

Suite of Fire and Fuel management Tools: Fuel Characteristic Classification System (FCCS), Natural Fuels Photo Series, Digital Fuels Photo Series (DPS), Consume 3.0, and Fire Emissions Production System (FEPS)



October 2009



FCCS
Fuel Characteristic Classification System
developed by the Fire and Environmental Research Applications Team

Seattle
SW Sagebrush

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Digital Photo Series

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Consume v3.0
developed by the Fire & Environmental Research Applications Team

Chapparal Central Arizona

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Fire Emission Production Simulator

Version 1.1.0

Developed By:

- David V. Sandberg, USDA Forest Service, Pacific Northwest Research Station
- Gary K. Anderson, HCG Inc.
- Robert A. Norheim, University of Washington





Fire and Environmental Research Applications Team

Anchoring the Pacific Wildland Fire Sciences Laboratory in Seattle, Washington



FERA is an interdisciplinary fire science team combining fuels, fire science, and fire ecology. We take on the broader landscape-scale issues such as hazard mapping, global change and carbon issues, air quality and regional haze assessments, and ecosystem sustainability issues.

FERA is integrated with the University of Washington, College of Forest Resources; and with the Pacific Northwest Region of National Forest Systems/Bureau of Land Management. Significant funding for our projects comes from the National Fire Plan, Joint Fire Science Program, National Forests, and other federal, state, and local partners.

Fuel Characteristic Classification System (FCCS)

<http://www.fs.fed.us/pnw/fera/fccs>

Natural Fuels Photo Series

http://www.fs.fed.us/pnw/fera/research/fuels/photo_series

Digital Photo Series

<http://depts.washington.edu/nwfire/dps>

Consume 3.0

<http://www.fs.fed.us/pnw/fera/research/smoke/consume>

Fire Emission Production Simulator (FEPS)

<http://www.fs.fed.us/pnw/fera/feps/>

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

The Fuel Characteristic Classification System (FCCS 2.0)

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

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 version 2.0 builds on this system by predicting surface fire behavior and quantifying 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.

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 version 2.0 predicts surface fire behavior, including reaction intensity ($\text{BTU ft}^{-2} \text{min}^{-1}$), 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 2.0 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 2.0 also reports carbon storage by fuelbed category and subcategory and predicts the amount of combustible







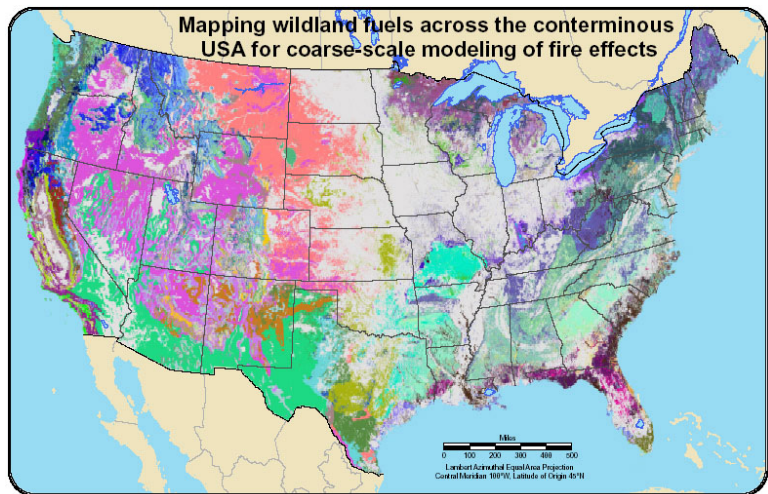
Stratum		Category
CANOPY		Trees, snags, ladder fuels
SHRUBS		Primary and secondary layers
NONWOODY VEGETATION		Primary and secondary layers
WOODY FUELS		All wood, sound wood, rotten wood, stumps, and woody fuel accumulations
LITTER-LICHEN-MOSS		Litter, lichen, and moss layers
GROUND FUELS		Duff, basal accumulations, and squirrel middens

Figure 1: Fuel strata and categories in the FCCS.

carbon in each category and subcategory based on selected fuel moisture scenarios. Additional changes in version 2.0 include: reports in English and metric units, photo uploads to represent each fuelbed, and a batch mode to provide output on a set of multiple fuelbeds.

Applications

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. FCCS 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 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, Deschutes National Forest, and 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 is currently developing a map layer of the FCCS fuelbeds throughout the United States.

FCCS software, tutorial, and user's guide are available for download from the FERA website (<http://www.fs.fed.us/pnw/fera/fccs/>). The FCCS has been transferred to managers and scientists during 15 national workshops and through eight published papers in a special section of the Canadian Journal of Forest Research (CJFR). In future versions, we expect References will be available, new fuelbeds, linkages with other FERA tools, FireMON, links to FOFEM, Fuelbed building tool

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Visit the FCCS Website at:

<http://www.fs.fed.us/pnw/fera/fccs/>

Last Updated: November, 2008





The Natural Fuels Photo Series

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

The Natural Fuels Photo series are a set of photographs with accompanying fuelbed characteristics data from sites where no recent management activity has occurred. They are used to make quick, easy, and inexpensive determinations of fuel quantities and stand conditions when less precise estimates are acceptable. The Natural Fuels Photo Series currently includes 15 volumes representing various regions of the United States and one volume each from Brazil and Mexico. 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.

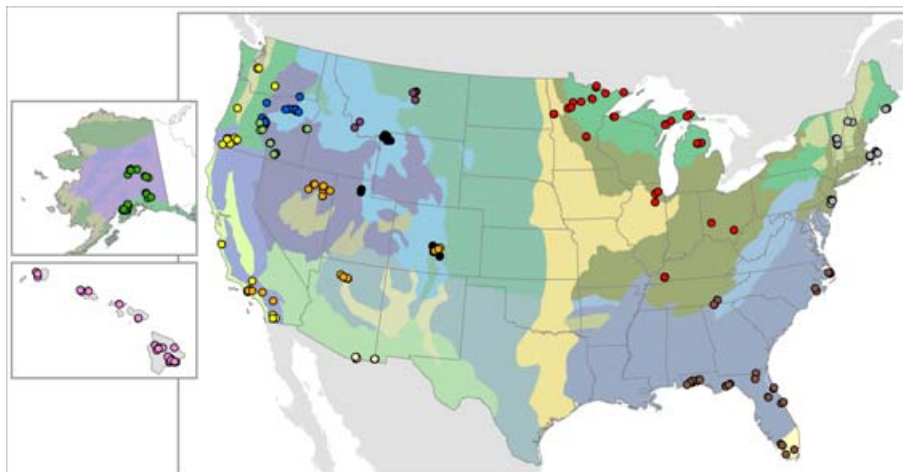
The photo series are important land management tools that can be used to ecologically assess landscapes through appraisal of living and dead woody material and vegetation biomass (fuels) and stand characteristics. Once an ecological assessment has been completed, stand treatment options such as prescribed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

Volume	Region	Fuelbed Types
I	Pacific Northwest	Mixed-conifer, western juniper, sagebrush, grass
II	Alaska	Black and white spruce
Ila	Alaska	Hardwoods with spruce
III	Rocky Mountains	Lodgepole pine, quaking aspen, Gambel oak
IV	Southwest	Pinyon-juniper, sagebrush, chaparral
V	Central & Lake States	Red & white pine, northern tallgrass prairie, mixed oak
Va	Lake States	Jack pine
VI	Southeast	Longleaf pine, pocosin, marshgrass
VIa	Southeast	Sand hill, sand pine scrub, hardwood with white pine
VII	West Coast	white oak, deciduous oak, mixed-conifer with shrubs
VIII	Northeast	Hardwoods, pitch pine, red spruce/balsam fir
IX	Southwest	Oak-juniper woodlands and savannahs
X	Montana	Sagebrush with grass, ponderosa pine-juniper
XI	Eastern Oregon	Sagebrush
XII	Southeast	Post hurricane fuels in forests of the southeast
Hawaii	Hawaii	Grassland, shrubland, woodland, forest
Brazil	Brazil	Cerrado (savannah)
Mexico	Mexico	Pine and oak

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 estimate 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:

http://www.fs.fed.us/pnw/fera/research/fuels/photo_series/

Ordering the Natural Fuels Photo Series:

Volumes I through VIII are available for ordering by fax from the National Interagency Fire Center (208-387-5573/5548). See their website for ordering instructions (<http://www.fire.blm.gov/gbk/publications.html>)

Volume XI can be printed from the Digital Photo Series (<http://depts.washington.edu/nwfire/dps/>). No printed copies are available.

Copies of Volumes IX, X, XII, Hawaii, and Brazil are available at no charge upon request from Roger Ottmar.

Copies of the Mexico photo series are available at no charge upon request from Ernesto Alvarado (alvarado@u.washington.edu).



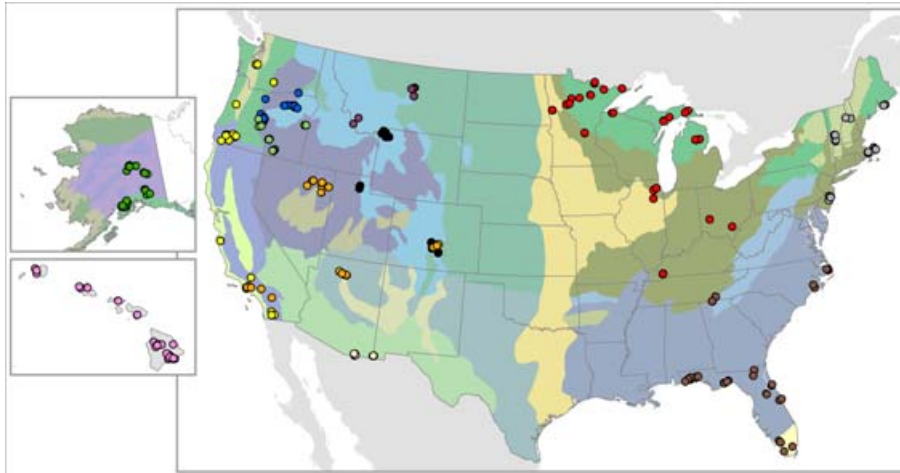


The Digital Photo Series

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

Background

Photo series provide a quick and easy way to quantify and describe current fuel and vegetation properties such as loading of dead and down woody material, tree density, or height of understory vegetation. This information is critical for making fuel management decisions and predicting fire behavior and fire effects. A significant national effort over the last decade has been undertaken to produce photos series for previously unrepresented vegetation types. Most recently, photo series for natural fuels have been published for hardwoods with spruce (Alaska); jack pine (Central and Lake States); Oregon white oak, California deciduous oak, and mixed conifer with shrubs (western U.S.); sand hill, sand pine scrub, and hardwoods with white pine (southeast U.S.); northern hardwoods, pitch pine, and red spruce/balsam fir (northeast U.S.); sagebrush with grass and ponderosa pine-juniper (central Montana); oak/juniper woodlands (southern Arizona and New Mexico), sagebrush (eastern Oregon); and post hurricane fuels (southeast U. S.).



The Natural Fuels Photo Series, a photo guide designed for field use, is a source of high quality fuels data and images for a wide variety of forest and range ecosystems throughout the United States. The original photo series guides were primarily developed for field-based assessments. Technological advances since the inception of the Natural Fuels Photos Series, coupled with development of new fire- and natural resource-based software applications highlight the need for an electronic version of the Photo Series. The Digital Photo Series is a user-friendly interface to the existing database of fuels information and high quality photographs.



About The Digital Photo Series

The Digital Photo Series contains searchable data and images for nearly 400 sites representing fuels in a wide range of ecosystems throughout the United States. Each entry includes a site description, species composition, fuel loading and arrangement, and overstory composition and structure. This information can be used for planning fuels treatments or other management actions, and as inputs to fire behavior and fire effects models and applications.

The Digital Photo Series has the ability to grow as new photo series are developed and as the priorities and needs of fire and fuels managers change and evolve. The Digital Photo Series is nearing completion and a beta version is available online (<http://depts.washington.edu/nwfire/dps/>). The Digital Photo Series will be available in two formats. Users will be able to access data and images using their web browser through an internet connection or, where the internet is not available, by loading the data and images from a CD. Either way the Digital Photo Series will have the same look, feel and functionality.

Digital Photo Series: Volume VII -- Site WO 07 (Under Development) - Mozilla Firefox

[Print Site WO 07] Measurement system: English

Volume VII: Western United States > Oregon White Oak > WO 07

SITE INFORMATION

Coordinates: N 46° 17' 32.72" W 120° 45' 3.69"
 Land owner: Yakama Indian Reservation (Bureau of Indian Affairs)
 SAF Cover Type: Oregon White Oak (SAF 233)
 Plant Association: Oregon white oak/blue wild rye woodland
 Ecoregion Division: Marine - Mountain Provinces (M240)
 Ecoregion Province: Cascade Mixed Forest - Coniferous Forest - Alpine Meadow (M242)
 Fire history: Unknown
 State: Washington
 Elevation: 1,540 ft
 Slope: 20%
 Aspect: NNW
 Crown closure: 74%
 Notes: If the sum of total forest floor constancy and the mineral soil constancy is less than 100, then the remainder is the constancy of a grass-dominated surface material with no duff.

SITE SPECIES

Trees (% of stems) Quercus garryana (100)
 Seedlings (% of stems) Quercus garryana (100)
 Understory (% cover) Graminoids (7)

UNDERTORY VEGETATION

Coverage (%)	Lifeform			
	Seedling	Shrub	Forb	Graminoid
Avgt height (ft)	--	1.4	0.0	0.4
Biomass (t/ha)	--	1	90	145
Density (stems/ac)	7,464	--	--	--

SAPLINGS AND TREES

	Size class (diameter at breast height in inches)			
	<= 4	4 - 9	9 - 16	> 16
Most common species (% of stems)	Quercus garryana (100)	Quercus garryana (100)	Quercus garryana (100)	Quercus garryana (100)
Tree density (stems/ac)	470	468	43	491
Live	262	332	29	361
Dead	188	116	14	130
Avg DBH (in)	2.2	4.0	9.9	6.3
Live	2.2	6.1	10.1	6.5
Dead	2.2	5.6	9.8	6.1
Avg height (ft)	9.0	16.0	22.0	17.0
Live	11.0	18.0	26.0	19.0
Dead	6.0	10.0	14.0	10.0
Avg height to crown base (ft)	2.0	4.0	4.0	4.0
Live	2.0	4.0	4.0	4.0
Dead	2.0	2.0	--	2.0
Avg height to live crown (ft)	4.0	7.0	8.0	7.0

WOODY MATERIAL

Diameter (in)	Loading (tons/ac)		Density (pieces/ac)	
	Sound	Rotten	Sound	Rotten
<= 0.25	0.40	0	0.40	--
0.26 - 1.0	1.00	0	1.00	--
1.1 - 3.0	1.40	0	1.40	--
3.1 - 9.0	2.20	0.10	2.30	88
> 9.0	0	0	0	0
Total	5.00	0.10	5.10	88

FOREST FLOOR

	Depth (in)	Loading (tons/ac)	Constancy (percent)
Surface material	2.4	6.40	95
Duff	1.0	3.40	56
Total forest floor	3.0	9.80	87
Substrate (Mineral soil)			4

Documentation: [Photo Series] [Volume VII] [WO series] Download WO series: [Excel] [Text] [XML]

http://depts.washington.edu/nwfire/dps/images/Vol_VII/eng/WO_07.jpg

Digital Photo Series

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Logos for nfw, U.S. Forest Service, and other agencies.

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Visit the Photo Series Website at:

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



CONSUME v. 3_0

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

Introduction

Land managers use fire to maintain and restore ecosystems, reduce fuel loading, expose mineral soil, improve wildlife habitat, and reduce the hazard of wildfire. As understanding of forest ecosystems has increased, forest managers have become more discriminating in their use of prescribed fire and managing wildland fire. Fires are now applied to satisfy land management objectives and benefit forest ecosystems as a whole.



Fuel consumption is a key variable in fire effects modeling and understanding when and how fire should be applied to meet site and landscape objectives while at the same time reducing air quality impacts. Until recently, much of the considerable research on fuel consumption focused on prescribed burning following logging in forested ecosystems.

FERA recently completed fuel consumption studies with support from the Joint Fire Science Program in natural fuel environments to improve our understanding of fuel consumption in wildland fuels for shrublands (including chaparral, sageland and palmetto/galberry types), hardwood forests (including southern and eastern regions of the U.S.), and boreal forests (including white spruce, black spruce and hardwood forests of Alaska). Improved models of fuel consumption were incorporated into Consume v 3_0. We also resolved differences in fuel consumption between the relatively short flaming phase of combustion and the longer smoldering phase of combustion that generally contributes the majority of wildland fire emissions.

Consume v 3_0 reflects an improved understanding of fuel consumption and emissions in wildland fire across major fuel types in the United States. Consume is a decision-making tool designed to assist resource managers in planning for prescribed fire, wildland fire for use, and wildfire. Consume predicts fuel consumption, pollutant emissions, and heat release based on a number of factors including fuel loadings, fuel moisture, and other environmental factors. Using these predictions, resource managers can determine when and where to conduct a prescribed burn or plan for a wildland fire to achieve desired objectives, while reducing the impact on other resources.

Fuel Consumption Research

Seventy-one sites were 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). Thirty-five sites were inventoried and burned in sagebrush on Bureau of Land Management, National Park Service, and U.S. Fish and Wildlife Service lands in eastern Oregon, Nevada, Wyoming, Utah, and California. Additionally, over 150 sites were burned in clearcut and partial cut logging slash fuelbeds in Washington and Oregon. Data from all burns have been compiled and analyzed. Consumption models were built for fuel categories within the following fuelbed types: Douglas-fir/western hemlock, lodgepole pine, grand fir/Douglas-fir, black and white spruce/hardwoods, longleaf and loblolly pine, ponderosa pine, grasslands, and sagebrush.

Consume 3_0 Software

Consume 3_0 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, and Consume outputs fuel consumption and emissions by combustion phase and by fuelbed category. Consume imports data from the Fuel Characteristic Classification System (FCCS), and outputs are formatted to feed other models and provide usable reports for burn plan preparation and smoke management requirements. Additionally, a tutorial and user's manual are available. Consume is applicable to most wildland fires in forests, shrubs, woodlands, and grasslands in North America.

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Visit the CONSUME Website at:

<http://www.fs.fed.us/pnw/fera/products/consume.html>



Last Updated: October, 2009



The Fire Emission Production Simulator (FEPS)

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.



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

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.

Fire Emission Production Simulator

Version 1.1.0

Developed By:
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<https://www.fs.fed.us/pnw/fera/feps/>

Fuels Photo Series



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The development of the natural fuels photo series is an ongoing project by the Fire and Environmental Research Applications Team (FERA). Several volumes and supplements have been completed. A majority of the photo series books can be ordered through the National Interagency Fire Center, Publication Management System, Boise, Idaho for a small fee. Order blanks can be obtained from the FERA website www.fs.fed.us/pnw/fera or by visiting the National Wildfire Coordinating Group Publication Management System's website: <http://www.nwgc.gov/pms/pms.htm>. Four of the available photo series were published by the U.S. Forest Service Pacific Northwest Research Station and are available free of charge via e-mail request.

AVAILABLE NATURAL FUELS PHOTO SERIES

- ¹**Ottmar, Roger D.; Vihnanek, Robert E.; Wright, Clinton S. 1998.** Stereo photo series for quantifying natural fuels. Volume I: mixed-conifer with mortality, western juniper, sagebrush, and grassland types in the interior Pacific Northwest. PMS 830. Boise, ID: National Wildfire Coordinating Group, National Interagency Fire Center. 73 p. Order Number – NFES #2580 \$33.07
- ¹**Ottmar, Roger D.; Vihnanek, Robert E. 1998.** Stereo photo series for quantifying natural fuels. Volume II: black spruce and white spruce types in Alaska. PMS 831. Boise, ID: National Wildfire Coordinating Group, National Interagency Fire Center. 65 p. Order Number – NFES #2581 \$32.21
- ¹**Ottmar, Roger D.; Vihnanek, Robert E. 2002.** Stereo photo series for quantifying natural fuels. Volume IIa: hardwoods with spruce in Alaska. PMS 836. Boise, ID: National Wildfire Coordinating Group, National Interagency Fire Center. 41 p. Order Number – NFES #2668 \$33.57
- ¹**Ottmar, Roger D.; Vihnanek, Robert E.; Wright, Clinton S. 2000.** Stereo photo series for quantifying natural fuels. Volume III: lodgepole pine, quaking aspen, and gambel oak types in the Rocky Mountains. PMS 832. Boise, ID: National Wildfire Coordinating Group, National Interagency Fire Center. 85 p. Order Number – NFES #2629 \$36.82
- ¹**Ottmar, Roger D.; Vihnanek, Robert E.; Regelbrugge, Jon C. 2000.** Stereo photo series for quantifying natural fuels. Volume IV: pinyon-juniper, sagebrush, and chaparral types in the Southwestern United States. PMS 833. Boise, ID: National Wildfire Coordinating Group, National Interagency Fire Center. 97 p. Order Number – NFES #1084 \$27.53
- ¹**Ottmar, Roger D.; Vihnanek, Robert E. 1999.** Stereo photo series for quantifying natural fuels. Volume V: midwest red and white pine, northern tallgrass prairie, and mixed oak types in the Central and Lake States. PMS 834. Boise, ID: National Wildfire Coordinating Group, National Interagency Fire Center. 99 p. Order Number – NFES #2579 \$36.52
- ¹**Ottmar, Roger D.; Vihnanek, Robert E.; Wright, Clinton S. 2002.** Stereo photo series for quantifying natural fuels. Volume Va: jack pine in the Lake States. PMS 837. Boise, ID: National Wildfire Coordinating Group, National Interagency Fire Center. 49 p. Order Number – NFES #2669 \$36.84
- ¹**Ottmar, Roger D.; Vihnanek, Robert E. 2000.** Stereo photo series for quantifying natural fuels. Volume VI: Longleaf pine, pocosin, and marshgrass types in the Southeast United States. PMS 835. Boise, ID: National Wildfire Coordinating Group, National Interagency Fire Center. 56 p. Order Number – NFES #2630 \$30.09
- ¹**Ottmar, Roger D.; Vihnanek, Robert E.; Mathey, Jared W. 2003.** Stereo photo series for quantifying natural fuels. Volume VIa: sand hill, sand pine scrub, and hardwood with white pine types in the Southeast United States with supplemental sites for Volume VI. PMS 838. Boise, ID: National Wildfire Coordinating Group, National Interagency Fire Center. 78 p. Order Number – NFES #1119
- ¹**Ottmar, Roger D.; Vihnanek, Robert E.; Wright, Clinton S.; Olson, Diana. 2004.** Stereo photo series for quantifying natural fuels. Volume VII: Oregon white oak, California deciduous oak, and mixed-conifer with shrub types in the western United States. National Wildfire Coordinating Group, National Interagency Fire Center. 76 p. Order Number – NFES #1119
- ¹**Ottmar, Roger D.; Vihnanek, Robert E., Wright, Clinton S. 2006.** Stereo photo series for quantifying natural fuels. Volume VIII: Hardwood, pitch pine, and red spruce/balsam fir types in the northeastern United States. PMS 840. Boise, ID: National Wildfire Coordinating Group, National Interagency Fire Center. 91 p.
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²Ottmar, Roger D.; Vihnanek, Robert E.; Miranda, Heloisa S.; Sato, Margarete N.; Andrade, Saulo M.A. 2001. Stereo photo series for quantifying Cerrado fuels in central Brazil – Volume I. Gen. Tech. Rep. PNW-GTR-519. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 87 p. Available from Pacific Wildland Fire Sciences Laboratory. Send requests via e-mail to: rottmar@fs.fed.us

²Ottmar, Roger D.; Vihnanek, Robert E., Wright, Clinton S. 2007. Stereo photo series Stereo photo series for quantifying natural fuels. Volume X: Sagebrush with grass and ponderosa pine-juniper types in central Montana. Gen. Tech. Rep. PNW-GTR-719. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest research Station. 59 p. Send requests via e-mail to: rottmar@fs.fed.us

²Ottmar, Roger D.; Vihnanek, Robert E., Wright, Clinton S. 2007. Stereo photo series Stereo photo series for quantifying natural fuels. Volume IX: oak/juniper in southern Arizona and New Mexico. Gen. Tech. Rep. PNW-GTR-714. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest research Station. 41 p. Send requests via e-mail to: rottmar@fs.fed.us

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³Vihnanek, Robert E., Wright, Clinton S., Ottmar, Roger D. 2009. Stereo photo series for quantifying natural fuels. Volume XI: Sagebrush and grass, sagebrush and woodlands, sagebrush and ponderosa pine in southeast Oregon. No printed copies. Photo series can be obtained and printed from the digital; photo series. (<http://depts.washington.edu/nwfire/dps/>)

²Alvarado, Ernesto Celestino, Morfin-Rios, Jorge E., Pelaez-Jardel, Enrique J., Vihnanek, Robert E., Wright, David K., Mchel-Fuentes, Jose, M., Wright, Clinton S., Ottmar, Roger D., Sandberg, David V., Diaz-Najerae, Andres. 2008. Photo series for quantifying forest fuels in Mexico: montane subtropical forests of the Sierra Madre del Sur, and temperate forests and montane shrublands of the northern Sierra Madre oriental.. University of Washington College of Forest Resources. Seattle, Washington, USA. Send requests via e-mail to: rottmar@fs.fed.us

AVAILABLE ACTIVITY FUELS PHOTO SERIES

²Ottmar, Roger D; Hardy, Colin C.; Vihnanek, Robert E. 1990. Stereo photo series for quantifying forest residues in the Douglas-fir--western hemlock type in the Willamette National Forest. Gen. Tech. Rep. PNW-GTR-258. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 63 p. Available from Pacific Wildland Fire Sciences Laboratory. Send requests via e-mail to: rottmar@fs.fed.us

²Ottmar, Roger D; Hardy, Colin C. 1989. Stereo photo series for quantifying forest residues in coastal Oregon forests: second growth Douglas-fir—western hemlock type, western hemlock—Sitka spruce type, and red alder type. Gen. Tech. Rep. PNW-GTR-231. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 67 p. Available from Pacific Wildland Fire Sciences Laboratory. Send requests via e-mail to: rottmar@fs.fed.us

¹ Available for a small fee from the National Wildfire Coordinating Group, Publication Management System, Boise, Idaho: <http://www.nwcg.gov/pms/pms.htm>.

² Available through the Pacific Wildland Fire Sciences Laboratory by phone or e-mail request.

³ No printed copies. Photo series can be obtained and printed from the digital; photo series. (<http://depts.washington.edu/nwfire/dps/>)

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FCCS 2_0 CD Installation Instructions

FCCS will run on many different operating systems, including Linux, Macintosh, and Microsoft Windows. To run FCCS, your computer must have a current version of Java Virtual Machine (version 1.6 or greater) installed. Because many computers already have this installed, it is probably easiest to install FCCS first. If FCCS does not open, your computer probably needs a Java update (see “Java Installation” below).

Administrative Privileges

If you do not already have administrative privileges on your computer, you must obtain them before installing FCCS. To check if you have administrative privileges, double-click on the time at the bottom right of your desktop. If you are allowed to change the date and time on your computer, you already have administrative privileges. If you do not, please contact your system administrator for assistance.

CAUTION! If you reinstall or update FCCS, and you have customized fuelbeds stored in the ...\\fcss\\con\\fuelbed\\user_fuelbeds directory, copy them to a location outside the FCCS before reinstalling the program. Otherwise, your customized fuelbeds will be automatically deleted.

FCCS Installation for Windows

Step 1. Using the CD accompanying the Fact sheet binder, go to the folder named Fuel Characteristic Classification System.

Step 2. Double-click the self-extracting file **fcss20_setup.msi** to launch the installation.

Step 3. Change the installation path to **c:\\fcss** (note that a forward slash will not work).

IMPORTANT!! The Microsoft installation instructions will suggest you place the program in the location **c:\\Program Files\\fcss\\2.0.0**. Please do not use this default location since it is incompatible with certain governmental computer regulations, and the subdirectory name “2.0.0” does not work with the Consume 3_0 interface with the FCCS. Please change the installation path to: **c:\\fcss**.

Step 4. Click **Next** to continue with the installation. The installer will create an FCCS icon on your desktop.

Step 5. To open FCCS, double-click the FCCS icon on your desk top. Depending on your computer’s processing speed, the program may take a few moments to load. If the program does not open, please see instructions for upgrading your computer’s version of Java Virtual Machine (below).

FCCS Use for Microsoft Vista Users

Vista users will find it necessary to run fccs 2_0 as an administrator, to increase your user permissions, or to run in Compatibility Mode with an earlier version of windows. Right click on the fccs icon and open the 'properties' tab to access these options.

FCCS Installation for Other Operating Systems

Step 1. Unzip the file **fccs20_setup.zip** to a destination of your choosing (e.g., c:\fccs).

Step 2. Open your file managers and migrate to the FCCS folder.

Step 3. Double-click the **fccs.bat** file to open the FCCS. Depending on your computer's processing speed, the program may take a few moments to load. The FCCS will open two windows: a welcome screen and a command window. Closing the command window will close the application.

Java Installation (If Needed)

The FCCS needs the free software called Java to run. If FCCS does not open, you probably need to install Java Virtual Machine (version 1.6 or greater). Administrative privileges are necessary for this installation.

Step 1. To verify you have administrative privileges, double-click the time on the tool bar in the lower right corner of your screen. If you have administrative privileges, you can change the date and time on your computer. If you do not have administrative privileges, please contact your system administrator for assistance.

Step 2. Go to <http://www.java.com> and click the **Free Java Download** button.

Step 3. You will be asked if you accept the "Terms of Use". Click **Continue**. Once the installation is complete, try reopening FCCS.

Step 4. If there is a different problem with your installation, please contact FCCS Tech Support (pnw_fccshelp@fs.fed.us) for help diagnosing the problem.

Contacts for assistance:

Susan Prichard (509-996-2408); sprich@u.washington.edu

Ellen Eberhardt (541-750-7481); eeberhardt@fs.fed.us

Roger Ottmar (206-732-7826); rottmar@fs.fed.us

Last Updated October 2009

FCCS 2_0 Installation Instructions Using FERA Website

FCCS will run on many different operating systems, including Linux, Macintosh, and Microsoft Windows. To run FCCS, your computer must have a current version of Java Virtual Machine (version 1.6 or greater) installed. Because many computers already have this installed, it is probably easiest to install FCCS first. If FCCS does not open, your computer probably needs a Java update (see “Java Installation” below).

Administrative Privileges

If you do not already have administrative privileges on your computer, you must obtain them before installing FCCS. To check if you have administrative privileges, double-click on the time at the bottom right of your desktop. If you are allowed to change the date and time on your computer, you already have administrative privileges. If you do not, please contact your system administrator for assistance.

CAUTION! If you reinstall or update FCCS, and you have customized fuelbeds stored in the `...\fccs\con\fuelbed\user_fuelbeds` directory, copy them to a location outside the FCCS before reinstalling the program. Otherwise, your customized fuelbeds will be automatically deleted.

FCCS Installation for Windows

Step 1. Go to: <http://www.fs.fed.us/pnw/fera/fccs/downloads.shtml>.

Step 2. Download (save) the file `fccs20_setup.msi` to your computer. Remember where you put it.

Step 3. Double-click the self-extracting file `fccs20_setup.msi` you’ve saved to your computer (above) to launch the installation.

Step 4. Change the installation path to `c:\fccs` (note that a forward slash will not work).

IMPORTANT!! The Microsoft installation instructions will suggest you place the program in the location `c:\Program Files\fccs\2.0.0`. Please do not use this default location since it is incompatible with certain governmental computer regulations, and the subdirectory name “2.0.0” does not work with the Consume 3_0 interface with the FCCS. Please change the installation path to: `c:\fccs`.

Step 5. Click **Next** to continue with the installation. The installer will create an FCCS icon on your desktop.

Step 6. To open FCCS, double-click the FCCS icon. Depending on your computer’s processing speed, the program may take a few moments to load. If the program does not open, please see instructions for upgrading your computer’s version of Java Virtual Machine (below).

FCCS Use for Microsoft Vista Users

Vista users will find it necessary to run fccs 2_0 as an administrator, to increase your user permissions, or to run in Compatibility Mode with an earlier version of windows. Right click on the fccs icon and open the 'properties' tab to access these options.

FCCS Installation for Other Operating Systems

Step 1. Unzip the file **fccs2_0_setup.zip** to a destination of your choosing (e.g., c:\fccs).

Step 2. Open your file managers and migrate to the FCCS folder.

Step 3. Double-click the **fccs.bat** file to open the FCCS. Depending on your computer's processing speed, the program may take a few moments to load. The FCCS will open two windows: a welcome screen and a command window. Closing the command window will close the application.

Java Installation (If Needed)

The FCCS needs the free software called Java to run. If FCCS does not open, you probably need to install Java Virtual Machine (version 1.6 or greater). Administrative privileges are necessary for this installation.

Step 1. To verify you have administrative privileges, double-click the time on the tool bar in the lower right corner of your screen. If you have administrative privileges, you can change the date and time on your computer. If you do not have administrative privileges, please contact your system administrator for assistance.

Step 2. Go to <http://www.java.com> and click the **Free Java Download** button.

Step 3. You will be asked if you accept the "Terms of Use". Click **Continue**. Once the installation is complete, try reopening FCCS.

Step 4. If there is a different problem with your installation, please contact FCCS Tech Support (pnw_fccshelp@fs.fed.us) for help diagnosing the problem.

Contacts for assistance:

Susan Prichard (509-996-2408); sprich@u.washington.edu

Ellen Eberhardt (541-750-7481); eeberhardt@fs.fed.us

Roger Ottmar (206-732-7826); rottmar@fs.fed.us

Last Updated October 2009

Consume 3_0 CD_Installation Instructions

I. System Requirements

You can install **Consume** on a personal computer with the following system:

30 MB of available disk space.

Microsoft Windows[®] 2000 ,XP, and Vista operating systems.

Optional requirement; Consume links to Microsoft Excel for viewing 1000-hr fuel moisture graphs. If you do not have Excel on your computer, Consume will run but will not support this graphics feature.

II. Administrative Privileges

If you do not already have administrative privileges on your computer, you must obtain them before installing **Consume**. To check if you have administrative privileges, click on the clock at the bottom right of your desktop. If you are allowed to change the date and time on your computer, you already have administrative privileges. If you do not, please contact your system administrator for assistance.

III. Notes on Installing Consume

In order to run **Consume** in Microsoft Windows®, it is necessary to have both Microsoft Framework .NET v 1.1 and Visual J#.NET installed on your computer. Most computers will already have the Microsoft Framework .Net v1.1, but Visual J#.NET will need to be installed on most computers.

The best way to check if you have the necessary Microsoft Windows updates is to try installing **Consume 3_0**. You will receive detailed error messages if you need to install Microsoft Framework.NET version 1.1 and/or Visual J# .NET. To download and install the necessary updates, see the instructions provided later in this installation guide.

IV. Installation Instructions

Step 1. Using the CD accompanying the Fact Sheet binder, go to the folder named **Consume**.

Step 2. Double click on the self extracting files **setup.msi** to launch the installation process.

Step 3. Change the installation path to **C:\Consume** (note that the forward slash will not work)

*****IMPORTANT***** The Microsoft installer will suggest you place the program in the location c:\Program Files\Consume. Please do not use this default location since it may be incompatible with upcoming governmental computer regulations. Please change the installation path to: **c:\Consume**.

Step 4. To open **Consume**, double-click the Consume icon (burning log) on your desktop. Depending on your computer's processing speed, the program may take a few minutes to load. If the program does not open, please see the following instructions on installing the two free Microsoft products:

- 1) Framework.Net version 1.1 Redistribution Package and
- 2) Visual J#.NET Redistributable Package 1.1. These will require administration rights.

Installing Microsoft Framework .NET version 1.1 Redistributable Package for Consume Operation

Most Microsoft Windows 2000 and XP operating systems should have a working version of Microsoft.NET v1.1. If you have a more recent version of .NET, you will still need to install .NET v1.1. Note: it is not necessary to uninstall more recent versions of .NET.

Step 1. Go to the Consume website: <http://www.fs.fed.us/pnw/fera/products/consume.html>

Step 2. Click Download under **LINKS**.

Step 3. Click **Microsoft.NET Framework v 1.1**.

Step 4. From the File Download dialog box, click Save to Disk, then OK. Depending on your internet connection speed, the file download may take a few minutes.

Step 5. Once the download is complete, double-click on the file **dotnetfx.exe** to launch the installation process.

Step 6. Follow the on-screen instructions to complete the installation.

If your operating system already has Microsoft Framework .NET v1.1 installed, you will get an error message during this installation process. You can cancel this installation and proceed to install Microsoft J#.Net Redistributable Package version 1.1.

Installing Visual J#.NET Redistributable Package 1.1 for Consume Operation

Most Microsoft Windows 2000 and XP operating systems will not have Visual J#.NET. If your computer does not have Visual J#.Net v 1.1, follow these installation instructions:

Step 1. Go to the Consume website: <http://www.fs.fed.us/pnw/fera/products/consume.html>

Step 2. Click Download under *Links*.

Step 3. Click **Microsoft Visual J# v 1.1**.

Step 4. From the File Download dialog box, click Save to Disk, then OK. Depending on your internet connection speed, the file download may take a few minutes.

Step 5. Once the download is complete, double-click on the file vjredist.exe to launch the installation process.

Step 6. Follow the on-screen instructions to complete the installation.

If your operating system already has Microsoft Visual J#.NET 1.1, you will get an error message during the installation process. Cancel this installation and proceed to download and install Consume 3.0.

For further information, contact:

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Susan Prichard, FCCS and Consume 3.0 Manager
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sprich@u.washington.edu

Last updated October 2009

Consume 3_0_ Web_Installation Instructions

I. System Requirements

You can install **Consume** on a personal computer with the following system:

30 MB of available disk space.

Microsoft Windows[®] 2000 ,XP, and Vista operating systems.

Optional requirement; Consume links to Microsoft Excel for viewing 1000-hr fuel moisture graphs. If you do not have Excel on your computer, Consume will run but will not support this graphics feature.

II. Administrative Privileges

If you do not already have administrative privileges on your computer, you must obtain them before installing **Consume**. To check if you have administrative privileges, click on the clock at the bottom right of your desktop. If you are allowed to change the date and time on your computer, you already have administrative privileges. If you do not, please contact your system administrator for assistance.

III. Notes on Installing Consume

In order to run **Consume** in Microsoft Windows®, it is necessary to have both Microsoft Framework .NET v 1.1 and Visual J#.NET installed on your computer. Most computers will already have the Microsoft Framework .Net v1.1, but Visual J#.NET will need to be installed on most computers.

The best way to check if you have the necessary Microsoft Windows updates is to try installing **Consume 3_0**. You will receive detailed error messages if you need to install Microsoft Framework.NET version 1.1 and/or Visual J# .NET. To download and install the necessary updates, see the instructions provided later in this installation guide.

IV. Installation Instructions

Step 1. Go to the **Consume** download page:

http://www.fs.fed.us/pnw/fera/research/smoke/consume/consume_download.shtml

Step 2. Click Consume 3_0 software download.

Step 3. From the File Downlaod dialog box, click **Save to Disk**. Depending on your internet connection speed, the file download may taker a few minutes.

Step 4. Once the download is complete, go to the folder where the download is located and double-click on the file **Setup.msi** to launch the installation process.

Step 5. Change the installation path to **C:\Consume** (note that a forward slash will not work).

*****IMPORTANT***** The Microsoft installer will suggest you place the program in the location c:\Program Files\Consume. Please do not use this default location since it may be incompatible with upcoming governmental computer regulations. Please change the installation path to: **c:\Consume**.

Step 6. To open **Consume**, double-click the Consume icon (burning log) on your desktop. Depending on your computer's processing speed, the program may take a few minutes to load. If the program does not open, please see the following instructions on installing the two free Microsoft products:

- 1) Framework.Net version 1.1 Redistribution Package and
- 2) Visual J#.NET Redistributable Package 1.1. These will require administration rights.

Installing Microsoft Framework .NET version 1.1 Redistributable Package for Consume Operation

Most Microsoft Windows 2000 and XP operating systems should have a working version of Microsoft.NET v1.1. If you have a more recent version of .NET, you will still need to install .NET v1.1. Note: it is not necessary to uninstall more recent versions of .NET.

Step 1. Go to the Consume website: <http://www.fs.fed.us/pnw/fera/products/consume.html>

Step 2. Click Download under **LINKS**.

Step 3. Click **Microsoft.NET Framework v 1.1**.

Step 4. From the File Download dialog box, click Save to Disk, then OK. Depending on your internet connection speed, the file download may take a few minutes.

Step 5. Once the download is complete, double-click on the file **dotnetfx.exe** to launch the installation process.

Step 6. Follow the on-screen instructions to complete the installation.

If your operating system already has Microsoft Framework .NET v1.1 installed, you will get an error message during this installation process. You can cancel this installation and proceed to install Microsoft J#.Net Redistributable Package version 1.1.

Installing Visual J#.NET Redistributable Package 1.1 for Consume Operation

Most Microsoft Windows 2000 and XP operating systems will not have Visual J#.NET. If your computer does not have Visual J#.Net v 1.1, follow these installation instructions:

Step 1. Go to the Consume website: <http://www.fs.fed.us/pnw/fera/products/consume.html>

Step 2. Click Download under *Links*.

Step 3. Click **Microsoft Visual J# v 1.1**.

Step 4. From the File Download dialog box, click Save to Disk, then OK. Depending on your internet connection speed, the file download may take a few minutes.

Step 5. Once the download is complete, double-click on the file vjredist.exe to launch the installation process.

Step 6. Follow the on-screen instructions to complete the installation.

If your operating system already has Microsoft Visual J#.NET 1.1, you will get an error message during the installation process. Cancel this installation and proceed to download and install Consume 3.0.

For further information, contact:

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CD Table of Contents

FUEL_CHARACTERISTIC_CLASSIFICATION_SYSTEM

scientific_documentation (folder) (14.3 MB)

factsheet_fccs20.pdf (456 kb)
FCCS Fact Sheet

fccs_overview.ppt (61.0 MB)
Overview of the FCCS

fccs20.msi (43 MB)
FCCS software

abridged_fccs_user_guide_20.pdf (2.2 MB)
FCCS Users Guide

fccs_tutorial_1-1.zip (16.8 MB)
FCCS tutorial

NATURAL_FUELS_PHOTO_SERIES

factsheet_ps.pdf (131 kb)
Photo Series Fact Sheet

factsheet_dps.pdf (352 kb)
Digital Photo Series Fact Sheet

ps_tutorial.zip (35.1 MB)
Photo Series tutorial

CONSUME

factsheet_consume.pdf (127 kb)
Consume Fact Sheet

consume_overview.ppt (56 MB)
Overview of Consume

Setup.msi (23.8 MB)
Consume software (self-executing)

consume30_user_guide.pdf (2.4 MB)
Consume Users Guide

consume_tutorial.zip (20.8 MB)
Consume tutorial

microsoft_end_user_license_agreement.pdf (55 kb)
Agreement for installation of dotnetfx.exe and vjredist.exe

dotnetfx.exe (23.7 MB)
Microsoft .NET executable file

vjredist.exe (6.8 MB)
Microsoft .NET Redistributable executable file

FIRE_EMISSION_PRODUCTION_SIMULATOR

factsheet_feps.pdf (89 kb)
FEPS Fact Sheet

feps.msi (13.2 MB)
Fire Emission Production Simulator (FEPS) software (self-executing)

FEPS_users_guide.pdf (5.7 MB)
FEPS Users Guide

feps_tutorial.zip (17.8 MB)
Fire Emission Production Simulator (FEPS) tutorial

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