	15	X		(At PMS) June 2003
Hardwood/ conifer (II)	Southeast	7	X		August 2003
Sand hill pine (II)	Southeast	7	X		August 2003
Jack pine (II)	North Central	19	X		(At PMS) June 2003
Hawaii/grass/ shrubland/ woodland/forest (II)	Hawaii	36	X	X (July 2002)	
Conifer/shrub (II)	PNW	11	X		December 2003
Oak/savanna (II)	Southwest/PNW	15	X		December 2003
Fill in gaps (marshgrass, pine/palmetto) (II)	Southeast	4	X		August 2003
Mixed hardwoods (III)	Northeast	15			2005
Pitch pine (III)	Northeast	Sites located (12)			2005
Red spruce/Balsam fir (III)	Northeast	Sites located (13)			2005
Douglas-fir/hemlock (III)	Northwest	None (15)			2005
Total sites located and inventoried		**129**			

Issues/concerns affecting the project: None. Note: Photo series phase III has been funded by the JFSP and will concentrate on northeast fuels during FYs 2003-2004.

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Project title: Modification and Validation of Fuel Consumption Models for Shrub and Forested Lands in the Southwest, Pacific Northwest, Rockies, Midwest, Southeast, and Alaska

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Description of project: The purpose of this project is to modify and improve existing fuel consumption models to better predict the consumption of fuels during wildland fires in fuel types where there is a limited knowledge base and where there will be an increase in prescribed burning. The major focus of the project will be directed primarily to nonforested fuel types. The effort will also lead to better predictions of fuel consumption during the smoldering stage in fuel types where residual smoke is a consistent problem. The empirical models derived from these new data will be implemented into Consume 3.0; and used to validate existing fuel consumption models including CONSUME 1.0 (Ottmar and others 1993), Consume 2.1 (Ottmar and others, 2001), Burnout (Albini and Reinhardt 1997), and FOFEM 5.0 (Reinhardt and others 2002). This study is composed of 6 major tasks that will be completed in 2004. The tasks include: (1) a needs assessment; (2) study plan development; (3) field data collection and analysis; (4) new and modified model implementation into the user software product Consume 3.0; (5) user manual and training package completion; and (6) scientific documentation.

Status report: Discussions with Department of Interior, USDA Forest Service, DOD fuels and fire managers during 5 recon fuel trips and several fuels meetings led to a preliminary list of fuel types critical for fuel consumption model development. The fuel types include: (1) sage (Intermountain, Pacific Northwest, Rockies,); (2) west coast and interior chaparral and oak brush (Southwest, Rockies); (3) ponderosa pine/fir (Intermountain, Pacific Northwest, Rockies, Southwest); (4) black and white spruce (Alaska); (5) hardwood/pine transition (South); and (6) long leaf pine/sand pine (south).

To date, 73 sites have been inventoried and burned for this fuel consumption study in black spruce and hardwoods (Alaska), chaparral (California), ponderosa pine/mixed conifer (Oregon), and pine/hardwood mix (South Carolina, Tennessee, and Florida). Twenty-three units in sage were burned and monitored on BLM, National Park Service, and U.S. Fish and Wildlife Service lands in eastern Oregon, Nevada, Wyoming, Utah, and California. Table 1 provides a progress summary.

The product from this study will be the software product Consume 3.0 with built in Fuel Characteristic Classes and new or modified fuel consumption models that will better represent the pine, spruce, hardwood, shrub, and grass types during the flaming and smolder combustion phases throughout the United States. Preliminary fuel consumption models have been produced for black spruce and pine/mixed conifer types to date. Air Science INC has developed the software design document for Consume 3.0. The software development and training package will be developed by the FERA synthesis and integration team and will be complete by June, 2004

Table 1. Fuel types, location and progress to date

Fuel Type	Location/Agency	Sites inventoried in FYs 1999-2002	Units burned and inventoried in FYs 1999-2002
Black spruce/hardwoods	Alaska (BLM, USFWS)	15	15
Pine/hardwood	South (USFS/DOD)	14	14
Pine/fir	Pacific Northwest (USFS)	20	20
Chaparral	Southwest (USFS)	1	1
Sagebrush	West (BLM, NPS, USFWS, USFS)	23	23

Issues/concerns affecting the project: This project is within budget but an extension was requested and received. No sage burning was accomplished during 2000 because of the fire season and the study was approximately 1year behind. The new completion date is June 2004.

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Project title: Application of a Fuel Characterization System for Major Fuel Types of the United States
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Description of project: The objective of this project is to design a National Fuels Characterization System (FCC) that will provide a comprehensive set of fuelbeds and fuel class potentials that provide a method for assigning fuelbed properties to landscapes across the United States. This fuels project, scheduled for completion in 2003, will allow fire managers, researchers, air quality managers, ecologists, and carbon modelers across the United States to obtain detailed estimates of fuel characteristics and probable fire parameters based on either of two types of information: specific fuel data (categories of fuel and their relative abundance), or general site data that is available from broader areas (such as land cover type, disturbance type, or other data obtained from remote sensing, forest inventories, or models). The detailed fuels information provided for each Fuel Characteristic Class is needed to support fire hazard assessments and fuel treatment decisions. These data can be used to drive sophisticated fire models (such as Consume, EPM, FFE-FVS, FOFEM), that will provide smoke production estimates and other required information.

Status report: This project is on schedule and within budget.

The Fuels Characteristic Class project is being conducted during four major phases. In the design phase, fuel and fire management specialists, fire scientists, fire ecologists, modelers, and mappers have been enlisted to design the final structure of the FCC system and supply specific fuels data during 6 regional workshops held in FY 2000 (Fairbanks, AK (boreal); Palm Coast, FL (tropical/subtropical); Phoenix, AZ (dry), Atlanta, GA (subtropical); Portland, OR (western temperate); and Nebraska City, NE (eastern temperate). The design phase is complete and a software design document developed. The system is based on 6 fuelbed strata, 16 fuelbed categories, physiognomic properties, and gradient variables. A workshop was completed in December, 2001 with the Missoula Fire Lab and the Washington Office to discuss the system's applicability to existing and new fire behavior tools.

In the generation and research phases we are using existing field data, photo series data, biophysical models, and expert knowledge to assign values to fuel properties for a comprehensive set of FCCs. A gray literature and model search contract has been completed by Fire Program Solutions for the research phase. Current in-house research is focused on collecting fuelbed data, organizing a fuels data catalog, developing fuelbed prototypes, and linking it to vegetation and fuel characteristics. The relational database structure consists of : 1) fuelbed data and source tables; 2) definition tables; 3) inferred associated variables; 4) calculated associated variables; and 5) other information required by the user interfaces and calculation processes. We are finalizing design issues and constructing fuel characteristic generation protocols. Finally, we are finalizing the design of a three-digit descriptor that classifies the FCC fire potential of fuelbeds based on fire behavior potential (x-axis, 6 levels), crowning potential (y-axis, 4 levels), and available fuel potential (z-axis, 5 levels). An article in the Journal of Wildland Fire has been printed and distributed.

The implementation phase, which is running concurrently with the other phases, will produce a FCC software tool with accompanying user manual and training package. ESSA Technologies Ltd. has completed a 1) software development guide for the system; 2) a protocol to link FCCs to the Fire and Fuels Extension to the Forest Vegetation Simulator (FVS); and 3) a CD-rom prototype of the FCC system for testing. Currently, the webbased FCC system is being developed by the FERA staff. Release of the FCC software is scheduled for late in 2003.

Issues/concerns affecting the project: During the 9 month contracting process, no contractor was found that was within the budget specified to develop the FCC web-based application. Consequently, the FERA team decided to compete the software development internal. This has put the project 9 months behind schedule and a no-cost extension will be requested within the next two months. Actual development of FCC linkages to other models is not part of this project and will need to be considered for future efforts.