



# Western Forest Insect Work Conference

WESTERN FOREST INSECT WORK CONFERENCE 2017  
Snow King Resort, Jackson Hole, Wyoming, USA  
May 1 – 4, 2017

## *Adapting in a Time of Transitions*

### Monday, May 1

|           |  |                       |
|-----------|--|-----------------------|
| 1500-2000 | Registration open  | Grand Teton Mezzanine |
| 1600-1700 | Executive meeting  | Timberline Two        |
| 1800-2000 | <b>Meet and Greet Social</b><br>Cash bar, light hors d'oeuvres | Hayden's Post Deck    |

### Tuesday, May 2

|           |   |                       |
|-----------|---|-----------------------|
| 0700-1000 | Registration open   | Grand Teton Mezzanine |
| 0700-0800 | Continental Breakfast   | Teton Room            |
| 0800-0815 | <b>Welcome to Jackson</b><br>Hotel details, announcements/housekeeping  | Grand Room            |
| 0815-0845 | <b><i>Ecological resilience, historical ecology, and climate change: managing northern Rocky Mountain ecosystems for an uncertain future</i></b><br><b>Dr. Bob Keane</b> , US Forest Service, Rocky Mountain Research Station | Grand Room            |
| 0845-0915 | <b><i>Challenges of managing forest projects for an uncertain future</i></b><br><b>Liz Davy</b> , District Ranger, Caribou-Targhee National Forest  | Grand Room            |
| 0915-0945 | Memorial Scholarship (2015) Presentation<br><b>Jennifer Klutsch</b>   | Grand Room            |
| 0945-1015 | Break   | Teton Room            |
| 1015-1145 | Concurrent Workshops  |                       |
|           | <b><i>Forest resistance and resilience</i></b>  | Timberline One        |
|           | <b><i>Pollinators in forest ecosystems</i></b>  | Timberline Three      |
| 1145-1315 | Lunch (on your own)   |                       |
| 1315-1445 | Concurrent Workshops  |                       |
|           | <b><i>Cumulative effects of drought on forest disturbances and tree mortality</i></b>   | Timberline One        |
|           | <b><i>All stocked up here: Strategies for optimizing forest density to increase resilience to bark beetles</i></b>  | Timberline Three      |
| 1445-1515 | Break – Teton Room  | Teton Room            |

|           |  |            |
|-----------|--|------------|
| 1515-1615 | Graduate Student Session 1   | Grand Room |
| 1615-1700 | <b>Initial Business Meeting</b>  | Grand Room |
| 1730-1830 | <b>Sheryl Costello Memorial Fun Run</b>  |            |
| 1900-2100 | Reception – cash bar, snacks   | Teton Room |
| 1900-2100 | <b>Poster Session</b><br><b>Silent Auction</b> to benefit the Memorial Scholarship | Grand Room |

### Wednesday, May 3

|           |  |                       |
|-----------|--|-----------------------|
| 0700-1000 | Registration open  | Grand Teton Mezzanine |
| 0700-0800 | Coffee/Tea   | Teton Room            |
| 0800-0930 | Concurrent Workshops   |                       |
|           | <b><i>Deciphering historical patterns and range of variability for key forest disturbance agents</i></b>                                       | Timberline One        |
|           | <b><i>Balancing dynamics of ski area operations with forest health challenges</i></b>  | Timberline Three      |
| 1000-1700 | Field Trip (lunch provided – pick up at 10:00 a.m. at the registration table in the Grand Teton Mezzanine)                                     |                       |
| 1800-2200 | Founders Award Banquet<br><b><i>Celebrating Forty-Four Years of Collegiality</i></b><br><b>Dr. Nancy Gillette</b> , Retired, US Forest Service | Grand Room            |

### Thursday, May 4

|           |   |                  |
|-----------|---|------------------|
| 0700-0800 | Continental Breakfast   | Teton Room       |
| 0800-0830 | <b><i>Opening the 'Windows of Opportunity' to maintain aspen in western US forests</i></b><br><b>Dr. Karen Mock</b> , Utah State University | Grand Room       |
| 0830-0900 | Memorial Scholarship (2016) Presentation<br><b>Andrea Hefty</b>   | Grand Room       |
| 0900-1000 | Final Business Meeting  | Grand Room       |
| 1000-1030 | Break   | Teton Room       |
| 1030-1200 | Graduate Student Session 2  | Grand Room       |
| 1200-1330 | Lunch (on your own)   |                  |
| 1330-1500 | Concurrent Workshops  |                  |
|           | <b><i>High Elevation Pines</i></b>  | Timberline One   |
|           | <b><i>Open session: submitted presentations on topical issues in forest entomology</i></b>  | Timberline Three |
|           | <b><i>Defoliators</i></b>   | Summit Two       |
| 1500-1530 | Break   | Teton Room       |
| 1530-1700 | Concurrent Workshops  |                  |
|           | <b><i>What's new with invasive forest insect species in the western USA?</i></b>  | Timberline One   |
|           | <b><i>Biomimicry: Adapting insect behavior and biotic interactions to help manage their impact to our forests</i></b>                       | Timberline Three |
|           | <b><i>Mountain pine beetle's changing range and challenges for forest management decision-making</i></b>                                    | Summit Two       |
| 1700      | Meeting adjourns  |                  |

## CONCURRENT WORKSHOPS

### Tuesday

#### Forest Resistance and Resilience

Moderator: Nadir Erbilgin

- *A ground-up view of resistance and resilience to herbivory in forest ecosystems.* **Ken Raffa**, University of Wisconsin
- *Forest resilience and disturbance interactions in fire-prone landscapes: what happens when we alter fire regimes?* **Sharon Hood**, USDA FS, Rocky Mountain Research Station, Missoula, MT
- *A paradigm shift in tree improvement: from volume to forest health.* **Barb Thomas**, University of Alberta

#### Pollinators in Forest Ecosystems

Moderator: Rob Progar

- *Why all the attention?* **Rob Progar**, US Forest Service, Pacific Northwest Research Station.
- *Recent developments in controlling for Douglas-fir beetle (*Dendroctonus pseudotsugae*) infestation in high risk stands using the anti-aggregation pheromone, 3-methylcyclohex-2-en-1-one (MCH), and potential implications for associated bee communities.* **Gabriel Foote**, Oregon State University.
- *Native bees in western forests: an overview of their natural histories and conservation needs.* **Jim Cane**, ARS, Logan UT.
- *Pollination: What you thought you knew, is probably not so!* **Andy Moldenke**, Oregon State University.

#### Cumulative Effects of Drought on Forest Disturbances and Tree Mortality

Moderator: Chris Fettig

- *Drought and fire: Ecohydrologic controls on future fire regimes in the West.* **Jeremy Littell**, Alaska Climate Science Center, USGS, Anchorage, AK, Donald McKenzie, Pacific Northwest Research Station, USFS, Seattle, WA, Samuel Cushman, Rocky Mountain Research Station, USFS, Flagstaff, AZ, Ho Yi Wan, Northern Arizona University, Flagstaff, AZ, and David L. Peterson, Pacific Northwest Research Station, USFS, Seattle, WA.
- *Cessation of landscape-level surface fires promotes establishment of fire-intolerant tree species and long-term increases in drought stress in ponderosa pine forests of central Oregon.* **Steve Voelker**, Utah State University, Logan, UT
- *Drought impacts on forest insects and diseases, with emphasis on the tree mortality event in California.* **Christopher J. Fettig**, Pacific Southwest Research Station, USFS, Davis, CA, Thomas E. Kolb, Northern Arizona University, Flagstaff, AZ, Mathew P. Ayres, Dartmouth College, Hanover, NH, Barbara J. Bentz, Rocky Mountain Research Station, USFS, Logan, UT, Jeffrey A. Hicke, University of Idaho, Moscow, ID, Robert Mathiasen, Northern Arizona University, Flagstaff, AZ, Jane E. Stewart, Colorado State University, Fort Collins, CO, and Aaron S. Weed, National Park Service, Fredericksburg, VA.
- *The impacts of drought on tree defenses and bark beetle attacks in southwestern pines.* **Monica L. Gaylor**, Forest Health Protection, USFS, Flagstaff, AZ, Stephen J. Burr, Forest Health Protection, USFS, Fairbanks, AK, Thomas E. Kolb, Northern Arizona University, Flagstaff, AZ, Richard Hofstetter, Northern Arizona University, Flagstaff, AZ, and Nate McDowell, Los Alamos National Labs, Los Alamos, NM.

#### All Stocked Up Here: Strategies for Optimizing Forest Density to Increase Resilience to Bark Beetles

Moderators: Robbie W. Flowers and Andrew D. Graves

- *Meta-analysis of stand density index threshold relationship with *Dendroctonus* spp. attack in yellow pine forests across the western U.S.* **Joel Egan**, USDA Forest Service, Forest Health Protection; Tom W. Coleman, Forest Health Protection; Chris Fetting, USDA Forest Service, Pacific Southwest Research Station; Chris Fettig; Russ Graham, Jose Negron, Sharon Hood, USDA Forest Service, Rocky Mountain Research Station, Chris Keyes, University of Montana, Dept. of Forest Management.
- *Risk of bark beetle-caused tree mortality following various forest management regimes in southern California and Northern Baja California, Mexico.* **Tom W. Coleman**, Adrian Poloni and Andrew D. Graves, USDA Forest Service, Forest Health Protection
- *Fifteen-year growth response of legacy pines to local (radial) and stand-level thinning.* **Danny Cluck**, USDA Forest Service, Forest Health Protection; Sharon Hood, USDA Forest Service, Rocky Mountain Research Station; Bobette Jones, USDA Forest Service, Lassen National Forest
- *Using historical range of variability to inform future management strategies.* **Andrew Sánchez Meador**, Ecological Restoration Institute, Northern Arizona University.

### Graduate Student Session 1

Moderator: Monica Gaylord

- Bacteria associated with pine engravers degrade tree defense compounds. **Michael Howe**, Ken Raffa, University of Wisconsin
- *The mite-fungal communities of the mountain pine beetle (*Dendroctonus ponderosae* Hopkins, Coleoptera: Curculionidae) in the southwest.* **Sneha Vissa**, Richard Hofstetter, Northern Arizona University
- *Ant functional group patterns along elevational gradients in northern Arizona.* **Derek Uhey**, Richard Hofstetter, Karen Haubensak, Matt Bowker, Northern Arizona University

### Wednesday

#### Deciphering Historical Patterns and Range of Variability for Key Forest Disturbance Agents

Moderators: Joel Egan, Seth Davis, Barbara Bentz

- *A century of drought-related mountain pine beetle disturbance throughout Northern Region forests from 1915-2016.* **Joel Egan**, Forest Health Protection, Missoula, MT
- *Multidecadal time series from aerial survey data reveals climatic and landscape factors underlying tree mortality from spruce beetle across the western US.* **Seth Davis**, Colorado State University
- *A multi-method approach to studying disturbance in the Northern Rocky Mountain, USA.* **Jenn Watt**, University of Utah; Andrea Brunelle, University of Utah, Barbara Bentz, US Forest Service, Kurt Kipfmuller, University of Minnesota.
- *Genetic analyses reveals mountain pine beetle historical distribution patterns driven by Pleistocene glaciation.* **Barbara Bentz**, Rocky Mountain Research Station, Logan, UT; Greg Ragland and Eddy Dowle, University of Denver; Ryan Bracewell, University of California; Karen Mock, Utah State University, Mike Pfrender, Notre Dame.

#### Balancing Dynamics of Ski Area Operations with Forest Health Challenges

Moderator: Darren Blackford

- **Bill Schreiber**, Jackson Hole Mountain Resort
- **Christian Santelices**, Snow King Ski Area
- **Mark Pollish**, Alta Ski Area
- **Nancy Bockino**, Grand Teton National Park

## Thursday

### Graduate Student Session 2

Moderator: Monica Gaylord

- *Response to multiple stressors in Pinus pinaster Ait.: conflicts between drought and herbivory stress with Hylobius abietis.* **Estefania Suarez Vidal**, Jennifer Klutch, Nadir Erbilgin, Luis Sampedro, Rafael Zas, Misión Biológica de Galicia-CSIC, Pontevedra, Spain and University of Alberta
- *Synchronous resurgence of larch casebearer in western and eastern larch forests.* **Samuel Fahrner**, Brian Aukema, University of Minnesota
- *Naturalization of a native invasive: endemic mountain pine beetle in novel pine habits.* **Stanley Pokorny**, Allan Carroll, University of British Columbia
- *Response of mountain pine beetle and its fungal mutualists to simulated climate change: preliminary results from a reciprocal translocation experiment.* **David Soderberg**, Barbara Bentz, Karen Mock, Utah State University and Rocky Mountain Research Station.
- *Modeling developmental differences between northern and southern populations of mountain pine beetle (Dendroctonus ponderosae).* **Anne McManis**, Barbara Bentz, James Powell, Utah State University and Rocky Mountain Research Station.

### High Elevation Pines

Moderator: Ken Raffa

- *Geographic variability in climate suitability for whitebark pine mortality from mountain pine beetles.* **Polly Buotte**, Jeffrey A. Hicke, Haiganoush K. Preisler, John T. Abatzoglou, Kenneth F. Raffa
- *Great Basin bristlecone pine resistance to mountain pine beetle.* **Erika Eidson**, Barbara J. Bentz, Karen Mock
- *Defense syndromes of lodgepole and whitebark pines against mountain pine beetle - fungal complexes.* **Ken Raffa**, Pieruligi Bonello, Stephen Cook, Nadir Erbilgin, Ken Keefover-Ring, Jennifer Klutsch, Charles Mason, Caterina Villari, Phil Townsend
- *Disentangling the effects of white pine blister rust, mountain pine beetle and drought on whitebark pine mortality in the Greater Yellowstone Ecosystem.* **Erin Shanahan**, Kathryn M. Irvine, David Thoma, Siri Wilmoth, Andy Ray, Kristin Legg, Henry Shovic
- *Protection and restoration of whitebark pine ecosystems.* **Carl Jorgensen**

### Defoliators

Moderator: Sky Stephens

- **Sky Stephens** and **Dan West**, US Forest Service, Forest Health Protection, and Colorado State
- **Andy Graves**, US Forest Service, Forest Health Protection
- **Richard Hofstetter**, Northern Arizona University

### Open Session: Submitted Talks on Topical Issues in Forest Entomology

Moderator: Lorraine Maclauchlan

- *Unravelling the biology of Pissodes striatulus: a tree-killing weevil in subalpine fir forests of southern British Columbia.* **Lorraine Maclauchlan** and Kevin Buxton. BC MFLNRO, Kamloops, B.C.

- *Novel trophic interactions for endemic mountain pine beetle and its microbiome in Alberta.* **Jordan Lewis Burke**, Richard C. Hamelin, Allan L. Carroll. Department of Forest & Conservation Sciences, Faculty of Forestry, University of British Columbia, Vancouver, B.C.
- *Factors affecting trap catches of hardwood Cerambycidae - The need for changes in detection programs for exotic species.* **Dan R. Miller**, John D. Sweeney. USDA, Athens, Georgia, USA.
- *Next Year Forecast of Beetle, Borer and Drought-Induced Tree Mortality in California* **Nancy E. Grulke**, Haiganoush K. Preisler, Zachary Heath, Sheri L. Smith.
- *Population genomics of the European spruce bark beetle, Pityogenes chalcographus.* **Martin Schebeck**, Edwina J. Dowle, Dimitris N. Avtzis, Coralie Bertheau, Hannes Schuler, Jeffrey L. Feder, Gregory J. Ragland, Christian Stauffer.

### What's New with Invasive Forest Insect Species in the Western USA?

Moderators: Steve Seybold and Carl Jorgensen

Contributors: **Bob Rabaglia**, **Kate Hrinkevich**, and **Robbie Flowers**

Topics will include: A brief overview of the FS R&D National Invasive Species Assessment; an unusual, new invasive leaf mining insect causing crown dieback in madrone in northern California; an update on the early detection of invasive forest insects in the West; climate risk modelling of balsam woolly adelgid damage in subalpine fir; and the 2015-2016 eradication program for Asian gypsy moth in Oregon and Washington.

### Biomimicry: Adapting Insect Behavior and Biotic Interactions to Help Manage their Impact to our Forests

Moderator: Javier Mercado

- *Improved tools that exploit bark beetle chemical communication and protect individual trees and forest stands.* **Christopher J. Fettig**, Pacific Southwest Research Station, USDA Forest Service, Davis, CA; A. Steven Munson, Forest Health Protection, USDA Forest Service, Ogden, UT (retired); Dezene P.W. Huber, Ecosystem Science and Management Program, University of Northern British Columbia, Prince George, BC; and Agenor Mafra-Neto, ISCA Technologies Inc., Riverside, CA.
- *Adapting acoustic communication to disrupt bark beetle behavior in high value trees, and its potential escalation to the stand.* **Richard W. Hofstetter**, Northern Arizona University; David D. Dunn; Nicholas (Nick) Aflitto, Cornell University.
- *Developing Spruce Beetle Mycoinsecticide: Discussing natural entomopathogenic fungi in forest habitats and field trials of fungal pathogen isolates against spruce beetle.* **Clifford Bradley**, Egan Jankowski and Janina Bradley, Montana BioAgriculture Inc., Missoula, MT; Danielle Malesky, Forest Health Protection, USDA Forest Service, Ogden, UT, USDA-FHP; Seth Davis, Colorado State University, Ft. Collins, CO.
- *Lessons learned about natural enemies of bark beetles: current and future needs.* **Lawrence Haimowitz**, University of Wyoming.

### Mountain Pine Beetle's Changing Range and Challenges for Forest Management Decision-Making

Moderators: Kathy Bleiker, Brian Aukema

- *Cold tolerance of mountain pine beetle in novel hosts.* **Brian Aukema**, Rob Venette, Derek Rosenberger.
- *Mountain pine beetle and climate: Implications for continued range expansion in Canada.* **Kathy Bleiker**, Greg Smith
- *Pushing North: some model predictions for how temperatures may affect northward range expansions.* **Devin Goodsman**, Chonggang Xu, Brian Aukema.
- *Forest management on the front lines: assessing the efficacy of mountain pine beetle spread and control in Alberta.* **Allan Carroll**

## Poster Titles and Authors

1. **Effect of trap height on catches of bark and wood boring beetles in a stand of white oak and shortleaf pine in Georgia.** Miller D.R., Crowe C.M., and Sweeney J.D.
2. **Comparing bottle traps to multiple-funnel traps for ambrosia beetles.** Miller DR, Crowe CM, Ginzel M.D., Ranger C.M., Schultz P.B.
3. **Attraction of non-cerambycids to cerambycid pheromones in southeastern USA.** Miller DR, Crowe CM, Silk P, Mayo P., Sweeney J.D.
4. **Detection of bark- and wood-boring beetles is increased by using a diversity of trap colors and heights and decreased by Z-3-hexenol.** Sweeney J, Silk P, Mayo P, Webster RP, Miller DR, Hughes C, Crowe C, Ryall K, Gutowski JM, Mokrzycki T, Francese J, Meng Q, Li Y, Kimoto T.
5. **Western Forest Insect Work Conference Founder's Award: An Amazing Legacy.** Founder's Award Committee.
6. **Tree mortality in the central and southern Sierra Nevada: Causes, extent, severity and impact.** Leif A. Mortenson, Christopher J. Fettig, Beverly M. Bulaon, Daniel R. Cluck, Patra B. Foulk, Ross Gerrard, Mark D. Meyer, A. Steven Munson, and Justin B. Runyon.
7. **SPLAT® Verb and "SPLAT® Repel", a prototype formulation containing (+)-verbenone, for management of mountain and southern pine beetles.** Christopher J. Fettig, A. Steven Munson, Stephen R. Clarke, Beverly M. Bulaon, Daniel R. Cluck, Monica L. Gaylord, Sandy Kegley, James R. Meeker, Leif A. Mortenson, John T. Nowak, Robert A. Progar, Cynthia L. Snyder, Lia Spiegel, Brytten E. Steed, and Agenor Mafra-Neto.
8. **Monitoring and ship inspection program for Asian gypsy moth and other Lymantria in the Russian Far East, Japan, South Korea, and China.** A. Steven Munson, Brendon J. Reardon, and Robbie W. Flowers.
9. **Evaluation of Systemic Insecticide and Fungicide for Protection of Sycamore from Polyphagous Shot Hole Borer / *Fusarium* Dieback.** Donald Grosman, Akif Eskalen, Joey S. Mayorquin, Joseph D. Carrillo, and David Cox.
10. **Evaluation of Systemic Fungicide and Insecticide for Management of Pitch Canker and Insect Vectors on Monterey Pine.** Don Grosman, Bryndie Birch, and Tom Zoller.
11. **Nuclear Polyhedrosis Virus as a Biological Control Agent for *Malacosoma americanum* (Lepidoptera: Lasiocampidae).** R.A. Progar, M.J. Rinella, D. Fekedulegn and L. Butler.
12. **A New Severity Rating System and A Model for Evaluating Stand-Level Impacts of Balsam Woolly Adelgid on Two Abies Species in the Pacific Northwest.** R.A. Progar, K. Hrinkevich, D.C. Shaw.
13. **Acoustic communication in *Dendroctonus* and *Ips* beetles.** Kasey Yturralde and Richard Hofstetter.
14. **Citizen science project reveals vulnerability to pests in Portland street trees.** Julie Fukuda, Jeff Ramsey, Kasey Yturralde, and Angie DiSalvo.
15. **Collecting and storing increment cores: Do's and don'ts for tree-ring objectives.** A.M. Lynch and A.H. Arizpe.
16. **Pine Engraver Adapting in a Time of Warmer Temperatures.** S. Kegley and T. Eckberg.
17. **Reducing Sequoia Pitch Moth Damage – Transitioning to New Technologies in Tree Improvement Pest Management.** S. Kegley and N. Sturdevant.

18. **MCH for area and individual tree protection against spruce beetle attack.** M Hansen, S Munson, D Blackford, A Graves, T Coleman, S Baggett.
19. **Testing a novel formulation of 3-methylcyclohex-2-en-1-one, MCH, for managing Douglas-fir beetle (*Dendroctonus pseudotsugae*) in high risk stands and potential implications for associated bee communities.** Gabriel G. Foote, Christopher J. Fettig, Justin B. Runyon, Darrell W. Ross, Tom W. Coleman, Monica L. Gaylord, Andrew D. Graves, Laura L. Lowrey, Joel D. McMillin, Leif A. Mortenson, A. Steven Munson, and Agenor Mafra-Neto.
20. **Latitudinal variation in mountain pine beetle prepupal diapause.** Barbara Bentz and Matt Hansen.
21. **Evaluating the threat of *Dendroctonus ponderosae* to Minnesota pine forests.** Kevin D. Chase, Mark Abrahamson, Angie Ambourn, Robert C. Venette, Brian Aukema.
22. **Optimal attack density of *Dendroctonus ponderosae* in naive lodgepole pine in Alberta.** Antonia E Musso, Dr. Maya L. Evenden, Dr. Allan L. Carroll, and Victor Shegelski.
23. **Current status of FHM and the activities it is focusing on into the future.** T. Eager.
24. **Preparing for Forest Entomology Reconnaissance in Mongolia.** K. Ripley.
25. **An economic analysis of Mountain Pine Beetle Direct Control in the Cranbrook Timber Supply Area.** Allison, C., B. Riel, and A. Stock.