

# Central Rocky Mountains White Pine Health Working Group, Spring 2007 Meeting

Wednesday and Thursday March 28 and 29, 2007  
Natural Resources Center (New Federal Buildings),  
2150 Centre Avenue, Building E- Arapaho/Roosevelt NF Office, Auditorium  
Fort Collins, Colorado  
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Det Vogler	USFS	

## **8:30 Welcome to the meeting: Bill Jacobi**

### **Bryan Howell: Monitoring Limber Pine Health in the RM Region (year one of three year project)**

Most recent infestations within 10 miles of RMNP

2006 FHM funded project initiated to monitor limber pine health (Wyoming, Montana, Colorado)

- Objectives:**
1. Asses long term ecological health of limber pine within infested and threatened areas
  2. Provide baseline information to protect, sustain limber pine in RM

- Used Kearns (2005) plots as sample population – selection stratified based on incidence of rust, elevation and slope position to get plots with and without WPBR
- RMNP – 4 plots, selected through GIS vegetation coverage combined with Kearns 2005 model (2 plots where rust predicted to be absent and 2 where rust predicted to be there)
- Limber pine data: common measurements, % canopy killed, incidence of cones, number and size of cankers, distance and location of cankers (stem and branch), height of lowest green needles within 12” from the bole
- 36 plots – 29 sampled WPBR infected limber pines
- Incidence ranged from 0 - 80% (highest incidence in Pole Mt. area)
- Re-measurements on current plots: goal is to measure every 3-5 years
- Next summer: Jim Blodgett, John Guyon to install ~30 plots in western WY. and Marcus Jackson: plots in MT.

#### Discussion:

- Specimens of WPBR from different mountain ranges from Holly’s collection – group in Moscow working on a paper looking at the genetic distribution
- Genetic bottleneck – although most of the rust will probably do the same thing on most of the tree (samples exchanged from various parts of the country look genetically similar) – east vs. west

#### **Kelly Burns/Jennifer Ross: Aerial Survey of Colorado and Wyoming**

- Colorado 5 needle pine damage – some areas of concentration on Roosevelt, Arapahoe, San Isabel, Gunnison NF. Damage already apparent gets a little larger from 2004-2006 to just 2006. Medicine Bow area ground-truthed.
- Area classified as 5-needle pine decline or MPB.
- Acreage of damage on the Med Bow increased, acreage on the Shoshone and Bighorns decreasing (population gone?)
- Acreage of damage in Colorado increasing but not very drastically
- Aerial survey website: [www.fs.fed.us/r2/resources/fhm/aerialsurvey/](http://www.fs.fed.us/r2/resources/fhm/aerialsurvey/) - click on quad maps, click on area
- GIS aerial survey data can be downloaded also
- Contacts: Jeri Lyn Harris (FHM Coord.), Bill Schaupp (Interim Program Director), Jennifer Ross (GIS Specialist)

#### **Jim Blodgett: Pest Trend-Impact Plot System Survey (PTIPS)**

- 22 PTIPS in Northwestern Wyoming (original 1998)
- Rust incidence: 30-45%, Mortality: 1-12% (all WPBR infested trees, although could have had MPB also)
- Branch canker growth rates - 2.7 (2000 - 2003) - 3.9 (2003 - 2006) cm/year: significant differences may be attributed to species difference, tree or branch physical data
- 2005 paper: Maria Newcomb and Diana Six – methodology for measuring bole vs. branch canker growth rates

#### **Jim Blodgett: Survey of Limber and Whitebark Pines in the Shoshone National Forest**

- 40 stands sampled: 5 plots/stand (at least 50% limber and/or whitebark pines, minimum densities for plot selection)
- Surveyed grid system in state of Wyoming (state lands, all federal lands, tribal lands): summarize disease, insects and damage causing mortality or likely causing significant stress (24 limber pine or whitebark stands in Wyoming)
- 67% of the limber or whitebark pine stands with significant impact from disease insect, or fire
- 58% WPBR, 38% MPB, 17% DM, 8% Armillaria, 4% Fire = included recent dead trees

#### **Nancy Bockino: WPBR and MPB in *P. albicaulus* in GYE**

- Which tree and stand characteristics determine beetle selection and the resulting mosaic of mortality?

- WBP and Climate Change: less winter MPB mortality, MPB range expanding, MPB increase brood production, host tree stress and promotion of WPBR spread
- 4 Study Sites: based on aerial photos (FHP), overstory used to delineate 3 stand types:
  - pure whitebark
  - whitebark + non-beetle host
  - whitebark + alternate beetle host (lodgepole)
- Sample size – 1947, 52% dead (61% both WPBR and MPB, 69% MPB, 83% WPBR)
- MPB selection depends on: blister rust severity and tree species
- MPB prefer: whitebark over lodgepole AND whitebark with heavy WPBR
- Predictor variables: stand type, WPBR severity, tree diameter (can be used to predict with one another)
  - selection stronger when fewer trees with high severity of rust
  - current beetle outbreak began in whitebark
  - trees with heaviest rust have highest selection (and less variability in selection)
  - trees in pure stands have highest selection
- Smaller diameter trees had higher selection (highest prediction ~ 40-70 cm) then drops off with diameter increase

### **Brian Geils and Maria Newcomb (Ribes)**

- Number of cankers vs. diameter of the trees (how much rust is on the tree vs. how much rust can that tree hold = rust index)
- Definition of “a tree” (cluster vs. single stem) – model fit both definitions similarly
- Relative severity index – fit to distance from the plot to a site on the ground (distribution of Ribes)
- Distance from site to *R. hudsonianum* (*R. montigenum* not as important) = model gives predicted rust severity as it increases from *R. hudsonianum*
- Conclusions: about 3 km from sites (with *R. hudsonianum*) = low incidence of rust

### **Brian Geils and Katrina Frank: Long Distance Transport and Establishment of WPBR**

- Where did rust in New Mexico come from?
- 15 sites: indices for likelihood of long distance dispersal (throughout Great Basin, US Southwest and southern RM Region)
- Upper level transport of aeciospores (spring air flow patterns) and suitability of infection (spring ground meteorological data)
- Very high likelihood of transport in Nevada and CA, lower down in southern NM
- Conditions suitable for infection lower in Nevada and higher in southwest
- Upper level transport + suitability for infection = highest risk for Nevada, CA (JRB, Ruby Mts), also some risk for southeastern NM and into southern Colorado

### **Det Vogler: Update from Placerville**

- 2002 – 119 families of RM/GB Bristlecone, inoculated in 2005 (after they were a few years old – inoculation of one-year old pine may kill them anyway b/c the immunity response may not be there in the wild)
- Goal: screen all high elevation species with phenotypic assays (sowing 100 seeds/family and inoculate at 1, 2, and 3 years – need > 5 years to gain results)
- Different mechanisms of resistance in white pines: classic immune response in needles
- When you plant “resistant” seedling crop: how much resistance/susceptibility do you put out there (without putting too much selection pressure on the rust so it develops a more virulent genotype)
- Why is there such a high frequency of resistance in sugar pine (MGR?)? Selection by pinon rust through sugar pine?

- southern end of White Mts. (pinon rust within 3 miles): 50% of families have some level of resistance
- 500 feet high elevation (further from pinon rust): 28% of families show resistance
- northern end (even further from pinon): even lower % of families show resistance
- Resistance mechanism that does not operate in needles (operates primary needles or stem)
- Resistant trees develop stem lesions or cast primary needles to prevent infection

**Anna Schoettle: White Pine Website** – <http://www.fs.fed.us/rm/highlevationwhitepines/>

Please advertise its presence and help promote it

## **Lunch program 12:30-1:30**

### **Anna Schoettle: Silviculture to accelerate adaptive change in tree species populations threatened by non-native pathogen**

1. Direct genetic intervention – supplement population, outplant rust resistant seedlings into population with artificial regeneration
  - Infected pine population → ID putatively resistant seed trees → genetically resistant seed trees → seedling culture → outplant in infected site → reproductive forest with increased genetic resistance to rust (longer period 30-50 years)
  - Proactive artificial regeneration: similar, but outplanting in areas *before* invasion (shorter period of impairment < 30 years)
  - Proactive artificial regeneration with improved stock (goals, end-products)
  - Younger trees reproductive
  - Capacity for regeneration restored
  - Can contribute to recovery from disturbance
  - Progeny not necessarily 100% resistant / immune
2. Natural processes – facilitation evolution of resistance *in situ*
  - Manipulate stand structure before invasion to promote natural selection and facilitate evolution of rust resistance in the native population upon invasion
  - With a young cohort for selection to act on first will limit the ecosystem impacts of mature tree mortality.
  - Evidence of more rapid natural selection for resistance in young cohorts than older trees (Smith and Hoffman 2000)
  - Observed mortality also in smaller diameter trees (Smith and Hoffman 2000)
  - Stimulate natural regeneration → generate mosaic of varied selection trajectories → resistant seed trees or resistant young trees (slow with older trees, faster with younger trees)

Ongoing activities:

- Regeneration and disturbance
- Silviculture techniques to stimulate regeneration (San Isabel NF, Freeman)
- Genetic structure of RM Bristlecone
- Adaptation variation in RM Bristlecone
- Archiving single seed collections
- Rust screening of bristlecone pine and limber pine

## **1:30 -3:00 PM**

### **Forest and National Park Management Issues: Panel with Land Managers, Moderator: Kelly Burns**

**Jim Meyers** – Silviculturist, MBNF

- FHM funded management program at Vedauwoo in 2003 – limber pine cone crop very good but no seed collected

- Fall 2006 – general collection of cones from ~50 + trees on Pole Mountain, general collection sent to Bessey Nursery
- CSU (Jacobi and Schoettle groups) and SAF chapter volunteered to collect cones
- ~50 bushels of cones, ~ 50 trees collected from around Pole Mountain/Vedauwoo
- Supervisor recognizes importance of forest health management
- Currently working with researchers at U of Wyoming, CSU, RMRS, FHM and proximity to land grant universities offers many opportunities

### **Kevin Zimlinghaus: Boulder Ranger District- Arapahoe/Roosevelt NF**

- District is south of confirmed WPBR on limber pine
- More concern about MPB, not a lot of knowledge or concern about WPBR.
- Opportunities for education with open-house meetings (speakers, tables, etc.)
- Current major focus is working on fuel reduction (come across limber and bristlecone pine in transects)

### **Dave Hattis – Silviculturist, Canyon Lakes District, Arapahoe/Roosevelt NF**

- CVU of limber pine and bristlecone on Arapahoe/Roosevelt Canyon Lakes District = 70,000 acres (~80% accurate), ~5500 acres of pure stands
- Goal is uneven ages stands for pest management
- Identification of pure stands difficult (stands relatively small, < 5 acres) but a continuous effort
- Major focus on fuels reduction and wildfire mitigation (next 3 - 5 years), sites few to several hundred acres
- Prescriptions very general, include taking out small diameter trees to reduce ladder fuels
- Target collection of limber and bristlecone pine cones – sent to seed bank at Bessey (6300 seeds/pound)
- Collection of + tree cones collected from Cherokee Park area in 2006 (Jacobi)
- Quarterly forest and grassland newsletter – WPBR article, good vehicle to get information out
- Most funding is going to MPB removal, prevention, etc.

### **Jim Thinnes – R2-Regional Silviculturist**

- Current responsibilities with USFS is determining funding allocations, tech transfer and information sharing with silviculturists
- Wildfire suppression and preparation funds now 45% of budget (used to be 15%)
- Funds are up for fire management and down for other management programs
- Best values is to collaborate with NF Vegetation/Watershed Funds
- NFVW funds go to meeting the hazardous fuels objectives (half of this has to be used on the forest/urban interface)
- Reforestation Trust Funds – (tax from imported lumber) money available for reforestation
- Coordination with other programs – Forest Health Management
- Funding based on unit dollars
- FACTS Database – for forest “needs”
- Projects: purpose and need for this project HAS to be tied in (desired conditions, forest plan, etc.)

### **Jeff Connor – Rocky Mountain National Park**

- 7 year strategic forest health plan: what should the park do with limber pine?

- Currently WPBR has not been found in RMNP
- What management practices are appropriate for a National Park? Management of native vs. exotic pests
- Backcountry campsites being hit with MPB (and spruce/fir beetles)
- Management of pests has a relationship to safety issues at campsites
- Park is mandated to keep designated campsites safe

### **Lynette A. Otto – Forest Wildlife Biologist/Shoshone/Yellowstone**

- Whitebark pine primarily in wilderness land
- Combined whitebark pine map collaborative effort
- Plus tree cone collection program: 20 trees were collected from in 2006 but funding limitations limited the extent of this activity
- More limber pine in more accessible areas, so greater possibility of change for WPBR management activities with this species
- Can controlled burns be used for WBPR management?
- Arbor Day program for Arbor Day/Earth Day in Cody, Wyoming
- Wildlife Natural Resource Trust Fund – funds (only in WY) may be used for WPBR management (?)
- Grizzly bear delisting and white pine health issues

### **Mary Maholovich: Conference call**

- More genetic variability within populations compared to between populations in RM Bristlecone
- A lot of inbreeding (still a fair amount of gene flow)
- Isolation effect
- Sample as many locations as possible (for restoration, gene conservation, etc.) BUT..
- Suggests bigger seed zones to sample from because of the variation within a population
- Bring RMB populations together to breed
- MGR screenings for limber pine and bristlecone: inoculations in September
- *P. longaeva*, *P. aristata*: immunity trait (?) – high frequency, co-occurs with MGR? (stem lesions or slight needle spotting, appears to be inherited)

### **John Schwandt - Update on whitebark pine restoration projects**

- Whitebark pine detail
  - Range-wide health assessment
  - Restoration needs
  - Restoration strategies
- Implementation of restoration
- Funding: R1 – Suppression = \$160,000 to protect trees from MPB
  - Washington Office - \$200,000
  - R1 Forest Management \$130,000 – didn't go through (at present time)
  - R1 Wildlife \$100,000 – didn't go through
- Whitebark pine pre-proposals: 56 sent in, range from \$1,000 - 125,000 in requests for fund
- Restoration Activities: Funds requested= \$1,005,700, matched amount = \$850,500

## **Diana Tomback: Blister Rust Prevalence in Krummholz Whitebark Pine: Implications for Treeline Dynamics**

- High incidence of blister rust in krummholz whitebark pine found east of the continental divide on the Blackfoot reservation
- Resler (2004,05) suggest that whitebark pine in the treeline east of the continental divide initiates tree islands
- Sheltered sites determine spatial distribution of whitebark pine
- Summer 2006 Objectives:
  - Relationships between whitebark pine and tree island distribution
  - Incidence and severity of blister rust in trees and tree islands
- ~260 tree islands: 80% were individual stems
- 150/231 solitary trees were whitebark pine
- 255/266 tree islands included whitebark pine
- 0-18 whitebark pine per tree island
- Whitebark pine was an initial colonizer (significantly greater than any other species)
- 33.7% of whitebark pine had potential, active or inactive cankers
- 24.3% had active or inactive cankers
- Found dead whitebarks with symptoms of blister rust
- Higher incidence of cankers/whitebark pine on multi tree islands compared to single stem (solitary trees)

**Meeting adjourned for Wednesday at 5:15 pm**

**Thursday March 29, 2007**

### **Bill Jacobi report on recent studies at CSU:**

- Colorado Bristlecone and Limber Pine seed lot sent to Dorena
- Still have some live trees after inoculation in 2003
- many that were infected with needle infections and small spot cankers which have not killed the trees –
- Pruning study with FHM and NPS– Mosca and Vedauwoo
- 160 trees at each site were lifted, pathologically pruned or both
- timed pruning, etc – about 5 minutes per tree
- small trees had cankers throughout crown, while large trees had most cankers in the upper part (but no branches at the bottom)
- so cankers on small trees tend to be more lethal, and might have to treat more frequently
- every 4-5 years

### **General Discussion on what the major needs are for future progress on white pine health in the region**

- Four areas of management need research to provide information and coordination is needed for these areas

#### **One: Stimulate natural regeneration to promote resistance screening in the seedling population**

- How do we prioritize where to do this work?
- Anna suggests that we avoid high hazard areas and focus on low or moderate risk areas where potential for success may be greater
- May need to think about additional plot info that would contribute to successful regen
- Anna and Kelly are already talking about this
- Jonathon will provide some info after this year for limber and bristlecone
- Limber is extremely variable in terms of where they occur, so it may be difficult to determine what conditions are best for regen and survival (and conditions may change from regen to sapling?), and may change over range

#### **Two: Selection of Plus Trees for seed production**

Should we be planting seed from 'good' trees even without screening them?

- Det feels there is no question these should be better than a basic bulk lot
- Planting now might help, but also provide an opportunity to learn how to plant properly for success

### **Three: Screening of plus tree seedlings for resistance**

- Need to get started on screening ASAP because nurseries may not be around much longer (10+ years?)
- Det thinks that statement in the Return of Giants that says we would not use immunity even if we had it – is offensive – it is how we use it rather than should we use it
- Anna says we “should do no harm” ; if we feel we are not doing harm to the ecosystem, then we should proceed
- Bill – can we trust results from the screening center. Conditions are so different at the nursery they may not work in the field; We need to incorporate Field testing of screened materials.
- Nursery site at Pole Mt – what should be done with it?? Might be a good place to install a field test of plus trees
- Kelly/Anna – need a quick collection from the Big Horns before it disappears
- Could be a great opportunity to find plus trees
- Jim Blodget – says that MPB seem to prefer rust infected trees (has a report) at Big Horns
- Need to identify potential plus trees ahead of time!! Especially if the area is hard hit with BR, getting there early (June?) makes canker identification easier –
- *Can also look for evidence of cone crop*
- Might not be a good cone crop this year (last year was pretty good), but could still identify potential plus trees.
- Don't want an inexperienced crew trying to identify plus trees in September!
- Kelly would like to try to get to Laramie Peak
- need research to identify mechanisms of resistance and modes of inheritance
- Anna pointed out need to look at adaptive traits as well – does survivability have same suite of adaptive traits
- Is there a “fitness cost” to rust resistance? )

### **Four: Bulk seed collections;**

1. Need to give managers protocols for how to collect bulk lots and explain how important these will be in the future
2. need to collect from areas with little rust pressure Encourage districts to collect bulk collections if they don't have blister rust
3. Encourage districts to collect bulk collections if they don't have blister rust

### **Five: Seedling planting and natural regeneration:**

- Also need to find out what field conditions offer the best opportunity for planting success and survival
- Jonathon is doing this for Bristlecone
- Some silvi folks may be able to answer some of this based on current work
- Seed zones information is needed

### **Funding issues**

- Is there a way to convince fire \$\$ people to spend some \$\$ on cone collection to have seed collected for reforestation after fires??

- Might be able to get fire crews to help in fall if there is no big fire season!!
- Get into Wyoming trust fund \$\$ - adaptive management
- Need to involve NPS, BLM, and BIA
- Jim Thennis may be willing to fund some cone collection (and screening?)
- Once collected – is there a mandate to get it screened and can they draw from it for
- Need MF to identify the correct people in region 2 and Region 3 who need to be ‘lobbied’ to provide the funding to her to set up the screening (Who are Bruce Fox’s counterparts), and does she have suggestions on how to approach them?
- Might want to get a regional plan to help coordinate the efforts
- Is there a region 1/r interest in limber pine??

#### **Other Questions:**

- What should we do about “new spots” of blister rust?
- Can treatments such as eradication (i.e. pathological pruning) be effective in slowing the spread?

#### **Limber Pine preliminary screening**

- 90 families – (some with and w/o infections) 1753 seedlings
- ,almost all seedlings got spots, some cankers in 6 mo
- 89% had cankers, and the rest had spots
- about 7% had HSR spots, susc spots, or ?HSR spots
- appears to be something geographic going on, but not a simple relationship
- found that “plus” trees had about 10% fewer cankers and twice as many HSR?? Cankers as the “bulk” collections or parent trees with cankers

#### **Next Year’s Meeting**

- might try to combine meeting with regional silviculturist meeting (if it is going to be held again in Feb?)
- Kelly will check into it
- Send a thank you to those that participated and ask their opinion about the meeting PLUS ask if there are topics that would interest them next year (and if they might be willing to share info again)
- Include NP people (including Glacier?)
- Include Wind River Indian Resv. And BLM
- Especially aiming at the Shoshone and Bighorn forests