

**2006 Meeting of the
Central Rocky Mountain White Pine Health Working Group
Tuesday, Wednesday, & Thursday
March 7- 9, 2006**

[Meeting Attendees](#)

Tuesday, March 7, 2006

8:30 a.m. Bill Jacobi Welcome & Introductions

Jim Bedwell, Supervisor

USDA Forest Service, Canyon Lakes Ranger District (Arapaho & Roosevelt National Forests and Pawnee National Grassland)

2150 Centre Avenue, Building E

Fort Collins, CO 80526-8119

970-295-6600

Building, part of the Natural Resources Center Complex part of CSU opened in 2004

Green building designed with energy and water conservation in mind.

Canyon Lakes Ranger District now all in same building.

The Arapaho and Roosevelt National Forests and Pawnee National Grassland (ARP) is located in north central Colorado. The forests and grassland encompasses 1.5 million acres and extends north to the Wyoming border, south of Interstate 70 to Mount Evans, west across the Continental divide to the Williams Fork area and includes short grass prairie east of I-25. The forests and grassland are head-quartered in Fort Collins, with District offices in Boulder, Fort Collins, Idaho Springs, Granby and Greeley.

Arapahoe / Roosevelt National Forest

<http://www.fs.fed.us/r2/arnf/>

Fire and Fuels

[Quick Facts](#) [Key Messages](#) [Fact Sheet \(.pdf\)](#)

Invasive Species

A strategic Forest Service response to invasive species is embodied in the National Strategy and Implementation Plan for Invasive Species Management launched in October 2004. The strategy is an aggressive program that harnesses the capabilities of the Forest Service. The Forest Service provides cutting edge leadership in natural resource management and research and development. For more information regarding the Forest Service National Invasive Species program, visit [Invasive Species](#).

Summary of Canyon Lakes Ranger District Forest Health

Mountain Pine Beetle

West side of divide large outbreak MPB

High elevation forests severely infested

District area encompasses 5 Colorado counties

Some areas being treated

were some of the most devastating in the United States.

Current Wildfire Prevention and Management Plans for 2006-2007:

Treat 14-15 thousand acres per year.

Impact on white pine communities ...

Although white pines do not compose a large portion of the area's natural forests, there are primary ecological components of high elevation forests. Level of vegetation management has increased over the recent years.

Tuesday, March 7, 2006, continued

Brian Kent
USDA Forest Service
Acting Assistant Director
Rocky Mountain Research Station

Welcomed members of the Central Rocky Mountain WhitePine Health Working Group.

The Rocky Mountain Research Station (RMRS) is a multicultural and diverse organization that employs over 400 permanent full-time employees, of which more than 100 are research scientists. The work done at RMRS is done in cooperation with other Forest Service units, universities and other agencies and institutions, helps to make informed decisions on a wide variety of natural resources issues and problems throughout the western United States. RMRS is recognized nationally and internationally as a leader in caring for the land and serving people. For more information about Rocky Mountain Research Station, visit <http://www.fs.fed.us/rm/> .

Research Activities at RMRS:

Front Range Fuel Treatment Partnership

White Pine Blister Rust and health of high elevation white pine ecosystems.

Many other projects that focus on research and management.

Dr. Kerry Britton
Forest Health Protection

Forest Health Protection's definition of a healthy forest: A condition wherein a forest has the capacity across the landscape for renewal, for recovery from a wide range of disturbances, and for retention of its ecological resiliency while meeting current and future needs of people for desired levels of values, uses, products, and services.

Disturbance agents are parts of a healthy ecosystem and usually do not require control. When the activity of a particular disturbance agent exceeds its natural range of variation, it may be necessary to implement control measures.

Control measures are usually confined to areas of special concern (i.e., recreation sites, threatened and endangered species, drinking water supplies, etc.).

Exotics are unwanted organisms in America's forests, thus Forest Health Protection will vigorously try to eradicate or slow the spread of exotic species. Invasive species include forest insects, diseases and invasive plants throughout the United States.

Goal of Forest Health Protection:

Rapidly respond to forest health threats to avoid unacceptable loss of forest resources.

Goal achieved through seven guiding principles:

1. Primary responsibility for minimizing impacts and damages of native and invasive forest insects and pathogens.
2. Provide unique technical expertise (e.g. forest entomology, pathology, and pesticide use and risk management).
3. Predict future forest health trends.
4. Monitor and report all aspects of forest health conditions (insects, pathogens, invasive plants, air pollution, storms, etc.).
5. Bring together all stakeholders to work on all forestlands through our unique authorities in an unbiased manner.
6. Develop and implement cutting-edge forest health technology.
7. Cooperate internationally on global forest health issues.

Responsible for minimizing the spread of established invasive species and lessening the damages caused by native insects and diseases.

Protects and improves America's forests using cutting-edge technology to rapidly respond to forest health threats.

Forest Health Protection recognizes that a management strategy to control invasive species is essential for sustaining forest and rangeland health, and to reduce long-term management and restoration costs. USDA FS Forest Health Protection has developed an Integrated Forest Service Program involving National Forest System, State and Private Forestry, Research and Development, and International Programs, along with federal and nonfederal partners; this Integrated Forest Service Program will minimize the effects of unwanted invasive species in America's forests and grasslands.

Forest insect and disease organisms introduced from other continents pose an increasing threat to the forests of North America. It became apparent to folks involved with Forest Health Protection that information on the management of foreign pests was often not readily available to pest management specialists, regulatory officers, research scientists or the general public. In order to provide needed information pertaining to exotic forest pests, Forest Health Protection established The Exotic Forest Pest Information System for North America (EXFOR) www.spfnic.fs.fed.us/exfor. EXFOR concentrates hard-to-find information assessing an exotic forest insect or pathogen's risk of establishment and spread in North America and on methods

to manage them should they become established. EXFOR is a scientifically-based Internet database for more than 135 exotic insects and diseases.

Forest Health Protection and White Pine Blister Rust (WPBR):

WPBR is a disease that continues to threaten the health of the forested ecosystems of North America.

White pines play an important role in maintaining watershed health and providing wildlife habitat.

Cronartium ribicola was introduced into North America nearly 100 years ago.

All nine species of native white pine are at risk of infection by *C. ribicola*.

Scientists have worked to develop disease resistant sugar pine, western and eastern white pines, all are considered to be valuable timber trees and all susceptible to WPBR.

Silvicultural strategies have been developed to augment white pine forest restoration, which requires large openings and fire to control competing vegetation (90% of western white pine-dominated forests have been taken over by more pest-prone species, e.g., firs, cedar and hemlock).

Pruning and thinning to remove rust infections can extend the life of planted pines.

Active management can restore sugar pine, western and eastern white pine ecosystems, with the capacity for self-renewal, recovery, and ecological resilience.

Disease resistant seed and seedlings of sugar pine, western and eastern white pines are being produced in Forest Service seed orchards and nurseries.

Bristlecone, foxtail, limber and whitebark pine are sometimes the only tree species that can survive in arid high-elevation environments, these species help to regulate snow accumulation, stabilize soil, and provide critical wildlife habitat.

Less is known about managing in the high-elevation white pine species.

WPBR management and WPBR resistance in ecologically-important high elevation white pine species such as whitebark or bristlecone pine is largely unexplored.

Wildlife at risk if high elevation white pine forests taken out by WPBR include:

Clark's nutcrackers, pine squirrels, black bears, grizzly bears, and many small seed-eating birds and mammals.

http://www.fs.fed.us/foresthealth/briefs/2005_briefing_papers/White_Pine_Blister_Rust_2005.htm .

National Strategy and Implementation Plan for Invasive Species Management

http://www.fs.fed.us/foresthealth/publications/Invasive_Species.pdf

USDA FS Invasive Species Management web page

http://www.fs.fed.us/foresthealth/programs/invasive_species_mgmt.shtml

USDA FS Invasive Species Strategy

http://www.fs.fed.us/foresthealth/briefs/2007_budget_briefings/invasive_species_strategy.htm

Current Forest Service White Pine Blister Rust Model

Forest Health Protection, in conjunction with Forest Health Technology Enterprise Team has developed the **White Pine Blister Rust Model** that simulates the activities of *Cronartium ribicola*. The **White Pine Blister Rust Model** is maintained and supported by the Forest Health Technology Enterprise Team. The **White Pine Blister Rust Model** is available as an extension to FVS and is based on the original work of GERAL I. McDONALD, RAYMOND J. HOFF, and WILLIAM R. WYKOFF (documented in USDA Forest Service Research Paper INT-258 published in 1981). The **White Pine Blister Rust Model** simulates the life cycle of *Cronartium ribicola* and the resulting mortality of white pine. The model has recently been enhanced to also recognize sugar pine, but specific model parameter values for sugar pine have not yet been developed. This enhancement was designed to facilitate the inclusion of additional pine species as research findings become available. The **Blister Rust Index**, a measure of WPBR infection level or potential for a site, area, or stand, drives the model. The initial value of the blister rust index can be provided by the user, calculated from current infections provided with inventory data, or calculated based on *Ribes* populations. Three principle *Ribes* hosts are represented in the model: *Ribes hudsonianum*, *Ribes lacustre*, and *Ribes viscosissimum*. For additional information pertaining to the **White Pine Blister Rust Model** (<http://www.treearch.fs.fed.us/pubs/4702>).

9:00 am

Bark Beetles and White Pines Jose Negron, Research Entomologist, Rocky Mountain Research Station, Fort Collins,

Mountain Pine Beetle: An over view

In Lodgepole Pine Stand, factors that favor Mountain Pine Beetle attack include:

8" diameter class

Stand age of 80+years

At an elevation/latitude conducive to beetle survival

In Ponderosa Pine Stand, factors that favor Mountain Pine Beetle attack include:

70% Probability of infestation in stands with Basal area >16.9 m²/hectare

21% Probability of infestation in stands with Basal area ≤16.9 m²/hectare

Trend shows increase in Mountain Pine Beetle activity over recent years.

Mountain Pine Beetle-caused mortality in whitebark, western white, and limber pine stands has increased dramatically in recent years.

Increased Mountain Pine Beetle-caused mortality in whitebark, western white, and limber pine stands has caused major concerns related to watershed, wildlife, and recreation.

Dramatic increase in Mountain Pine Beetle-caused mortality in whitebark pine in Yellowstone National Park observed in 2004.

Dramatic increase in Mountain Pine Beetle-caused mortality in whitebark pine in Montana.

WPBR Condition	Code	Not Attacked by MPB	Attacked by MPB	Unknown Mortality	Total
No WPBR	0	40 (40)	60 (60)	0	100
Light WPBR	1	73 (53)	66 (48)	0	139
Moderate WPBR	2	54 (58)	39 (42)	0	93
Severe WPBR	3	24 (55)	20 (46)	0	44
WPBR Present (Could not accurately determine severity)	4	1 (5)	20 (91)	1 (5)	22
Total		192	205	1	398

Schawndt and Kegley, 2004

NOTE:

Increased MPB attack in trees **without** WPBR compared with trees with WPBR.

Authors concluded:

- **Endemic** populations of MPB, trees with WPBR infections are preferred
 - **Epidemic** populations of MPB, trees with no WPBR were preferred
- (Kegley et al. 2003, 2004)

Discussion >>>**John Schwandt** commented that although he looked at these whitebark pine sites in Idaho with Kegley, he believes that these sites need to be better categorized in terms of WPBR severity on individual trees. More investigation needed in order to determine the level of tree vigor required for MPB infestation.

Question >>> **Brain Geils** >>>"Can a whitebark pine get so sick that MPB are not attracted to the tree?"

Discussion followed between **Brian Geils** and **Det Vogler** about possible genetic / biochemical factors that could account MPB feeding behavior in stands of whitebark pine infected / not infected with WPBR.

Jose Negron ... continued

	Jack Pine	Limber Pine	Lodgepole Pine
Total Adults Emerged	812	6313	674
Adults /m ² log surface	165	1195	129
Adults / gallery	2.56	24.37	3.94
Female to Male Ratio	1:0.95 (not sig)	1:0.79 (sig)	1:0.60 (sig)

Cerezke (1995 in the journal entitled The Canadian Entomologist)

Increased number of adults observed emerging from limber pine compared with lodgepole or jack pine.

Discussion

Diana Tomback commented about the higher ratio of female MPB to males MPB in limber pine compared to the F:M ratio in lodgepole >>> WHY the difference in F:M ratio?

Is MPB selecting younger rather than older limber pines?

Andrew McMahan commented that phloem thickness may have something to do with the difference.

Diana Tomback stated that phloem of limber pine thicker than phloem of lodgepole pine.

Eric Smith commented assumption of low numbers of adult emergence from galleries of Jack and lodgepole pine

Kerry Britton questioned roll of genetics in this.

Blakey Lockman questioned pathogenicity of fungi in trees on the MPB

Diana Dean commented her research shows that MPB prefer Limber pine over Lodgepole pine, MPB take 2-3 years to kill limber pine, and association with WPBR in these trees is very little if any.

Det Vogler commented that increased number of females probably reflects an increase in pheromone.

Geils, Lockman, & Vogler had a continued discussion pertaining to geographical distribution of vulnerable stands. What impact does drought have on host susceptibility?

Vogler asked what motivates a MPB to attack a particular host? Stand Density & MPB in Whitebark pine (Perkins & Robert study reported in 2003) BA > 10 square m/ ha (44 sq ft/ac) or sdi > 80 had a 1.0% probability of being attacked by MPB

Rich S & Schwandt Eric Smith <<<Looking at survivors for sources of resistance in stands with 80%+ mortality

Amy <<< Possible management strategies when dealing with MPB & WPBR?

Perkins and Roberts (2003)

examined residual stands from 1930's outbreak

stands with basal area > 10 m²/ha (44 ft²/ac) or sdi > 80 had a 1.0 probability of being attacked by mpb

Some data indicates:

- perhaps mpb exhibits differential preference in hosts in whitebark pine as it pertains to blister rust:
- endemic populations in trees with blister rust infections
- epidemic populations in trees with no blister rust
- limber pine appears to be a better host for mpb than lodgepole pine
- in whitebark pine, mpb is associated with higher stocking levels

Questions?

is host selection by mpb influenced the same way by blister rust and dwarf mistletoe?

is vegetation management through silvicultural thinnings an option for reducing whitebark pine (and possibly others) susceptibility to mpb?

how will whitebark pine (and bristlecone pine) rank as suitable hosts for mpb?

are limber pine stands a refugia for endemic mpb populations?

What are the immediate knowledge needs about bark beetles in white pine and high elevation ecosystems

What are the immediate needs in bark beetle ecology and management to support restoration and conservation efforts?

Discussion>>>>Holly Kearns reported many limber pine she surveyed were also infected with dwarf mistletoe And MPB. Surayed areas that had living and dead trees.

Geils asked about occurrence of other species of beetles in limber and whitebark pine.

Dwarf Mistletoe (DM) Ecology in Western White Pines

Holly Kearns

Of the 39 North American taxa of *Arceuthobium*, 13 are reported to infest white pines, and 6 of these prefer a species of white pine as their principal host.

Number of species of *Arceuthobium* known to parasitize the following species of white pines endemic to western North America:

P. aristata: 4

P. flexilis: 3

P. monticola: 7

P. albicaulis: 4

P. lambertiana: 4

P. strobiformis: 4

P. balfouriana: 1

P. longaeva: 1

Negative impacts of DM on health of white pines: *Arceuthobium cyanocarpum*

Considered one of the most important diseases of high-elevation 5-needled pines in the West (only WPBR is considered more damaging)

Causes heavy mortality in limber pine in the Rockies and whitebark pine in Northern California

Other Principal Hosts: Rocky Mountain and Great Basin bristlecone pines

Occasional and 2° Hosts: western white and foxtail pines

Will kill mature trees

Concerns:

White pine reproduction potential may be reduced

White pine regeneration may never reach cone-bearing stage

DM could eliminate some WPBR-resistant white pines

Attention should be focused on protecting apparent WPBR-resistant white pine trees

Protection efforts may require pruning and selective removal of DM from WPBR-resistant trees

Discussion>>> Eric Smith>>>When thinning of stands for DM management; does a forester treat limber the same as lodgepole, or should different control strategies be used in limber pine stands? Brian Geils responded that *Arceuthobium cyanocarpum* cycles very fast throughout stands. >>> Russell Beam>>> What is the major vector of DM? >>> Jim Hoffman replied several species of birds, and spoke of Valley of the Moons National Park? An area ancient lava flows <<< studies have been done to determine birds involved in movement of *Arceuthobium cyanocarpum* <<< area not known to be infested with MPB, but limber pines severely impacted by *Arceuthobium cyanocarpum*.

Bill Jacobi >>> Have studies been conducted to determine impact of pruning on DM management?

Det Vogler >>>Since no one harvests high elevation white pines, these trees are ideal for studying the interactions of bark beetles, WPBR, and tree genetics. Det believes that WPBR is a bit oversold because it is an exotic invasive, but what about other endemic pathogens that move into areas where historically they were not present?

10:10 am

BREAK

10:40 a.m.

Wyoming White Pine Health Update

Jim Blodgett

PTIP plots:

Used to determine incidence of WPBR in trees in selected stands of some of the national forests of WY

Plots composed primarily of limber pines, but some plots include whitebark pines

Data collected in 1998, 2000, 2003 indicate that the incidence of WPBR has increased over the years

14% increase of WPBR in plots between 1998 and 2000

7% increase of WPBR in plots between 2000 and 2003

Canker growth rate:

2.7 cm per year <<< average (small standard error)

5.3 cm / year <<< maximum

1.0 cm / year <<< minimum

Comments>>> Brian Geils asked if Jim could use data to determine age of canker and when infection first occurred in the plots.

Identification of *Ribes* species in Custer State Park in the Black Hills

July 8, 2004

30 transects

84% (492 stems per hectare) *Ribes oxycanthoids* subspecies *setosum*

15% *Ribes oxycanthoids* subspecies *oxycanthoides*

1% *Ribes cereum*

Jim did not survey for WPBR on these *Ribes*

Discussion>>>Det Vogler stated that time of origin of WPBR infection information data would be extremely helpful for determining dynamics of the pathogen in particularly recovery from WPBR. Additional discussion followed pertaining to sampling methods

Discussion>>>Diana Tomback cautioned about making extrapolations based on just a few years of data, especially since the area has been in a period of drought for the past several years.

Discussion>>>Rich Sniezko asked about levels and severity of WPBR infection in study stands.

Discussion>>>Jim replied that levels and severity of WPBR infection varied depending on stand, but noted increase in white pine mortality over the years. Jim commented that he feels that the PTIPS plots are worth keeping because they have provided so much information over the years.

11:10 a.m.

Report from Regional Whitebark Pine Coordinator

John Schwandt

Regional Whitebark Pine Coordinator (A 1-year position that will not be renewed)

Purpose of Whitebark Pine Coordinator:

1. Get folks who work with whitebark pine talking with each about their WBP-related research.
2. Pool data pertaining to the health of whitebark pine in its native range (high elevation forests of western United States).
3. Prepare an updated report on the health of whitebark pine in its native range.

Update on the Health of Whitebark Pine:

WBP health conditions adversely affected by:

White Pine Blister Rust and
Mountain Pine Beetle

General Conservation/Restoration Strategies:

Emphasis on Forest **FHP** activities

Distribution of Whitebark Pine:

Many folks have maps already generated for specific areas. Examples include:

U.S. Geological Survey 1999. Digital representation of "Atlas of United States
Trees" by Elbert L. Little, Jr.

<http://climchange.cr.usgs.gov/data/atlas/little/> [February 2003]

Anna Schoettle (USDA Forest Service Rocky Mountain Research Station)

Brendan Wilson (Parks Canada) <<< Canadian distribution of whitebark pine stands [draft]

Blakey Lockman & company (Whitebark limber pine Information System (WLIS))

Brian Geils (?)

Dick Halsey (Boise FHP?)

WBP Silvics (tree species factors):

Size

Density

Site factors

Competing vegetation

Property access (often hampered due to private ownership of land), as well as,

Wildlife (nutcrackers [prefer mature trees because of cones/seeds], bears,
others).

Restoration Actions Required for Renewal of Health of Whitebark Pine:

Surveys/evaluations/monitoring

Planting

Seedlings

Seed

Site Prep

Dealing with com veg

Burning

Getting several different groups to agree that fire would be a good thing for some
ecological sites ...

Fall and winter are good times because folks have better control at these times of year!
Timing of burn greatly impacts regeneration ...
too hot of fires can actually permanently damage and alter forested areas!
Ribes usually prolific in areas following burns ...
this could be counter productive for management of WPBR!

Resistance Screening
requires lots of money for these projects
MaryFrancis Mahalovich has done some, but more still needed!

Comments: Diana Tomback mentioned the need for resistance screening in the Greater Yellowstone Area, especially those areas hit hard by MPB infestations.

Conservation Activities:

Establish seed banks
Potential problems with seed pathogens and insects
Controls for seed pathogens and insects
Establish pollen banks?
Locate PLUS trees ...
Protecting these PLUS trees from attack by MPB
“verbenone” (anti-aggregation pheromone) ...
applications 2 times per year
Grafting from PLUS trees
Establish seed orchards
Resistance screening for conservation of potentially “resistant” or “highly tolerant” genetic material.

Discussion: Det Vogler asked about reasoning for grafting <<< grafting will protect genes, but not necessarily protect an individual tree

Research Needs:
“The Giant List”

Funding Sources: John stated “Kerry Britton has all the answers!”

Discussion: Brian Geils asked about impacts of climate <<< are we thinking far enough ahead? “Do the folks in Washington have some strategic plans for dealing with climate change and its impacts on WPBR?”<<< Higher elevations with warmer and wetter conditions in the future would favor WPBR!
Rich Snieszko talked about climate change and its potential impact on future seed source.

11:35 a.m.

Funding of White Pine Initiative

Kerry Britton

Forest Pathologist

Forest Health Protection

State & Private Forestry (Washington D.C. Office)

2006 budget cuts resulted in 35% reduction in funding for USDA Forest Service Forest Health Protection.

Folks involved with USDA Forest Service Forest Health Protection have to plan on no new money for the 2006-2007 fiscal year!

Without a CLEAR vision of where USDA Forest Service Forest Health Protection wants to be, we will get no where

Folks involved with USDA Forest Service Forest Health Protection should have a “package” ready to submit to the Invasive Species Conference June 14&15

Focus of conference will be how the Forest Service can protect lands from invasive species.

Regional pathologists, entomologists, work in groups to come up with ideas!

Focus on how to accomplish goals will require different groups working together.

Comments: Diana Tomback asked about use of GIS to develop strategies for focusing efforts.

Kerry Britton continued, stating that the “Strategic Plan” has been revised.

Revised Strategic Plan allows forest managers to claim acres for “wildland fire” money use.
Kerry had hoped the WBP could serve as a model to encourage appropriate management practices.
USDA Regional invasive species research teams are collaborations among several sciences.

Comments: Bill Jacobi mentioned that the USDA Forest Service needs to include the urban forests!

Kerry Britton continued, stating that the Emerald Ash Borer (EAB) has been declared “UNSTOPPABLE”, which means that the Federal Government not be putting up special funds to impede the movement of EAB!
Thus, the USDA Forest Service will not implement nor enforce restrictions on the movement of firewood.

Comments: Blakey asked about the “White Pine Initiative”?

Kerry reported that previous focus on concern for the health of high elevation white pines resulted in John Schwandt’s position of Whitebark Pine Health Coordinator!

Kerry stated the importance of getting the attention of politicians. She gave an example of the attention given to issues concerning Mountain Pine Beetles (MPB)...
Since the activities of large populations of MPB can turn entire hillside red ... this gets peoples attention! Concerned people (especially concerned influential people) in turn get the attention of local and national politicians!

Comments: Diana spoke about threats to entire ecosystems ... WPBR impacts not just a Few species, but Entire ecosystems!
Diana stressed the importance of thinking in terms of the “worst case scenario”?

Comments: Rich Sniezko commented about the importance of attaching numbers to the information ... “What are the NUMBERS of dollars, NUMBERS of species, NUMBERS of acres that WPBR impacts?”

Comments: Diana Tomback stated that in Region 1 folks do seem to be more aware of the significance of the WPBR problem in their high elevation whitebark pine forests!

Comments: Det Vogler warned that as scientists, we can not predict the future, therefore we should refrain from making “doom and glum” statements about the future.

Comments: Brian Geils asked, “What do we need to do with the “White Pine Initiative”?” Kerry stated that there is a need for researchers to publish articles about the different components of ecosystems impacted by pests, especially WPBR.

Comments: Diana Tomback stated that she and others concerned about the declining health of Whitebark Pine ecosystems are yelling “The Sky is Falling”. With MPB taking out WBP at a high rate, WE are in danger of losing potential WPBR-resistant WBP even before they are discovered! In areas where WPBR has wiped out almost entire stands of WBP, MPB can move in to area and infest the remaining potentially WPBR-resistant individuals ... thus negatively impacting entire ecosystems!

Comments: Det Vogler stated that he wholly supports what Diana is doing, but from a USDA Forest Service viewpoint.

Comments: Diana Tomback mentioned the Whitebark Pine Foundation, of which 99% of members are federal employees, so it is quite evident that many USDA Forest Service personnel are concerned about the health of WBP.

Comments: Kerry mentioned other invasive species especially, *Phytophthora ramorum*, and the potential impacts that this could have on eastern hardwood forests.

Comments: Eric Smith mentioned that congressman Ken Salazar is aware of and interested in the health of Colorado Forests.

Comments: Jeff Witcosky added that federal monies are often withheld for projects that focus on proactive resistance screening ... he would like to see government take a proactive approach to dealing with invasive species, rather than the all-to-common reactive approach.

Comments: Several folks mentioned the need to get wildlife conservation groups involved in helping to voice the need for WPBR research, especially the need for resistance screening and the promotion of fire for the regeneration of high elevation white pine species.

12:30 p.m.

Pruning: Can it prevent limber pine mortality from WPBR?

Presentation by Amanda Crump, MS Student, Bioagricultural Sciences and Pest Management, Colorado State University

Protecting and preserving high-value and culturally significant five-needle pines trees in recreation areas is a concern for land managers.

Unfortunately, silvicultural strategies for WPBR management have not been tested for high elevation white pine species.

The purpose of the pruning study is to evaluate the efficacy of pruning techniques and canker removal treatments in reducing infections, decreasing mortality, as well as to assess several pruning treatments in terms of cost, feasibility, and effectiveness.

Future study plans require that both study sites will be re-visited in 2006 to do an initial evaluation of the pruning treatment.

Trees will be re-evaluated every 3-5 years to determine if the treatments were effective.

Comments: Blakey Lockman asked about the criteria used to determine the effectiveness of the pruning treatment?

Comments: Diana Tomback stated that it would be interesting to note effects of pruning on cone production!

Comments: Eric Smith asked if anyone notices any apparent “healing” of cankers, thus suggesting the presence of some type of hypovirulence?

Comments: Kelly Burns noted that some of the bristlecone pines did not produce abundant amounts of cones. Kelly was not sure what was responsible for this.

Comments: Brian Geils asked what was done with the cut branches?

Comments: Bill Jacobi replied that the pruned branches were just scattered the area.

Comments: John Schwandt asked if all cankers on an infected tree were scribed, or if just one canker on an infected tree was scribed?

Comments: Bill Jacobi stated that it varied, and depended on the individual tree.

Comments: Bill Jacobi stated that, ideally, all branches with needles close to main trunk of tree should have been pruned.

Comments: John Schwandt asked a question pertaining to pathological pruning.

1:20 p.m.

Rocky Mountain Research Station Invasive Species Programs

<http://www.fs.fed.us/invasivespecies/>

**Brian Geils, Rocky Mountain Research Station - Flagstaff Lab, Southwest Forest Science Complex
2500 South Pine Knoll Drive, Flagstaff, AZ 86001**

<http://www.rmrs.nau.edu/lab/people/bgeils/>

A species is considered invasive if it meets these two criteria:

1. It is nonnative to the ecosystem under consideration, and
2. Its introduction causes or is likely to cause economic or environmental harm or harm to human health.

National Strategy and Implementation Plan for Invasive Species Management
(pdf publication)

http://www.fs.fed.us/invasivespecies/documents/Final_National_Strategy_100804.pdf

This national strategy encompasses four program elements:

1. Prevention.
2. Early detection and rapid response.
3. Control and management.
4. Rehabilitation and restoration.

Comments: Kerry Britton stated that future plans within “the agency” moves “invasive species” in with “fire”. Research team staff members are being asked to get involved with programs outside of their main area of research. Need to identify research needs very quickly ... within the next 4 months!

Comments: Anna Schoettle confirmed the need for collaborative work among the different work groups within the RMRS. Anna stated that this will be a “positive thing” in that it will allow others to see how all these different projects are interconnected ... “packaging the programs” will be a positive thing for the entire RMRS. Currently the RMRS is focusing on weeds ... 100% towards weeds, so there is a need to determine how weeds fit in with the other projects already in existence. Anna continued, stressing the fact the WE need to impress on the administrators/leadership that we already have a program ... we do not need a new program, we just need to show how all the parts interact. WE need to demonstrate that WE are a “community of people working cooperatively”.

Comments: Kerry Britton emphasized the need to impress on the leadership that a multifaceted plan already exists.

1:40 p.m.

Burns/Blodgett/Jacobi/Geils/ Schoettle installation of Additional Monitoring Plots

Funding for installation of about 80 monitoring plots in southern WY and N Colorado
Planning on using the guidelines developed by the [Whitebark Pine Ecosystem Foundation](http://www.whitebarkpine.org/)
(<http://www.missoularaptors.com/test/wbp/index.php>)

Comments: Daina Tomback stated that the foundation will be expanding the guidelines/methods to include limber pine. Plans are to put out a fs doc.

Comments: Judy Adams stated that there will be no additional fund for new PTIPS in the future, thus no new PTIPS plots can be established>>> some plots may be retired<<<talk of cutting numbers of PTIPS plots by one half.

Comments: Kelly Burns commented that she would like to swap some root disease plots so that new WPBR plots can be established.

Whitebark – Limber Pine Information System (WLIS):

A Database of Condition and Distribution of Whitebark and Limber Pines

Blakey Lockman Plant Pathologist, Forest Health Protection, State and Private Forestry Region 1 P.O. Box 7669 Missoula, MT 59807

Objectives:

Purpose of the Whitebark/Limber Pine Information System (WLIS) was to develop a GIS-linked database of survey plot data containing whitebark pine (*Pinus albicaulis*) and / or limber pine (*Pinus flexilis*) in order to better visualize the health conditions of these high elevation white pine species.

Methods:

Compiled existing survey data. Created an interactive database of some critical elements based on existing surveys. Created an interactive map. Created map of distribution of whitebark and limber pine. Identified the gaps.

Produced an interactive CD entitled, “Whitebark – Limber Pine Information System (WLIS)”

Features of WLIS:

- User’s guide,

- Related links (including link to National Park Service tree data),

- Field methodology (linked to [Whitebark Pine Ecosystem Foundation](http://www.whitebarkpine.org/)

(<http://www.missoularaptors.com/test/wbp/index.php>),

- Access to data from 2271 plots,

- Access to maps,

- Query function (allows user to search for specific data), and

- Allows user to label specific plots

Updating and Maintenance Issues:

Blakey asked Kerry Britton if it will be possible to house the database on the server of the USDA Forest Service’s Washington D.C. Office.

Comments: Kerry Britton replied that while it may be possible for the national office to house the database, she warned that Frank Sapio (USDA-USFS Director) doubted that the FS would be able to update and maintain the database.

Kerry cautioned that errors can get inputted into existing databases<<< would need to have a designated person responsible for updating WLIS.

Comments: Diana stated that in order for the database to be of value, it needs to produce “something” ... like a publication.

Aerial Survey of White Pines Regions 2,1, & 4

Update for Wyoming and Colorado

Erik Johnson

Aerial Survey Program Manager

Renewable Resources

Region 2

Tallied over 1,000,000 limber and whitebark pines in Wyoming.

Survey revealed a significant number of whitebark pine in the Towgetee Pass area.

Aerial survey data consists of digitized data that has been collected since the mid 1990s.

Some maps from the 1950s still exist, but these need to be digitized; need additional funding in order to digitizing the earlier maps.

Comments: Brian Geils asked if anyone has utilized the digitized data for other research projects...has anyone analyzed these for distribution and trends ...we are spending a lot of money for these aerial surveys ... what are we doing with the data???

Comments: Erik noted that Jose Negron is the only U.S. Forest Service researcher that he is aware that has utilized these digitized images.

Comments: Jim Hoffman added that aerial survey data were originally targeted for use by local land managers.

Comments: Blakey Lockman gave an example of a study conducted by Carol Randell who is using aerial survey data to validate ratings.

Comments: Kerry Britton asked what proportion of aerial surveys utilize digital sketch tools

Jim Hoffman

He got interested in WPBR because of aerial survey

“Something funny about whitebark pines” in 1992 in a particular area of ID

Over the years the area impacted by WPBR slowly moved to the east

JJ smith and Hoffman later did a ground survey and published a report.

Region 4 does not fly Yellowstone National Park (that is responsibility of Region 1), but MPB has moved into the area and significantly impacted mature cone-bearing Whitebark Pine. What is happening with regeneration??? No idea... need to focus on this area for regeneration data.

Need data pertaining to decay rates of Whitebark pines.

Dana Perkins (Ecologist, U.S. Department of the Interior / Bureau of Land Management / Idaho Falls District, Challis Field Office, 801 Blue Mountain Road, Challis, Idaho 83226) had done some work with the impact of MPB on Whitebark pine in Idaho.

Jim said need to look at the impact of other tree species on Whitebark pine health

John Schwandt showed map generated for FHP data on distribution of Whitbark, limber, and western white pine.

2:50 p.m.

Erik Smith

Sampling Methods

FIA method overestimates number of dead trees

1/6 acre sized plots sampled in 1 year

only measures dead trees up to 5 years

3:05 p.m.

Frank Krist FHET National Risk Map and Region 2 Risk Map

Version 3

Multicriteria Model

Allows for the combination and weighting of multiple factors related to risk

Provides a flexible framework for evaluating criteria.

Susceptibility vs Vulnerability:

Susceptibility currently not an established pest.

Vulnerability currently is an established pest.

Example shown using Holly Kearns's WPBR model.

Use a weighted overlay to combine criteria values.

Comments: John Schwandt asked about lack of information pertaining to Whitebark pine in California.

Comments: Brian Geils noted lack of data pertaining to Whitebark pine in California, where the species does exist along with the pathogen ... so where is the data?

Risk maps will help to determine where ground surveys and research plots need to be established in order to validate the accuracy of the model. Improvement of map dependent up on research.

Comments: Bill Jacobi expressed need data NOW in order to predict disease impact in the future!

Comments: Diana Tomback expressed concern about the lack of assessments that should be included in the risk map data ...

Washington, Oregon, & California ... need to incorporate WLIS data ... also expressed concern that folks who view these maps will be left with the impression that the problem is not as severe as it really is!

Brian Howell

FHM

Region 2 WPBR Risk Model

Based on Holly Kearns's Data, SPlot statistical software, Classification and Regression Tree Model

Significant data elements were climate factors, May Relative Humidity, <54.5% OR

Has developed map for WBPR occurrence in limber pine in CO

<http://www.fs.fed.us/r2/fhm/reports/htm>

3:50 p.m

SLOW the Spread

Update

How to get the word out about the severity of White Pine Blister Rust to white pines in the Rocky Mountain Region:

Jim Hoffman<<< newspaper article

Blakey Lockman<<< Lewis & Clark program participation <<< focused on Whitebark pine

Bill Jacobi noted that efforts to collaborate with state Department of Agriculture<<<<

CSU master gardener program<<< difficult to get printed information inserted into other agencies' mailings.

4:00 p.m.

Kelly Burns

Preparation of White Pine Blister Rust Management Guide for the Rocky Mountain Region

Currently in a draft form.

Contributors: Anna Schoettle, Mary F. Mahalovich, Bill Jacobi, Jim Worrall, Jim Blodgett, Brian Geils, and Gene Van Arsdel.

Comments: Jeff Witcosky asked if other regions had published WPBR management guidelines.

Comments: John Schwandt stated that imangement guidelines do exist for western white pine

Comments: Jim Worrall suggested posting White Pine Blister Rust Management Guide on a website, such as his website, Forest & Shade Tree Pathology (<http://www.forestpathology.org/>)

Comments: Blakey Lockman asked if current guidelines contain use of fire as a management tool.

Kelly replied, not the DIRECT use of fire.

Kelly added that she has a draft of a survey of White Pine Blister Rust in the Sangre De Cristo Mountains of Southern Colorado.

Comments: Anna Schoettle expressed the need for the white pine health group to design and distribute "something" that can handout to the public! She asked about possible outlets ... journals or science publications? Need to get information out to other groups that share interest in white pine ecosystems! Scope? What can we do to keep WPBR from doing significant damage to high elevation ecosystems?

Comments: Brian Geils suggested the journal of the Ecological Society of America, Frontiers of Ecology and the Environment, (<http://www.frontiersinecology.org/>) as a place to publish our story.

Comments: Anna Schoettle thought that publication might be a bit too focused on the scientific communitiy.

Comments: Rich Sniezko gave an example of a brochure from Oregon pertaining to Port-Orford-Cedar (*Chamaecyparis lawsoniana*) Root Disease caused by *Phytophthora lateralis* (United States Department of Agriculture Forest Service

Comments: John Hart suggested publishing in National Geographic.

Comments: Diana Tomback stressed that we have a message to share with the public that needs to get out there! A program produced for Public Television could disseminate this message to the general public.

Comments: Several folks suggested publishing an article in American Forests

Comments: Diana Tomback said that she and others have already drafted an article for Nature about White Pine Blister Rust
Geils stated that we need to get our scientific knowledge out to the public because if we don't someone else will, and it may not say what we want it to say.

Josh Bronson

WPBR Screening for WPBR-Resistant Eastern White Pines

Ocanto River Seed Orchard

Ocanto River Seed Orchard provides tree seeds

Primarily conifers WPBR-resistance screening Provides space, labor, and equipment for other researchers Established in 1969 on a 670 acre facility.

Comments: Det stated that Jason Smith had done something with MGR

Wednesday, March 8, 2006

8:30 a.m.

White Pine Website

Anna Schoettle

Target Audience Students and general public

Provide information about importance of white pines of high elevation western US

Question: Bill Jacobi asked “What about maintaining the site?”

Comments: Jim Worrall stated that he maintains Plant Pathology.org on his own time!

Question: Kerry Britton asked if required to use USDA FS template<<< Anna said “Susie” said NO she did not have to use the USDA FS Template. (Anna didn’t want the High Elevation White Pines website (<http://www.fs.fed.us/rm/higherelevationwhitepines/>) to look like a USDA FS website

Anna believes that the High Elevation White Pines website will be well used because she gets lots of calls and inquiries about white pines in the Central Rocky Mountain Region.

Anna plans to have a separate e-mail address for dealing with the website.

Question: Kerry Britton asked if she had a plan for publicizing the site<<< Kerry spoke of an announcement that is targeted towards elementary school teachers.

Comment: Bill Jacobi suggested master gardener program <<< contact Ned Tisserat at CSU.

Comment: Erik Smith expressed need to information pertaining to landscapes composed of white pines and *Ribes* <<< Anna said that the website contains some information but not details.

Question arose pertaining to what if people think they have found WPBR how who would be able to deal with those questions.

Site contains numerous links to other sites.

Preparing the Landscape for invasion: Proactive intervention to mitigate impacts of WPBR management Anna Schoettle USDA Forest Service Rocky Mountain Research Station Fort Collins, Colorado

Despite efforts to control White Pine Blister Rust, the disease continues to spread in the Rocky Mountain region.

Threatened white pine species: Bristlecone (*Pinus aristata*), Whitebark (*Pinus albicallis*), Foxtail (*Pinus balfouriana*), and Limber (*Pinus flexilis*). WPBR impacts biodiversity of high elevation ecosystems.

WPBR severely reduces seed production well before tree mortality. Many wildlife species depend on seeds of 5 needle pines, loss of seeds of 5 needle pines has a rippling effect on the food chain. Clark’s Nutcracker is a primary example of one species dependent upon high elevation white pines.

WPBR not only affects mature trees, but seedlings as well, thus threatening regeneration of high elevation white pines. *Ribes* are often in association with high elevation white pines. White pines affect distribution of other tree species. Bristlecone pine provides protection for establishment of subalpine fir. Limber pine and whitebark pine facilitate the establishment of other species at lower mesic sites.

Comments: Det noted that the main issue of concern regarding WPBR is the reproductive forest, as Anna’s diagram illustrates. Loss of high elevation pines significantly impacts snow retention at high elevation sites.

Comments: Diana Tomback stated that WPBR is already infecting krummholz at high elevations

Comments: Det noted impact of WPBR on high elevation pines in Japan.

Comments: Erik and Rich suggested need for documentation of the sequence of high elevation conifer establishment >>> Bristlecone is always before subalpine; further north limber pine is the leader.

Reactive Management:

Restoration of Impaired Ecosystems VS Proactive Management

Informed intervention to modify threatened ecosystems so as to maintain functional ecosystems in the presence of the non-native pathogen.

Approaches for Proactive Intervention to mitigate impacts:

In sites currently infected with WPBR:

How to increase the frequency of rust resistance in white pine populations:

1. Use art regeneration ...
2. Facilitate evolution of rust resistance in the native population ...

While contrary to current thoughts pertaining to evolutionary process ...

Pro active:

Manipulate forest structure while the forest is still healthy,

Provide trees at a highly susceptible life stage (young); this will promote efficient rust-resistance that will be essential for when the *Cronatrium ribicola* does invade.

Retain older trees for seed production.

Native reproductive forest >> stimulate natural regeneration>>>generate a mosaic of varied selection trajectories >>> older trees and younger trees

Need to know:

Geography of distribution of WPBR resistance.

Knowledge of durable resistance.

White Pine Blister Rust hazard ratings models.

NEEDS:

Regeneration Dynamics: Silvicultural Methods, Outplanting guidelines

Geographic Patterns of Local Adaptation

Frequency of Rust Resistance Hazard Models

Important to look at all three in an integrated program

STDP funding available to look at limber pine in 2006

90 limber pine families from infected and non-infected sites will be screened

Knowledge will facilitate ability to develop guidelines for silvicultural treatments to promote white pine regeneration and establishment.

Gain insights into shifts in the suite of growth and physiological traits within the pop as a result of rust resistance selection

Gain insights into whether the level of resis is sufficient for post disturb forest recovery by natural regen process

Help to prioritize

Consequences of doing NOTHING are severe!

Comments: Diana Tomback stated that not everyone needed is onboard the paradigms<<< rapid loss of western white pine forests due to these threatened ecosystems.

Comments: Det stated the we destroyed the populations of western white pines because of the decisions the we made years ago. Suffer dangers not only from the loss, but also how we respond to loss!

Lively discussion followed pertaining to where and how to spend efforts and limited funding for future <<< is it wise to spend a lot of time and energy on high hazard sites???

Comments: Det noted need to know refugia genetic <<< may miss important genetic materials by too narrowly focusing on particular sites.

Comments: Brian Geils stated importance of need to be able to “sell” a research program!

9:40 a.m.

Whitebark Foundation Project & seedling survival in Yellowstone National Park

Whitebark Pine Ecosystem Foundation

Diana Tomback

Mission Statement:

To counteract the decline of whitebark pine to educate public and managers about WBP ecosystems.

Focuses on the Web of life surrounding whitebark pine

Cones >> seeds>> red squirrel caches >> Clark’s Nutcracker >>> cone crops impact behavior of grizzly bears <<< requires fire for regeneration

Nutcrackers dependent on high elevation white pines

Events and Activities:

Protocol developed for surveying limber pine, clark’s nutcracker activities and numbers,<<<

2005 restoration initiative (Clearwater NF and Flathead NF)<<< funds from membership and workshops and “Restoration Fund” Website, Educational Initiative (trying to secure monies from NSF)

Annual meeting: Sun Valley, ID Sept 28 – Oct 1, 2006

Pacific Coast meeting: August 27- 31, 2006 <<< spearheaded by Ellen Goheen

Rangewide symposium sometime in 2009 or 2010?<<< last on 1998<<< hope to expand to include all western white pines<<< need funds to help with costs

Whitebark pined seedling survival following the 1988 Yellowstone Fires: Implications for planting

Henderson mountain Study Area and Mount Washburn Study Area

Followed seedling development and growth 1990-1995, 2001, 2004, 2005

Data reveals that drought is negatively impacting seedling survival <<< no seedling emergence 2002-2005<<< we are still in this drought cycle

Higher mortality actually higher at the wetter mesic site >>> increased mortality especially during drought years >>>

Proportion of conifers coming in to the area resemble that of the prefire forest.

Examined microsite survival <<< multiple shade-casting objects <<< SNAGS

Presence of shade casting objects, some veg cover beneficial to seedling establishment<<< especially on xeric sites

Low vegetation cover on plot favors regeneration<<< this suggests that there is a definite window of time during which regeneration can occur!!!!

10:35 a.m.

Restoration proposal for whitebark pine

John Schwandt and Diana Tomback

Vinegar Hill WBP Seed Test <<< Oregon

Planting seed vs planting seedlings

Efficient restoration

Cost effective restoration

Seedlings vulnerable to periods of drought

Seeds<<< are WPBR-resistant selections being put into areas where WBP are prone to WPBR.

Wilderness "folks" are against the planting of seedlings but favors planting of seeds.

Dorena folks helped to supply seeds?

30 day warm water treatment to aid in seed germination.

Vinegar Hill site <<< encroachment of subalpine fir in area of declining WBP populations<<<girdled Subalpine fir were gathered and burned.

Comments: Linda Joyce asked if girdling subalpine fir had any impact on whitebark pine seedling emergence. Neither John nor Diana had an answer... doubtful... will have to look more closely during next visit.

11:00 a.m.

Genetics: Update on whitebark pine project

John Schwandt, Reporting for Mary Francis Mahalovich

Did sampling

Should presence of WPBR resistance in WBP

But is frequency of resistance high enough?

Found no major gene resistance (MGR)

11:15 a.m.

Genetics : Update from Dorena

Richard Sniezko

Dorena Genetic Resource Center

Dorena is south of Eugene Oregon

8 of 9 north American white pine species currently being tested (do not have the Great Basin Bristlecone Pine)

Test for MGR (limited to seedlings) and "normal" (seedlings grown out and evaluated for 5+ years)

20+ field trials

Different types of cankers develop of WBP seedlings

Top surviving families at Grass Creek(>33 years in the field) Family '43' and '119'

MGR 60 seed lots tested so far<<< NO MGR

WBP Prototype Inoculation

Unknown whether inoculum source influences results

Unknown what is the optimal inoculum density for WBP

Southwestern White Pine

9 families

Compared to wwp and sugar pine <<< SWWP less infection

Western White Pine

Mech 'X' and Moscow F2 Orchard seed sources

Mech 'X'

Help Wanted:

Researchers or graduate students to examine underlying resistance mechanisms in WWP as model species
Single spore isolates would be nice

Wednesday, March 8, 2006

11:30 a.m.

Screening for Major Gene Resistance in White Pines

Det Vogler

Distribution of WPBR in Western North America <<< MAP

Problems with terminology!!

(Det was an English major earlier in life)

Gene-for-gene hypothesis

Resistance VS Tolerance

Resistance

The inherited capacity to resist etc

Question:>>> Diana>>> What is it that we would recommend <<< refugia<<< setting out susceptible hosts with the hopes that at least 1 member will possess genes for resistance to WBPR?

Comments:>>>Rich<<< gave examples of <<< slow things down This allows for other opportunities to occur

Comments:>>>Josh referred to the work of George Newcomb, related to impact of climate on species escapes. What about impact on endophytes?

Det replied that plant defense mechanisms may actually be a disadvantage to endophytes.

Wednesday, March 8, 2006

12:00 Noon

Lunch

The remainder of Wednesday and Thursday was spent completing a planning session on West Wide Blister Rust

Contact Holly Kearns if you would like minutes of the West Wide Blister Rust Planning Session:

Holly Kearns Chair person (nominated at WIFIDC)