

2010 Western Mensurationists' Conference

Final Report for JFSP Project 10-S-01-2



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Abstract

The 2010 Western Mensurationists' Conference in Missoula, MT, drew together forest scientists and land managers with primary expertise in the measurement and modeling of forest resources. The meeting provided an opportunity to focus the collective technical expertise of this group on cross-disciplinary conifer crown modeling issues that are of increasing importance to existing and emerging forest management strategies in western North America. Thus, a special invited session on conifer crown modeling results and opportunities was added to the conference agenda together with a participatory workshop on crown modeling needs and challenges.

Funding was provided by the Joint Fire Science Program (JFSP) to offset travel costs for invited speakers. As a result, four highly recognized scientists were brought to the 2010 meeting to discuss conifer crown modeling results and strategies motivated by applications ranging from fuels management to tree growth prediction to wood quality control. The JFSP-supported conference components (invited session and subsequent workshop) attracted scientists and land managers from 18 states and provinces, greatly diversifying the attendance of a typically more western-centric meeting. JFSP support also helped secure further financial contributions for the conference from the Society of American Foresters' A1 Working Group.

The JFSP-supported crown modeling components of the conference identified parallel lines of research from different disciplines and regions, as well as opportunities for collaboration and cross-fertilization. These outcomes are being summarized in a synthesis paper for peer-review publication. The crown modeling presentations and discussions also had direct relevance to two ongoing JFSP supported research projects (10-1-02-10 and 10-1-02-13).

I. Background & Purpose

An understanding of the organization of crown materials on individual conifer trees and in the canopies of coniferous stands is central to many existing and emerging forest management strategies. Crown materials provide fuel for wildfires and are thus inventoried for fire behavior modeling and targeted in fuel hazard reduction treatments. The same materials are also viewed as potential fuels to be extracted for bioenergy or as potential carbon pools to be maintained for carbon balance. Additionally, crown and canopy structural information is increasingly being incorporated into forest growth models, while crown architecture has long been recognized as an important determinant of wood quality. As a result, considerable research has been conducted on modeling the structure and biomass of conifer crowns. However, this body of research is spread across multiple disciplines with distinct methods having been pursued in different fields. This has hindered the effective communication of parallel research results, needs, and opportunities.

The Western Mensurationists' annual conferences bring together forest scientists and managers with primary expertise in the measurement and modeling of forest resources and processes. As such, the 2010 conference in Missoula, MT, offered an excellent opportunity to focus the collective technical expertise of this group on cross-disciplinary conifer crown modeling issues. A special invited session and workshop on conifer crown modeling was therefore integrated into the conference agenda. These events were made possible by conference support funding from the Joint Fire Science Program (JFSP) in the form of travel grants to four invited scientists.

II. Conference Attendance

The 2010 Western Mensurationists' Conference drew researchers and managers from 18 states and provinces, as well as scientists and students from Brazil, Bangladesh, and Scotland. Typically the annual conferences draw the majority of their attendees from Oregon, Washington, and British Columbia, but participants from this region made up only 50% of the attendance in 2010. Instead, and as a direct consequence of the JFSP-supported session on crown modeling, there was substantial participation from southeastern states and from the northeast (USA and Canada).

Conference attendance was spread across employment sectors with just under 50% of the participants coming from academic institutions, 25% from governmental research and management agencies, and 25% from the private sector. Unfortunately, due to financial pressures, participation from industry scientists was down substantially in 2010, and this reduced overall attendance below average.

The primary fields of expertise of those attending included silviculture, inventory, fire science, forest growth & yield, biometrics, and ecological/ecosystem modeling. A complete listing of conference attendees and their affiliations has been uploaded to this project's page on the JFSP website.

III. Conference Format

The conference agenda is appended to this report. The conference consisted primarily of contributed sessions on diverse inventory, modeling, and statistical topics. The complete list of presentations is provided on the Western Mensurationists' website (westernforestry.org/wmens/) where the presentations themselves are also available for download. Notably, as a result of the JFSP support fully 1/3 of the conference was devoted to presentations and discussion of crown modeling strategies, challenges, and needs. This was further facilitated by funds from the Society of American Foresters' A1 (Biometrics and Inventory) Working Group that were advanced in direct support of the JFSP sponsored crown modeling session.

Financial support from JFSP was allocated entirely to the recruitment (i.e., travel support) of invited speakers for the crown modeling session. The invited speakers were

Dr. Douglas A. Maguire, Giustina Professor of Forest Management, Oregon State University

Dr. Harry T. Valentine, Research Forester, USDA Forest Service Northeastern Research Station

Dr. Tara Keyser, Research Forester, USDA Forest Service Southern Research Station

Dr. Harold E. Burkhart, University Distinguished Professor, Virginia Tech

Each of these invited speakers has expertise in different aspects or strategies of crown modeling. The abstracts of their presentations have been uploaded to the project page on the JFSP website. Dr. Maguire's presentation focused on variation in conifer crown structure in relation to stand density and species composition. He presented results on modeling crown recession in western conifer forests and emphasized the need for further crown profiling research for these ecosystems. Dr. Valentine examined crown modeling strategies developed for process-based growth and yield applications, and provided a critical review of previous crown-centered allometric research. The presentation by Dr. Keyser relayed recent JFSP-funded crown fuels research centered in the Black Hills. She detailed the ponderosa pine crown sampling and modeling strategies employed in that work, emphasizing the importance of the crown fuel characterizations employed in widely-used

decision support software. Dr. Burkhart provided a description of conifer crown modeling strategies that have been employed in plantations systems in the southeastern USA. Motivated primarily by wood quality considerations, uniquely detailed crown research has been undertaken on commercial pine species in these systems.

Collectively the invited presentations provided a comprehensive review of crown modeling research efforts arising from markedly different motivations – from the crown as the engine of tree growth to the crown as hazardous fuel to the crown as degrader of wood quality. They also provided an ideal backdrop for a wider ranging discussion of crown modeling needs and opportunities. Originally, a workshop following up on the invited speakers’ presentations had been planned as a limited-enrolment event following the conference. However, due to widespread interest in the advertised crown modeling session, it was decided that the follow-up instead would be incorporated directly into the conference agenda so that the entire audience could participate in discussions. The workshop was moderated by co-Principal Investigator Christopher Keyes and framed by the following questions

- What are the top 3 challenges involved in more accurately modeling crown response to management in coniferous forests, where “crown response” could mean anything from changes in crown architecture or dimensions to shifts in crown fuel amounts and distributions resulting from stand treatments and/or the passage of time?
- What are the most critical assumptions involved in crown modeling and how well are they supported by empirical data?
- What level of resolution is needed for providing adequate model input to support accurate estimates of canopy conditions such as canopy bulk density or canopy base height?
- How accurate are existing models of specific aspects of crown modeling, including crown bulk density, crown expansion, and crown recession?
- What are the primary hindrances to greater collaboration between biometricians and fire modelers?

A subset of these questions was issued to the invited speakers prior to the conference to facilitate the initiation of a pan-audience conversation. The ensuing discussions enjoyed active and widespread participation from the audience and the invited speakers. This workshop identified numerous crown modeling issues and needs that are being summarized in a synthesis paper under preparation by the project investigators.

IV. Relationships with Ongoing Work

The JFSP supported crown modeling sessions have direct relevance to ongoing JFSP project 10-1-02-13 “Characterizing Crown Biomass and Crown Density Profiles in Conifer Forests of the Interior Northwest” (Principal Investigator: David Affleck). In addressing its objectives of characterizing the extent and distribution of crown fuels in interior northwest conifer species, that project will integrate and apply many aspects of the crown modeling results and strategies discussed at the conference. Additionally, one of the JFSP-supported invited speakers, Dr. Tara Keyser, is a co-Principal Investigator on JFSP project 10-1-02-10, also investigating canopy fuel estimation procedures for western conifers. JFSP conference support therefore indirectly provided an opportunity for the investigators associated with these two projects to discuss opportunities for greater coordination and linkage of research.

V. Deliverables

Two of the stated project deliverables were the invited session on crown modeling and the follow-up workshop (Table 1). As described above, the travel costs of four invited speakers were covered by the JFSP funds and these invitees delivered their presentations in a single session on 21 June 2010. This session was immediately followed by the workshop which involved the complete conference audience as well as the invited speakers.

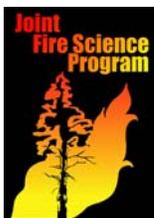
The conference proceedings consisted of abstracts for all the presentations as well as digital copies of the presentation files. The abstracts and the full set of conference attendees have been delivered directly to JFSP with this final report via the project website. Digital presentation files are available for download at the Western Mensurationists' website (westernforestry.org/wmens/).

The final deliverable for the project is a synthesis paper for peer-reviewed publication in *Fire Ecology* or an applied forestry journal such as the *Western Journal of Applied Forestry*. Initially conceived more as a summary of the crown modeling conference components, during the workshop and subsequent conference discussions it became evident that there were more strands of relevant modeling research and results than had been previously identified. This deliverable, in preparation by the project investigators, will provide a cross-disciplinary review of alternative approaches to conifer crown modeling strategies and will describe opportunities for integration and application of results.

Table 1. Summary of deliverables and current status.

Deliverable	Description	Status
Invited session	Invited conference session on crown modeling research – motivations and strategies.	Completed 21 June 2010
Workshop	Follow-up moderated discussion involving invited speakers and general conference audience.	Completed 21 June 2010
Conference proceedings & attendance	Conference abstracts have been uploaded to the JFSP website with a full list of conference attendees. The conference program is appended to this report. The presentation files are also available from the Western Mensurationists' website.	Completed 31 August 2010
Article	Synthesis paper on crown modeling strategies authored by project investigators to be submitted to a peer-reviewed journal.	In preparation 31 August 2010

2010 Western Mensurationists' Conference Agenda



June 20-22, 2010 • Missoula, MT



Sunday, June 20th

17:30 Registration Opens at the DoubleTree Hotel

19:00 Welcome Reception and Icebreaker

Monday, June 21st

07:00 Breakfast

08:10 Welcome and Announcements

08:20 **First Session – Projections & Processes** (Moderator: Renate Bush)

Aaron Weiskittel, N.L. Crookston, & P.J. Radtke: *Mapping current and future potential site productivity: Are process-based models needed?*

Elizabeth McGarrigle: *Combining historic growth and climate data to predict response to climate change in balsam fir in the Acadian forest region*

Jack Lonsdale: *Creating a hybrid process-empirical model for growth prediction of Sitka spruce in the UK*

09:50 Break

10:10 **Second Session – Topics in Forest Sampling** (Moderator: David Affleck)

James A. Westfall, W.A. Bechtold, & K.C. Randolph: *An assessment of repeatability for crown measurements taken on conifer tree species*

Jim Flewelling & J. Strunk: *The Walkthrough and Beyond solution to the boundary overlap problem*

Zane Haxton, T. Marquardt, & H. Temesgen: *N-tree distance sampling in riparian forests of western Oregon: a simulation study*

George McFadden: *Creation of a LiDAR field laboratory using Panther Creek Watershed*

12:15 Lunch

13:15 **Third Session – Invited Session on Conifer Crown Modeling** (Moderator: Chris Keyes)

Doug Maguire: *Response of crown and canopy structure to stand density regime in western conifers*

Harry Valentine: *Remembrance of crowns past*

14:40 Break

Tara Keyser: *The importance of crown architecture when estimating canopy fuels and fire hazard in the Black Hills*

Harold Burkhart: *Modeling crown characteristics of loblolly pine trees*

14:20 Questions and open discussion on the state of conifer crown models and its implications for fire behavior modeling

17:30 Announcements & Adjourn

Banquet

17:40 No host bar opens

18:30 Dinner served

Tuesday, June 22nd

07:00 Breakfast

08:15 **Fourth Session – Modeling Silvicultural Impacts** (Moderator: John Goodburn)

Ralph L. Amateis & H.E. Burkhart: *Impact of pruning young loblolly pine trees: 10-year growth results*

Gilciano Saraiva Nogueira, P.L. Marshall, H.G. Leite, V.M. LeMay, & J.C. Chagas

Campos: *Thinning impacts on even-aged stands of eucalyptus in Brazil*

Leah Rathbun: *Modelling tree growth under varying silvicultural prescriptions for mixed-species stands in coastal British Columbia*

09:45 Break

10:20 **Fifth Session – Advancing Methodology** (Moderator: David Affleck)

Suborna Ahmed: *Modelling tree mortality for large regions using combined estimators and meta-analysis approaches*

Nicholas L. Crookston & G.E. Rehfeldt: *How to solve a classification problem with 45 class levels using Random Forests*

Guillaume Thérien: *Models and Smoke-Screens*

11:50 Announcements & Adjourn

12:00 Lunch