

Outline

The Need for Action

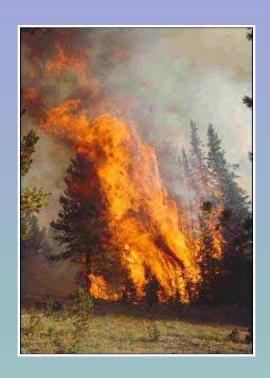
- Mountain Pine Beetle
- White Pine Blister Rust
- Climate Change





Outline

- Response by the Forest Service and its Partners
 - Restoration strategies
 - Fire ecology and management
 - Genetic variation
 - Gene Conservation
 - White pine blister rust resistance screening
 - Restoration activities





Mountain Pine Beetle

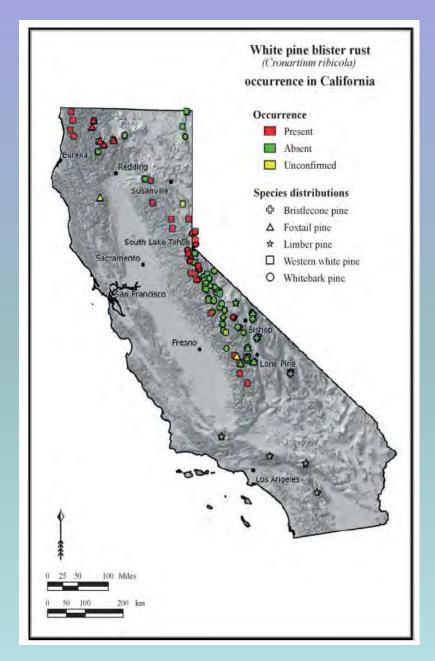
- Aerial surveys recorded 6.8 million acres of mortality in 2010
- Mortality reported in many high elevation 5-needle pine habitats
- Running out of quality hosts (lodgepole pine) at lower elevations





White Pine Blister Rust

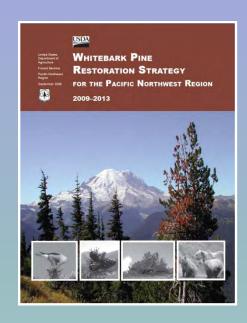
- Infection reported in all high elevation 5-needle pines except for Great Basin bristlecone pine
- Reported in approximately 500,000 acres above 5,000 feet in Idaho and Montana
- California reported highly variable infection rates but a high of 24% in the northern Sierras

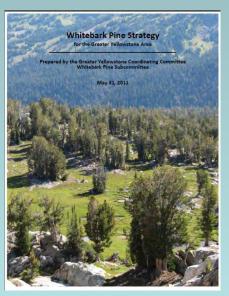


Response by the Forest Service and its Partners

Restoration Strategies

- A Range-wide Restoration Strategy for Whitebark Pine (Keane et. al., In Press)
- Whitebark Pine Restoration Strategy for the Pacific Northwest Region (Aubry et. al., 2008)
- Northern Region Restoration Strategy for Whitebark pine
- The Greater Yellowstone Area Whitebark Pine Restoration Strategy (GYCC, 2011)





Restoration Strategies - Components

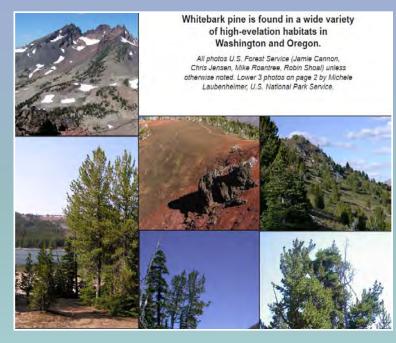
- Assess Condition
- Promote rust resistance
- Conserve genetic diversity
- Save seed resources
- Employ restoration treatments
 - Plan activities
 - Implement activities
 - Monitor
 - Conduct research



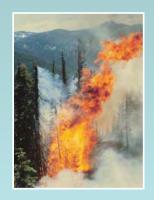


Restoration Strategies - Challenges

- WBP found in a wide variety of habitats
- Occupy at least 3 different fire regimes
- Not as much operational research on high elevation 5-needle pines as compared to other species









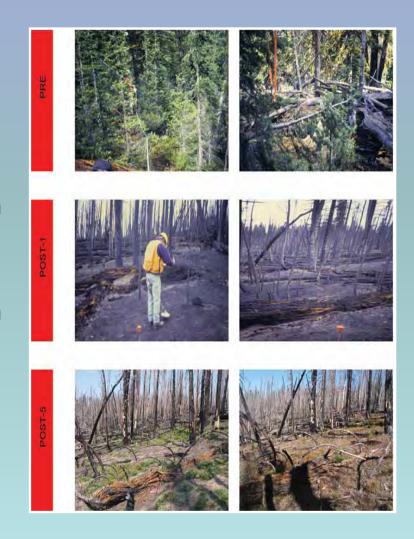
Fire ecology and management

Research

- The role fire plays
- Reintroduction of fire into the ecosystem
- Fire as a restoration tool

Management

- Reintroduction of fire into the ecosystem
- Fire as a restoration tool



Genetic Variation

- No range-wide genetic variation studies on any high elevation 5needle pines
- Regional Studies (Garden Plots)
 - Pacific Northwest (WBP)
 - Interior West (limber pine)
 - Underway RM Bristlecone pine (closest to range-wide study
- Molecular Studies—
 - Pacific Northwest (WBP)
 - Inland West (WBP)
- Preliminary Results Generalist similar to WWP – broad range



Gene Conservation

- Focuses on four out of nine native 5needle pine species:
 - Whitebark pine
 - Rocky Mountain bristlecone pine
 - Foxtail pine
 - Limber pine in parts of the range where heavily impacted by MPB









Response by the Forest Service and its Partners

Gene Conservation

Approach –

- Genes conserved in seeds
- 50 individual tree selections per seed zone or conservation area
- Long-term storage at ARS facility in Fort Collins, CO
- Redundant storage at local facility
- Leverage existing efforts
- Flexible







Gene Conservation

Accomplishments: 2008 to 2010

Region	Species					
		Whitebark pine	RM bristlecone pine	Limber pine	Foxtail pine	GB bristlecone pine
RM			71			
R5		10		43	51	10
R6		169				
PSW		84		25		
R1				3		
Collections in 2008-						
2009 from FHP						
Program		299	174	239	45	322
Totals		562	245	310	96	332
Target		1100	540	1087	110	
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Percent Completed		51.1%	45.4%	28.5%	87.3%	

White pine blister rust resistance screening

- All are susceptible in the lab, only Great Basin bristlecone pine not documented to be infected in its natural range
- Testing over 650 WBP families as of 2010
- Preliminary results for resistance look promising
- Testing underway for the other species







Restoration activities

- Over 100 projects supported through the Forest Health Protection Whitebark Pine Restoration Program started in 2007.
- Forest Health Protection provided over \$1.4 million to date that was matched with more than \$1.8 million.

Table 1. Whitebark	nine restoration	program	funding history.	
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	Totals	2007	2008	2009	2010
# Proposals Received	211	56	64	52	39
\$\$ Requested from FHP	4,661,135	1,005,700	1,981,134	960,851	713,450
Total Matching Funds	3,824,302	850,500	1,202,290	878,532	892,980
# Projects Funded	106	24	26	35	21
Forest Health Funds	1,448,032	267,320	398,900	481,612	300,200
Match for Funded Projects	1,782,358	291,700	433,850	444,683	612,125
TOTAL FUNDS INVESTED	3,230,390	559,020	832,750	926,295	912,325

Response by the Forest Service and its Partners

Over 50 FHP Supported Projects in 2011

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Restoration activities - Fire

- Reduce competition from other species
- Reduce fuel loads
- Can treat larger areas at lower costs
- Create openings for natural or artificial regeneration



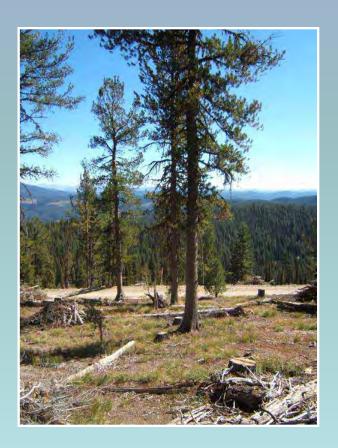




Restoration activities – Mechanical Treatments

- Thinning
- Girdling





Restoration activities – Seed Collection

- Collect seed for regeneration (natural and artificial)
- Collect seed for studies and research







Restoration activities –Natural Regeneration

- Studies to determine best practices for natural regeneration
 - Supplemental seeding
 - Caging seeds
 - Rodenticides





Restoration activities – Artificial Regeneration

- Plant seedlings to:
 - Convert areas to shade intolerant WBP
 - Restore heavily trodden recreation sites and parking areas
- Planted 2,725 acres of WBP in the Inland West from 1988 to 2011







Restoration activities - Protection

 Apply verbenone and carbaryl to protect trees from mountain pine beetle



Restoration activities – Rust Screening

- Identify potential blister rust trees
- Test for possible resistance to rust









Thank You

Robert Mangold USDA Forest Service, Forest Health Protection

- Photo acknowledgements and resources:
- Whitebark Pine Restoration Strategy for the Pacific Northwest Region (Aubry et. al., 2008)
- The Greater Yellowstone Area Whitebark Pine Restoration Strategy (GYCC, 2011)
- Management Guide to Ecosystem Restoration Treatments: Whitebark Pine Forests of the Northern Rocky Mountains, USA, RMRS- GTR-232, USDA Forest Service (Keane and Parsons, 2010)
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- Anna Schoettle, USDA Forest Service
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- Steve Thomas, National Park Service