United States
Department of
Agriculture

**Forest
Service**

Forest
Management
Service
Center

Forest Management Service Center

Annual Staff Report
Fiscal Year 2010

About Us

The Forest Management Service Center (FMSC), located in Fort Collins, Colorado, is a detached unit of the USDA Forest Service National Forest System Forest Management Staff, Washington Office. The Service Center provides mensuration, statistical, modeling, biometric, sampling, and analysis skills to the Forest Service and also cooperates and works in partnership with other government agencies (federal, tribal and state), research, colleges and universities, forest industry, consultants, and individuals in the United States and other countries. The FMSC is staffed with biometric and mensuration specialists possessing skills not available at most regional and forest level offices and is considered an extension of each region's technical staff.

Our Program Emphasis

We provide products and technical support for forest vegetation modeling and forest products measurement to the National Forests and our partners.

Message from the FMSC Center Manager

Fiscal year 2010 was a very busy year in the delivery of biometric services to the field in the areas of Forest Vegetation Simulation (FVS) and Forest Products Measurements.

In the FVS area, new activities focused on climate change and how it may affect vegetation. One of our research partners, Nick Crookston of Rocky Mountain Research Station, received funding last year to develop a climate sensitive version of FVS. In July, Nick's work was published in the Journal of Forest Ecology and Management[1]. This work covers nearly all the western variants. For developing a climate sensitive version of FVS for the eastern U.S., the FVS staff facilitated a workshop in Milwaukee, Wisconsin in September. Dr. Phil Radtke from Virginia Tech will be the principal investigator for this effort. It will be completed in the next 18 months.

The Joint Fire Science Program funded $106,000 to the FVS group to improve the performance of FVS so it can run faster in landscape analyses and within new fire models.

This past year we conducted 7 week-long, formal FVS classes with an average of 19 students per class, and answered more than 25 hotline calls per week.

In April, Don Vandendriesche and Dave Cawrse travelled to China to speak at a conference on natural disasters in forested environments and how FVS can model forest disturbances. In August, two professors from Beijing Forestry University visited the FMSC to learn more about the carbon report.

On the Forest Products Measurements side, we maintain a suite of programs related to cruising, scaling, volume estimation, and area determination.

With an increased emphasis on biomass, a national biomass library has been developed to allow users to determine the green tons of biomass for a tree species in their local area. The new Biomass Estimator Library (NBEL) was released this past spring both as an Excel function and as part of the CruiseProcessing program. NBEL provides componentized estimates of biomass material for the bole, branches, crown, stump, and bark in both dry and green tons. This library is useful for timber sales involving biomass as well as more accurate carbon reporting.

The measurements group is also working on ways to quickly measure land area and assist with navigation using GPS in a program called TwoTrails. Handbook FSH2409.12 chapter 50, Area Determination, has undergone intensive review to meet the demands of dynamic technical changes.

The FScruiser data collection program was updated to include the integration of geospatial data and a communication link with TwoTrails.

The randomized branch sampling method for estimating crown biomass is currently being used in the field.

The Service Center has been working with the Regions to update the Timber Cruising Handbook to accommodate an increased emphasis on biomass products for potential inclusion in timber sales.

Leah Rathbun was hired through the on-the-spot hiring program at the 2009 Society of American Forester's Convention. Leah started with our shop in June, 2010 and will work both in growth and yield and measurements. She recently completed her PhD at the University of British Columbia. Andrew Sanchez Meador left our shop to accept an assignment on the Lincoln National Forest.

We anticipate our budget to be about $1.5 million, down about 5% from last year. In 2010, nearly a third of a million dollars was generated in partnerships aimed at improving and validating FVS, and developing a climate sensitive version of FVS.

We will continue to provide excellent products and technical support for vegetation modeling and forest product measurements to the National Forests and our partners.

Dave Cawrse
Director, Forest Management
Service Center

[1] Crookston, Rehfeldt, Dixon, and Weiskettel "Addressing Climate Change in the Forest Vegetation Simulator to Assess Impacts on Landscape Forest Dynamics" Forest Ecology and Management July 2010.

Forest Products Measurements Staff Report

We maintain a suite of programs related to cruising, scaling, volume estimation, and area determination and provide hotline support and training.

Cruising

Timber cruising is the process of measuring forest stands to determine stand characteristics, such as average tree sizes, volume, and quality. The primary purpose of cruising is to obtain a volume estimate to appraise and prepare timber sales.

In FY10, the FScruiser data collection program was updated to include the integration of geospatial data and a communication link with TwoTrails. FScruiser runs on many field data recorders and personal digital assistants (PDAs). This allows field units to purchase hardware fitting their local environmental conditions and budget.

General maintenance on the CruiseProcessing program continued throughout 2010 with new releases made available as needed. The new Biomass Estimator Library (NBEL) was added to the CruiseProcessing program and was released in production form in the spring of FY2010. A new weight report was included in the release to facilitate review of the data obtained from NBEL.

The National Check Cruise program (NCC) was released in FY2010 as beta and production. The program automates the check cruising process and provides easy entry of regional tolerances and generation of necessary reports.

We are working with the BLM to develop a new three stage sampling method combining 3P sampling with the Point Count Measure sampling method. Development and testing will continue through FY2011.

The Average Piece Size Simulator (APSS) for estimating average log lengths removed from a timber sale for use in timber sale appraisals was released as a beta version.

Computer based tutorials were completed for Basic Measurements and the Timber Theft program. Updates were made to the Cruise Methods and CruiseProcessing tutorials.

Volume Estimation

The Volume Library provides consistent volume estimation from tree measurements using state-of-the-art volume models and is used in nearly all of our software applications and also used by our partners. This year, the library had several updates including the addition of log level output logic to the Region 9 profile models.

The development of a new Biomass Estimator Library has been completed and incorporated into FMSC software. The Biomass Estimator Library provides componentized estimates of biomass material for the bole, branches, crown, stump, and bark in both dry and green tons. The library is useful for timber sales involving biomass as well as more accurate carbon reporting. The FMSC is working with the Regions, other agencies, and outside cooperatives to continue development and validation of biomass equations.

The randomized branch sampling method for estimating crown biomass is currently being used in the field. We assisted Region 6 with a biomass study using the random branch sampling method and developed a new data recorder program to assist with the selection, recording, and analysis of the data.

Scaling

Scaling is the determination of the gross and net volume of logs. The primary purpose of scaling is to determine the volume by product or species to be charged at a predetermined rate. The measurements group maintains the FSscaler field data collection software and the Scale Expansion Program which transmits data to the Timber Information Management system (TIM).

We are working with the San Dimas Technology & Development Center (SDTDC) to incorporate voice activated data entry to the FSscaler program to explore hands free data entry.

Area Determination

The measurements group is also working on efficient ways to quickly and quantitatively measure land area and assist with navigation using GPS and traditional traverse methods. We continue to work with the Missoula Technology and Development Center (MTDC) supporting procedures using GPS and other surveying techniques in Forest Service operations including expanding the Accuracy Matrix for the various GPS units.

The TwoTrails program is becoming a tool used by many timber cruisers for area determination, navigation, group selections, and similar cruising survey needs.

Handbook FSH2409.12 chapter 50, Area Determination, has been undergoing intensive review to meet the demands of dynamic technical changes. A draft suitable for training has been created and shared with the goal of formalizing the changes in FY2011. Several Regions have already implemented the new direction as Regional Supplements to Handbook FSH2409.12.

One of our team members, Gary Boyack, serves on the Interagency Global Positioning System Challenge Team, which looks at developing a consistent policy to manage GPS as a national asset. Most federal land management regulatory agencies are part of this board, as well as academia, local governments, and individuals.

General

We coordinate the National Measurements Steering Committee which meets annually and provides direction for the measurements group.

The Service Center has been working with the Regions to update the Timber Cruising Handbook to accommodate an increased emphasis on biomass products for potential inclusion in timber sales and a draft version of FSH2409.12 chapter 30, Cruising Systems, was released for review by the measurements specialists.

Important Partnerships

We are gaining more partners in the measurements area. Besides the National Forests, users of our measurements software include state, tribal, and other federal agencies, educational institutions, Forest Service Research Stations, and individuals and companies. Nearly all land management agencies involved with land and timber measurement currently use our software (BLM, BIA, National Park Service, Agriculture Research Service, Fish and Wildlife Service, Natural Resource Conservation Service, Army Corps of Engineers and the Department of Defense), as well as five state forestry agencies. Ken Cormier was also invited to join the Scaling Primary Forest Products committee of the Canadian Standards Association and will serve as the USDA Forest Service Representative.

Customer Support

In FY10, the measurements staff participated or assisted in cruiser training workshops in Regions 1, 2, 3, 4, 6, 8 and 9. Additional training on TwoTrails and new area determination procedures were provided to Regions 2, 6, and 8. The Interagency Check Cruiser Workshop was held in Fort Collins, Colorado, in October 2009, covering the topic of Area Determination. The workshop examined the proposed changes to FSH2409.12 Chapter 50 with field exercises to demonstrate the implementation of these changes in the field.

The measurements staff averages about 30 hotline contacts, emails and phone calls per week relating to volume, cruising, scaling, and area determination questions from all regions of the Forest Service and other government agencies, as well as state agencies, universities, and private consultants.

Contact	**% of contacts**
Forest Service	75
Other Gov. Agencies	10
State/University	10
Private	5

Future Initiatives and Projects

Future projects include continuing to expand the biomass estimator library and explore cost effective methods for cruising biomass material. We will continue to support all software components within the National Cruise System. Software enhancements will include moving to a robust database system for data collection and processing, moving away from a binary flat file. FScruiser enhancements include a redesign of the program to provide a more stable data collection platform. Computer-based tutorials will continue to be developed to assist in cost effective training. A sampling simulator is being developed to assist in training for cruise design. FSscaler software will be updated to allow for Scribner and long log data entry and processing as required legislatively in Region 10. Also in the scaling area, the National Scale Expansion program will be converted to a database system compatible with current Forest Service architecture. Finally, updated handbook direction for FSH2409.12 chapters 30 and 50 will be reviewed and finalized.

Forest Vegetation Simulation (FVS) Staff Report

The Forest Vegetation Simulator (FVS) is a growth and yield model simulating growth and mortality for most forest tree species, forest types, and stand conditions. FVS can simulate a wide range of silvicultural treatments, fire, insects, diseases, and other disturbances. It can calculate stocking levels, harvest yields, biomass amounts, carbon allocations, fuel loads, fire effects, and many other metrics.

National

At the national level, one of our most important jobs is to maintain, enhance, and support the FVS code. This includes the base model as well as the Fire and Fuels Extension (FFE) and other extensions. This year we enhanced FVS functionality through:

- expansion of the number of recognized tree species in the western United States;
- improvement of the database capabilities for input and output;
- development and enhancement of FVS keywords and management actions, both in the base model and the extensions;
- beginning integration of FVS within the Data Analysis Tool for Inventory and Monitoring (DATIM). FVS will be used to process inventory data and compute stand-level metrics for a nationwide database system.
- enhancement of computing capabilities, including an alternative method of SDI calculation.

Additionally, we maintained, supported and upgraded the Suppose interface, as well as the FVS pre- and post-processing programs. All FVS documentation was kept up-to-date, with significant updates to the variant overviews.

The FVS Steering Team continued to provide strategic guidance in the development and enhancement of FVS using best available science. The third annual meeting was held in April. The program of work was reviewed. Guidance was given on needs for base model and extension enhancements, validation, training, and projects such as Climate-FVS. The Steering Team is proving to be a valuable networking group as well as a way to review the program of work and ensure best available science is being incorporated into FVS. Nearly a third of a million dollars was generated in partnerships aimed at improving and validating FVS, and developing a climate sensitive version of FVS.

The FVS carbon reports continue to be used not only by the Forest Service but also by many consultants and other users outside the Forest Service. The carbon reports are used in both the Chicago Climate Exchange and California Climate Action Registry for calculation of carbon offsets or credits.

Inquiries regarding development of the Climate-FVS model have been frequent. Nick Crookston had an article published in the Journal of Forest Ecology and Management. To begin development of a climate sensitive version of FVS for the eastern U.S., the FVS staff facilitated a workshop in Milwaukee, Wisconsin in September. Phil Radtke from Virginia Tech will be the principal investigator for this effort. It will be completed in the next 18 months.

Work is nearing completion on a project to improve the calculation and reporting of down woody debris in partnership with San Dimas Technology and Development Center.

The FVS group received funding from the Joint Fire Science Program to improve the performance and interoperability of FVS so it will run more efficiently and operate better within large software frameworks. This effort involves changing the software architecture of FVS, and will result in better linkages for use in other models. Several partners have joined in the effort, including BLM, BIA, British Columbia Ministry of Forests, and ESSA Technologies.

We initiated a cost share agreement with Michigan Tech University for validation work on the Lakes State and Central States variants. We will also began work with Oregon State to

incorporate the ORGANON growth and yield model as a variant in FVS.

In April, Don Vandendriesche and Dave Cawrse travelled to China to speak at a conference on natural disasters in forested environments and gave presentations on how FVS can model forest disturbances. In August, two professors from Beijing Forestry University visited the FMSC to learn more about the carbon report.

Regional and Forest Support

We provided national FVS support to Regions and National Forests for various projects. Much of this support included site visits. Here are just a few highlights of our national support efforts:

- Assisted Region 3 with Forest Plan Revision efforts;
- Continued collaboration with the Pacific Northwest Research Station on integration of FVS with the Fuel Characteristics Classification System (FCCS);
- Continued collaboration on simulations for snowshoe hare habitat in Region 2;
- Expanded the Tetons (TT) variant to 19 species and the Utah (UT) variant to 24 species;
- Updated valid Potential Vegetation (PV) codes and PV References Codes in several regions;
- Improved forest typing and dominance typing algorithms in several regions;
- Continued development of the northern boreal variant for interior Alaska.
- Helped the Deschutes National Forest achieve favorable court rulings using FVS.

Important Partnerships

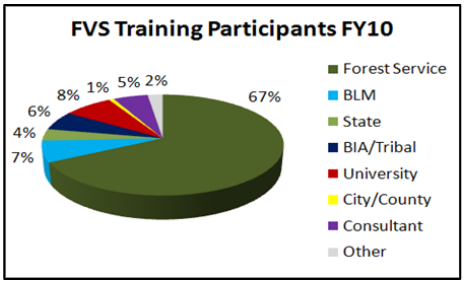
Our partners include Forest Service Research Stations as well as universities and other land management agencies, including the BLM and BIA. Some of our important partners and projects this year included:

- Rocky Mountain Research Station on FVS, FFE, and Climate Change development;
- Northern Research Station on FFE carbon reporting;
- Southern Research Station on FVS development and validation;
- NRIS-FSVEG staff on maintaining FVS data link with FSVEG;
- Forest Health Technology Enterprise Team (FHTET) on maintaining and enhancing FVS insect and disease extensions;
- Virginia Tech University and Southern Research Station on beginning the expansion of Climate-FVS to the east;
- University of Maine on validation studies using the FVS Northeastern variant;
- Bureau of Indian Affairs on providing technical assistance on forest inventory methods, volume determination, and FVS modeling;
- BLM, Department of Defense, State and Private Forestry, and University of Alaska on the development of the Alaska boreal forest (interior) FVS variant;
- Utah State University on validation work for the Western Sierra Nevada and Utah variants.
- Michigan Tech University on validation studies using the FVS Lake States variant.

Customers

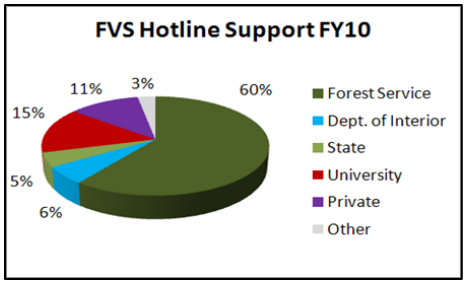
Besides the National Forests, other users of FVS software include Bureau of Land Management, Bureau of Indian Affairs, National Park Service, Department of Defense, and other federal agencies, as well as state and tribal agencies, educational institutions, private companies, and individuals. FVS software has been increasingly used internationally to model growth and yield. We have an ongoing partnership with Beijing Forestry University.

Customer Support



This past year we conducted 7 week-long, formal FVS classes. We trained approximately 130 users, with approximately 1/3 of the users being non-Forest Service employees.

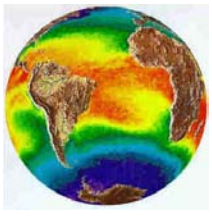
Training documentation was updated to reflect changes in the Suppose Interface and base model capabilities. The FMSC web site was kept current with software and documentation updates. Bulletins were sent out announcing each software release.



We provided FVS hotline support during normal working hours on every workday of the year. Requests came in the form of phone calls, emails, instant messages, and personal visits. We answered more than 1500 support requests, requiring over 700 hours of staff time. We assisted nearly every National Forest, and made numerous site visits. Approximately 40% of the requests came from outside of the Forest Service.

Future Initiatives and Projects

For FY11, in addition to the on-going activities of model maintenance, enhancements, and training, our future initiatives and projects include: continued development of Climate-FVS modeling capabilities, including initiation of work in the eastern US; incorporation of the national Biomass Estimator Library algorithms; enhancement of the reporting capabilities for down woody debris; continued effort to capture vegetation classification algorithms based on mid-scale structure attributes for all USFS Regions; completion of a water yield model; and many more projects.



Forest Management Service Center Staff

Front L to R: Lance David, Stephanie Rebain, Erin Smith-Mateja, Josie Wedlock, Don Vandendriesche
Back L to R: Chad Keyser, Andrew Sánchez Meador, Matt Oberle, Troy Heithecker, Dave Cawrse, Ken Cormier, Andrea Steiner, Mike Van Dyck, Bob Havis, Gary Boyack
Not pictured: Leah Rathbun
Behind the camera: Barbara Menzel

Dave Cawrse, Center Manager
Josie Wedlock, Administrative Support

Mike Van Dyck, FVS Group Leader
Bob Havis, FVS Programmer
Chad Keyser, FVS Model Support
Stephanie Rebain, Fire and Fuels Model Development
Erin Smith-Mateja, Model Development, Training Coordinator
Don Vandendriesche, FVS Model Support
Leah Rathbun, Biometrician

Ken Cormier, Measurements Group Leader
Gary Boyack, Forest Product Measurement Support
Troy Heithecker, Measurement Specialist
Barbara Menzel, Cruise Processing Programming Support, Training Support
Matt Oberle, Field Data Collection Programming Support
Andrea Steiner, Computer Programming Assistant

Our website can be reached through the following link:
http://www.fs.fed.us/forestmanagement/