

**Bark Beetle Technical Working Group Meeting  
October 20-21, 2015  
Ogden, Utah**

**Attendees:**

There were 27 attendees in Ogden, and five attendees who participated via LiveMeeting. Forest Service attendees came from Regions 1, 2, 3, 4, 5, 6, 8 and 9, the Pacific Southwest and the Rocky Mountain Research Stations, and the Washington DC office. State forestry representatives from Alaska, Idaho, New Mexico, Oregon, Utah and Washington also attended. A list of attendees is attached.

**State and Federal Personnel Changes:**

- Mike Shephard has replaced Steve Patterson as Deputy Director for State and Private Forestry, US Forest Service Region 10, Alaska
- Tom Coleman will be leaving USFS Region 5 for New Mexico, where he will replace Deb Allen-Reid as USFS FHP New Mexico Zone Leader. His position will be advertised.
- Melissa Jenkins, Invasive Plants Coordinator for the US Forest Service, Washington D.C. has accepted a position with Cooperative Forestry, Washington Office.
- Melissa Fisher is the new Washington DNR entomologist in Colville.
- Alan Kanaskie, Oregon Department of Forestry Pathologist, will retire next year. His position will be advertised.
- Teresa Raaf, Director of State and Private Forestry, US Forest Service Regions 6 and 10, Portland OR, will retire at the end of the year.
- Andy Eglitis, Entomologist for the US Forest Service, Central Oregon Insect & Disease Service Center, Bend OR, will retire at the end of the year.
- Anne Hoover, Deputy Director for State and Private Forestry, US Forest Service, Washington DC, will retire at the end of the November.
- Kendra Schotzko is a new entomologist in US Forest Service Region 2.
- US Forest Service Forest Health Protection is advertising a GS 7/8/9 technician position at the Lakewood CO Service Center.
- USFS Forest Health Protection, Wenatchee WA Service Center has two new pathologists. Betsy Goodrich has replaced Angel Saavedra, who is now with USFS FHP in Boise ID. Brennan Ferguson has replaced Ryan Blaedow, who is now with USFS FHP in Asheville NC.

**Condition Reports:**

Reports were handed out, and some highlights discussed.

- Idaho (Tom Eckberg and Lee Pederson)  
Aerial survey was finished last week.

In the Clearwater Valley, a stand that was logged between June and October 2014 had some Douglas-fir seed trees killed by *Scolytus monticolae*; no evidence of Douglas-fir beetle.

Douglas-fir beetle is expected to increase due to drought and fire.

Western pine beetle is expected to increase in the Clearwater Valley and southern Idaho due to drought and fire.

Sandy Kegley reported hemlock engraver in mountain hemlock stressed by fire.

- Region 3 (Andy Graves, Tom Zegler)  
New Mexico had good rain; there was a large reduction in bark beetle activity. Some spruce needle cast was mistaken for spruce beetle by aerial survey. Spruce beetle is present, but at a reduced level. Some lophodermium was mistaken for piñon ips.
- Region 2 (Bob Cain)  
2015 aerial survey data is still being processed. Spruce beetle is a major concern. It is increasing, especially in the Black Hills. It is a threat to the ski areas. There were 400-500 acres of Douglas-fir treated with MCH following fire. It is working well. Mountain pine beetle is declining across Colorado & southern Wyoming. The emphasis now is on reforestation.
- Region 4 (Laura Lowrey)  
Mountain pine beetle has been killing limber pines on the Wasatch Plateau. Spruce beetle is by far the most active tree killer. In places it has removed 70% of the spruce overstory. Infested trees are being removed in ski areas. Douglas-fir beetle has been building around Boise due to fires. Subalpine fir decline has been noted. It is a combination of western balsam bark beetle, twig beetle, and balsam woolly adelgid.
- Region 5 (Tom Coleman)  
California has had four consecutive years of drought and fire. Western pine beetle has caused significant mortality, especially in Coulter pine. Mountain pine beetle has been increasing in sugar pines. Drought mortality is increasing in the north. Polyphagous shot hole borer, *Euwallacea* spp., is an exotic ambrosia beetle that damages many species of native, ornamental and agricultural trees. A second species of *Euwallacea*, once considered to be polyphagous shot hole borer, is thought to be a separate species.
- Region 6 (Glenn Kohler)  
Overall numbers are lower because of fires in 2015. Western pine beetle and fir engraver are up in Oregon. Still surveying California five spined ips in the Columbia River Gorge.
- Region 8 (Steve Clarke)  
No southern pine beetle in Texas or Louisiana. Mississippi has an outbreak which started in 2012, and is shifting between Districts. There is also an outbreak in Honduras. SPB is in New York and New Jersey. The New Jersey

outbreak has been going on for over 10 years, and is now decreasing. The cold weather last winter in New York appears to have decreased activity there. SPB traps were placed in New York, Massachusetts, Connecticut, New Hampshire, Vermont, and Rhode Island. Beetles were trapped in New York (Hudson Valley), Massachusetts and Rhode Island, but no infested trees were found. There are some infested trees in Connecticut.

Red bay ambrosia beetle is moving west – Mississippi, Louisiana, southeast Texas.

- Region 10 (Jason Moan)  
Western balsam bark beetle was a significant damaging agent in 2014, but not in 2015.  
Spruce beetle activity has been low overall, but doubled between 2014 and 2015.  
Northern spruce engraver has also caused spruce mortality.

### **Washington Office Update** (Bob Rabaglia)

National Forest Health Protection supports four missions:

- Technical Assistance
- Survey and Monitoring
- Technical Development
- Treatments

The WO tries to balance support for tech/methods development and treatments. Most acres treated are gypsy moth Slow the Spread, which was funded at \$8,000,000 in 2015. Western bark beetle projects received \$4,400,000.

Total budget last year was \$104,577,000. Budget is predicted to go down unless we get a full year continuing resolution. Salaries and funding to the states are about 1/3 of total budget.

The formula for allocation of western bark beetle funds by Region is:

Risk Map Acres	1.5%
Drought	0%
Operable Acres With Mortality	1%

Early Detection/Rapid Response:

California, Texas, Florida, New York, Pennsylvania and Georgia are top priority states.

Looking at the genetics of *Orthotomicus caelatus*; may be two different species. In the West, we may be closer to the Eurasian species.

Tom Eager has seen lodgepole pines with unsuccessful beetle attacks. Galleries look like spruce beetle. There has been a small amount of blue stain mortality.

Verbenone Database:

Danielle Maleski entered her Splat work; it was easy. The database is not active now, but could be activated if users want it.

## **Research Updates:**

Barbara Bentz:

- Western Bark Beetle Research Group history – founded in 2007 with researchers from PNW, PSW, RMRS
- Mountain pine beetle habitat trends – thermal suitability for MPB
- Host difference for MPB – lodgepole, whitebark pine – both have an evolutionary history with MPB
- Vulnerability of *Pinus longaeva* and *Pinus balfouriana* to mountain pine beetle. Great Basin bristlecone pine does not appear to be suitable host. Rearing experiments are ongoing.

Matt Hansen:

- Working with Steve Munson, Dave Wakarchuk, on Semiochemicals for spruce beetle.
- Tested Synergy's terpenoid library both in the lab and in the field.
- MCH did show effectiveness; more MCH may be necessary. Matt et al used double bubbles.
- May want to use MCH with lethal trap trees.

Leif Mortenson:

Review of Chris Fettig's bark beetle projects.

- Ongoing work with SPLAT verbenone for mountain pine beetle in ponderosa, lodgepole, whitebark and sugar pines.
- Testing SPLAT plus non-host volatiles for western pine beetle. It reduced beetles in traps. NHV volatilized quickly. Working on another formulation.
- SPLAT verbenone for southern pine beetle. SPLAT minus doesn't work. Need to try SPLAT verbenone with (+)-verbenone included.
- SPLAT testing for spruce beetle.
- Brytten is editing a YouTube video on the use of SPLAT.
- Injection of emamectin benzoate to protect spruce from spruce beetles. Horizontal movement is difficult. Will have results in 2016. Expecting multiple years of protection.
- Monitoring fall rates and regeneration after mountain pine beetle outbreak – 10 years data. Doing a similar study in spruce.
- Application of Carbaryl to protect ponderosa pine from mountain pine beetles; comparing spring and fall applications.

Don Grosman:

- Trials of emamectin benzoate (TREE-age™) against coneworm, seed bug, bark beetles with various timings and spacings of injection sites.
- Trials of emamectin benzoate with and without fungicide for control of polyphagous shothole borer, walnut twig beetle.

Steve Munson:

- UC Davis donated field site for tests of emamectin benzoate on walnut twig beetle in English walnut; injections in May, test read in September. Twig beetle doesn't score the zylem in California, but it does in Arizona.
- Verbenone tests on whitebark pine in California and Oregon; 7 gm pouch, SPLAT 5, SPLAT 7, SPLAT 14 formulations. Will SPLAT be more long lasting than pouches?

### **Review of Research Needs**

We reviewed the priorities list that was compiled by Carl Jorgensen from the 2012 BBTWG meeting. That document identified seven research priorities. The first five priorities were discussed during the 2015 meeting. Status and continuing needs were identified as follows:

1. Improve methods to predict where, when & how much bark beetle activity will occur
  - a. Bark beetle attraction to defoliated trees
    - i. Douglas-fir beetle in Douglas-fir. **Laura Lowrey, Andy Graves and Connie Mehmel will follow up with field plots.**
  - b. Methods for predicting occurrence, rate of spread, size, duration and impact of outbreaks for different bark beetle species.
    - i. **Barbara Bentz is working to determine timing of foliage fade.**
    - ii. **Tom Coleman is following up in southern California.**
  - c. Develop operational predictive models for significant bark beetle/host systems.
    - i. Develop a bark beetle/fire interactions models for Forest Vegetation Simulator that simulate outbreaks following wildfire or Rx burn. **Andy Graves**
2. Interactions between bark beetle populations, wildfire and Rx fire.
  - a. Short & long term ecological relationships of beetles, fuel loads, and fires
    - i. Pine beetle responses to fire: **Andy Graves**
3. Evaluate the effects of "no action".
  - a. Post-outbreak conditions on treated vs. untreated lands? **Tom Coleman/Andy Graves**
  - b. Consequences of bark beetle outbreaks to forest ecological function?
    - i. Evaluate spruce beetle & mountain pine beetle outbreaks in the Interior West. **Steve Munson (carried over from 2013)**
  - c. Document & summarize case histories
    - i. Outbreaks in southern New Mexico. **Andy Graves (carried over from 2013)**
4. Develop additional technologies for natural attractants & repellents such as pheromones
  - a. Summarize what is currently known about the effectiveness of semiochemicals. **In process: Steve Seybold, Nancy Gillette, Barbara Bentz, Rob Progar**
  - b. Develop new & improve existing semiochemical technologies
    - i. Improve anti-aggregation pheromone for spruce beetle. **Ongoing: Joel McMillin, Andy Graves**
    - ii. Evaluate Verb SPLAT & Verb Plus formulations for MPB outbreaks. **Ongoing: Steve Munson**

- iii. Trapping bioassays for various antiaggregation compounds for spruce beetle. **Done: Steve Munson**
- iv. Evaluate further use of verbenone & conophthorin to disrupt northern spruce engraver colonization of slash. **Published: Chris Fettig**
- c. Develop attractant for polyphagous shot hole borer. **Done: Steve Seybold**
- 5. Validate silvicultural techniques to meet various management objectives
  - a. Evaluate current conditions of previous silvicultural treatments in lodgepole pine (>10 years old) to determine risk to bark beetles.
    - i. Assess conditions in unmanaged & treated areas in southern California. **Done: Tom Coleman**

Iral Ragenovich asked how these priorities relate to Vulnerability Assessments that the Forests need to do in the next two years. How does Forest Health Protection work relate to climate change?

#### **Bark Beetle Technical Working Group Website** (Robbie Flowers)

The BBTWG website, information and data is hosted on the Forest Service Forest Health Protection website. It can be access at the following URL:

<http://www.fs.usda.gov/goto/r6/fhp/bbtwg>

Meeting information, agendas, and notes from 1988 to the present can be accessed at this URL.

#### **Forest Insect and Disease Leaflets (FIDLs)**

Robbie Flowers is the National FIDL coordinator.

The new FIDL for Goldspotted Oak Borer (#183, Coleman et al) was distributed to attendees.

Revisions in process:

- Armillaria root disease #78 (Filip)
- Western Balsam Bark Beetle #184 (McMillan)
- Pine Reproduction Weevil #15 (Bualon)
- Hemlock Sawfly #31 (Graham)
- Douglas-fir tussock moth #86 (Pederson)
- Pales Weevil #104 (Asaro/Nowak)

New FIDLs in process:

- Piñon Ips (Steed)
- Sequoia Pitch Moth (Buhl/Mehmel)
- Walnut Twig Beetle (Graves/Coleman)
- Western Hemlock Looper (Kohler/Dickinson)
- Winter Moth (Elkinton/Souto)

#### **Western Forest Insects** (Iral Ragenovich)

The revision is about 80% done. We still need authors for weevils, some of the diptera, exotic ambrosia beetles. Any new host reports are needed. Iral is also looking for color photographs. Please send her any photos you think might be useful.

## **Bark Beetle Projects and Studies**

Michaela Teich, post doc at Utah State University, presented her work on the effects of bark beetle outbreaks on snow avalanche hazard at high elevations. She is working with spruce beetle outbreaks in the Uinta Mountains.

Andrew Giunta, MS student at Utah State University, presented his work with Douglas-fir beetle effects on fuels in the central Rocky Mountains. He has 12 sites in central and eastern Utah. He concluded that beetle-killed Douglas-firs are more susceptible to crown fire than live Douglas-firs.

Dr. Mike Jenkins, Utah State University, presented his work with mountain pine beetle and Great Basin bristlecone pine in the Sky Island Ecosystems. He found that bristlecone pines are not susceptible to mountain pine beetle attacks, even when growing with susceptible limber pines. He is comparing volatiles in these two pine species.

Cliff Bradley of Montana Bioagriculture Inc. presented his work with entomopathogenic fungi as biopesticides for bark beetles. They are specific to insects, and relatively selective for the target insect. Fungi can be applied by spraying the bark. Effectiveness lasts 45 to 75 days. *Beauveria bassiana* has shown effectiveness against several species of *Dendroctonus* and ambrosia beetles; less effective with *Ips* species. He described several spruce beetle trials. Many adults were killed, but larvae were still developing. He is also working with boring deterrents to prolong the time of adult exposure to the fungal spray. He is working with Steve Munson and Rich Hofstetter. He is eager to hear from anyone with ideas or test sites. His contact information is:

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Montana Bioagriculture Inc.  
406-544-1176

## **Project Updates (Prevention/Suppression/Restoration, EM, STDP, FS-PIAP, Etc.)**

Robbie Flowers discussed a 5-year follow-up report on the use of verbenone to prevent mountain pine beetle attacks in whitebark pine. This report was recently sent out by Andy Eglitis from the USFS Central Oregon Service Center.

Andy Graves, Monica Gaylord, and Barbara Bentz have been trying to use satellite imagery to detect MPB attacks on southwestern white pine. Can you distinguish southwestern white pine from ponderosa pine using satellite imagery? There is a long way to go in distinguishing these species.

Laura Lowrey has been working with Carl Jorgensen on lodgepole pine thinning in the Sawtooths.

Steve Munson handed out a list of Region 4 special projects.

There was a discussion of FHP's role in restoration? We need more restoration projects, particularly after the fires in the west. Does an insect or disease need to be present in order for FHP to fund restoration? Bob Rabaglia expressed discomfort about using FHP funds for tree planting. It has not been supported in the eastern US, but it might be important in the West. The East is more urban forest. Tree planting might be appropriate after an insect outbreak.

Steve Munson commented that we are trying to develop a future healthy forest structure.

Bob Rabaglia said that restoration is lower priority than prevention or suppression.

There was discussion about differences in project scoring between regions.

Gina Davis said that Mike Dudley's FY2016 letter to Idaho Department of Lands did not include restoration in the description of potential projects for funding.

Andy Graves is looking for vegetation management plans for ski areas that include insect activity. Steve Munson said that Region 4 has a vegetation management guide for spruce beetle. It looks at developing a structure that takes into account the loss of susceptible trees. Darren Blackford said that Jackson Hole is rewriting their vegetation management plan now. Laura Lowrey is working with Sun Valley. It would be good for us to work as a group to develop a sample plan.

Connie Mehmel gave a presentation on problems with MCH flake application in 2015. Flakes delaminated in the bucket. Don't know if the problem was with the auger or with the flakes themselves. Rick Kelsey at Corvallis tested samples of damaged and undamaged flakes that were left on site for five weeks. Flakes were collected at weekly intervals for testing. Damaged flakes eluted MCH much faster than undamaged flakes. The site still got protection from DF beetles because the timing of application was ideal.

Glenn Kohler presented a test of application using Synergy "double bubbles" plus conventional bubbles. They were able to apply a triple dose of MCH using 10 release points per acre. Three people were able to treat 25 acres in four hours, using a 65-foot spacing.

Joel Egan has a publication in review on Jeffrey pine beetle in the Lake Tahoe Basin Management Unit. This study provides fine-scale information on JPB attack behaviors at each of the various outbreak phases based on neighborhood analysis of 10,722 census stem-mapped surveyed annually during severe JPB outbreak. Interesting findings by outbreak phase include 1) progression of JPB-attack from small (incipient) to larger (epidemic) then back to smaller trees (post-epidemic); 2) spatial distances from brood tree and multi-temporal clustering patterns during the outbreak; and 3) multiple lines of converging evidence strongly suggested why density mattered where tree vigor appeared most important at incipient/post-epidemic outbreak phases and microclimate was most important at epidemic phase when majority of tree mortality occurs. This last finding has implications for both radial thinning to protect large-diameter pines and the new ICO restoration silviculture being widely implemented. Further work with Chad Hoffman (CSU), Mike Battaglia (RMRS), and Russ Parsons (RMRS Fire lab) is underway regarding this.

Barbara Bentz is interested in more Jeffrey pine beetle work. Darren Blackford has a good pocket she could use as a field site.

Tom Coleman has done work with Jeffrey pine beetle in southern California. He has 120 sites; still looking at the data. He compared JPB activity in managed and unmanaged forests. There is a need for more aggressive work. Dwarf mistletoe rates are higher in the thinned areas, but DMT does not predispose trees to bark beetles.

Steve Clarke stated that Brian Sullivan (SRS) is interested in trying trap-out for a local isolated population of western pine beetle in the Davis Mountains in Texas. Pat Shea did some work on this. It requires a lot of traps. Steve will report results next year.

Steve Clarke reported on southern pine beetle prevention, which has been very successful as evidenced by a study recently published in the Journal of Forestry. Prevention and suppression compete for funding. There is a paper coming out in Forest Science with an historical perspective on the correlation between the frequency and severity of SPB outbreaks and prevailing forest management practices back to the 1860s. Current accuracy of SPB spring surveys has not been good, and there are ongoing and proposed projects to improve predictability of outbreaks. Revisions include using a degree-day model, changing the lure combination deployed, and looking at size range of SPB collected.

Don Grosman is looking at using trap trees with emamectin benzoate. Targeted use is the endemic population.

Bob Rabaglia reported that John Reeve at Southern Illinois University is looking at beetle DNA in the northeast states. He is scheduled to be at NAFIWC in May. There is concern about getting through meeting management.

No one is doing projects with fir engraver. There is plenty of fir engraver activity, but most work consists of removing hazard trees.

No one reported projects with western balsam bark beetle.

Glenn Kohler reviewed trap catches of California five spined ips. He would like to do more work on the life cycle in Washington. All work to date was done in California. What is it doing in the trees? *Ips pini* and *Ips paraconfusus* are not found in the same areas.

Tom Coleman will be looking at *Ips confuses* in piñon pine.

Discussion of work being done with polyphagous shot hole borers. Distribution trapping is being done in California. The insects prefer healthy trees. Polyphagous shot hole borers don't interact with native ambrosia beetles.

Andy Graves is working on a twig beetle project with Steve Seybold. Mapping walnut distribution and matching genetics. Over 200 trees have been collected in 31 locations. WTB carries multiple strains of fungus. They are looking for tree resistance. Does WTB attack hybrid walnuts? Looking for microorganisms that compete with thousand cankers disease. The role of walnut in New Mexico and Arizona is not described. It is a riparian species.

Tom Coleman has an Evaluation Monitoring project with Goldspotted Oak Borer; changes in fuel load in areas that have been infested more than 10 years. Also working on a PIAP for imidacloprid, emamectin benzoate.

Harold Thistle has funding for small application development projects; \$45,000 last year. He has engineers on retainer at San Dimas. They did some equipment sterilization work for white nose syndrome. Canada's SERG program funds development for cross border issues. Their call for proposals is out now.

Gina Davis asked if the program could fund work on the application of drones. The answer is not yet because policy is still under development.

The University of Arkansas is working on emerald ash borer life cycle now that EAB is moving south.

Rob Progar is working on verbenone elution rates.

Joel Egan is modeling fire dynamics in bark beetle-killed Jeffrey pine.

Jim LaBonte will be holding a bark beetle identification session November 2-6.

We discussed training for aerial application, with an emphasis on technique. Harold Thistle could organize this. Need to decide on a venue, source of funding, time.

### **Mission Statement**

The mission statement will be rewritten as follows:

***The mission of the Bark Beetle Technical Working Group (BBTWG) is to foster communication, coordination and professional interactions among forest health specialists, research scientists, taxonomists and others working to address ambrosia and bark bark and wood boring beetle-related issues in North America.***

### **Action Items**

We reviewed the 2014 Action Items presented by Bob Cain. Bullet points were addressed and new action items identified as follows:

- Research funding and research needs. How do we use BBTWG priorities to emphasize EM/STDP value? This item was discussed; no further action.
- Develop a spreadsheet of BBTWG completed projects. Brytten is working on this. Should she continue? Where do we go from here? Discussion of how to access and update, e.g. Survey Monkey, EventBrite. It's a way to keep us aware of what others are doing – what worked or didn't work. Technology committee could take this on.
- Relate EM/STDP project to BBTWG research priorities. Need to be sure proposals tie to National priorities as stated in annual call letters.
- Develop a short (1-page) briefing paper describing major themes and key points of the BBTWG meeting. Bob Rabaglia will present these items at the November 17 Directors' Meeting.
- Develop research priorities. (Some discussion of whether this should be on the list.)
- NEW ITEM: Schedule a field trip as part of next year's joint meeting. We could schedule 1½ days for the bark beetle meeting and 1 day for the defoliator meeting, which would give us ½ day for a field trip.

Some discussion of a lack of research participation in this year's meeting. This meeting was originally set up as collaboration. Researchers get no professional points for attending. Need to do more emphasis of remote access option, e.g. Cliff Bradley's presentation on entomopathogenic fungi.

Respectfully submitted,

Connie Mehmel  
Entomologist  
USFS Forest Health Protection, Region 6  
Wenatchee Insect and Disease Service Center

Bark Beetle Technical Working Group Meeting 2015 Attendees

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