TITLE : Whitebark Pine Stand Conditions after Mountain Pine Beetle Outbreaks

LOCATION: Intermountain West (R1-R4 & R2)

DURATION: Year 1 of 2-year project **FUNDING SOURCE:** <Base >

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PROJECT OBJECTIVES:

The primary goal is to obtain information that will be used to make recommendations and set priorities regarding restoration of whitebark pine in the Intermountain West. Specific objectives to meet this goal include:

1. to determine the extent and severity of mountain pine beetle (MPB) impacts in whitebark pine stands following MPB outbreaks identified by aerial detection and other surveys
   - to quantify both dead and remaining live mature whitebark pine
2. to determine blister rust status of remaining mature live whitebark pine
3. to determine health of whitebark pine regeneration in these stands
4. to determine probable stand trajectory by recording health and abundance of other species in mixed stands

JUSTIFICATION: *Detection Monitoring Linkage*

Although whitebark pine has a very large range, populations are small and relatively isolated, so they are not well represented in FIA plots. This project will greatly augment the limited information available from FIA plots.

Aerial detection surveys (ADS) provide estimates of current dead trees, but are unable to provide information about remaining live trees or regeneration which is crucial to understanding future stand trends and determining restoration needs. This project will provide a valuable link between mortality estimates from aerial detection surveys and live trees remaining following MPB outbreaks. In mixed stands, we will also record mortality and remaining live trees of other species such as SAF, Englemann spruce, and LPP which may provide additional ground truthing for ADS mortality estimates caused by SAF decline, spruce beetle, and MPB in LPP.

This project will also document levels of blister rust in remaining mature whitebark pine and regeneration which are not recorded by ADS but are also critical elements in determining future stand trajectory and restoration priorities.

This project will use and build on previous EM projects such as the WLIS database and the GYE whitebark pine plot system to help locate stands of interest and compare survey results.

Significance in terms of geographic scale: Whitebark pine has a very large natural range but is in serious jeopardy especially in the Intermountain West. A recent study in northern Idaho suggests that whitebark pine has been lost from 98% of its potential historic range and many whitebark pine ecosystems are at risk of extirpation. (Schwandt 2006).

Biological impact and/or political importance of the issue: Whitebark pine is a crucial high-elevation tree species. Not only does it help in watershed stabilization, It plays a key role in the survival and distribution of many wildlife species. (Tomback et al 2001). Its highly nutritious seeds were once prized by Native Americans and currently provide a primary food source for nearly 20 species of birds and animals such as the endangered grizzly bear. The loss of this important species has led to steps to classify it as an endangered species in Canada and the state of Washington has listed whitebark pine as a species of concern.

Feasibility or probability that the project will be successfully completed: The survey procedures for collecting data (FINDITS) have been used for many years to assess bark beetle losses, and will also show residual live trees. Typical regeneration surveys will also be used to determine levels of regeneration of various species and potential stand trajectory. Data collected the first year will be analyzed over the winter and will provide input that will help identify data gaps or expand the survey the following year. The level of surveys will allow for a 2-person crew to cover many areas throughout the Intermountain West in a 2-year time period.

DESCRIPTION:

a. Background: Whitebark pine is a keystone species of high elevation ecosystems throughout western North America. It is often the only tree species capable of surviving in harsh subalpine areas, and is crucial in watershed stabilization and creating habitats that support a wide diversity of plants and animals. The old gnarled relics in remote timberline areas provide important aesthetic values by creating high elevation vistas and providing much of the character of the alpine experience. (Schwandt 2006, Tomback et al 2001)

Whitebark pine is currently at risk in much of its natural range due to a combination of white pine blister rust, forest succession, and recent outbreaks of MPB. (Keane et al 2002). Although MPB outbreaks have occurred historically in whitebark pine, the additional impacts of white pine blister rust have caused deviations far exceeding expected mortality resulting in local extirpation of some populations and threatened extinction of others.(Schwandt, 2006).

Aerial detection surveys (Gibson 2004) have documented recent increases in MPB activity in the Intermountain West, but coverage has not always been complete or consistent, and surveys only record current mortality, so cumulative mortality is not always known if areas are not flown annually. However, even where annual mortality levels have been reported, a major concern has been determining the amount of live whitebark pine remaining to provide regeneration potential. Since whitebark pine depends almost exclusively on the Clark's nutcracker for natural regeneration (Tomback 2001), the loss of most mature whitebark pines in a stand may result in no regeneration if the residual live trees cannot support a nutcracker population.

There have been a few reports documenting MPB mortality in LPP and whitebark pine stands during MPB outbreaks (Kegley et al 2004, Gibson 2004), but these have usually been limited in scope, conducted before the outbreak has run its course, and have not always looked at all species and regeneration. Recent MPB outbreaks have received a great deal of attention (Gibson 2004, Logan and Powell 2001) and have been prevalent across much of the whitebark pine range – especially in the Intermountain west. However, little information is presented to describe what the stands look like following MPB outbreaks except to claim the future prognosis for whitebark pine is bleak (Tomback et al 2001).

This project will investigate this information gap by documenting what is left in various stand types following MPB outbreaks which will help managers understand losses and prioritize restoration efforts. This information will help us better understand and define deviations from expected mortality from a combination of these insect and disease agents and provide information that will assist in developing and prioritizing restoration activities.

b. Methods: Areas in the Intermountain West where recent MPB outbreaks have occurred will be identified from past ADS, the WLIS database, local specialists, or other surveys. These areas will be sampled using standard FINDITS protocols that use variable radius plots for large trees and fixed radius plots for regeneration. Plots will be taken at a frequency that adequately covers selected stands (60-100 or more plots per stand depending on size and stand variability). In the GYE, it may be possible to use existing plots established with recent EM funding. Data collected will include: tree species, size (DBH), condition (mortality causes, and blister rust levels (for live trees)

c. Products: A report summarizing results for each area sampled that will describe current whitebark pine condition following MPB outbreaks as well as condition of other species sampled. It may also be possible to compare results to ADS information if available. Data will be entered into the WLIS database and compared with prior survey data to document trends over time. Results will be used to make recommendations regarding relevant restoration activities and priorities for restoration.

d. Schedule of Activities: Winter 07/08 – identify areas to be sampled; develop field protocols; hire field crew; Summer – sample areas selected; Fall 08 – analyze data and select areas for 2009 (expand to other Regions); Winter 09 - preliminary report; Summer 09 – sample additional areas; Fall 09 - analyze data and final report

COSTS: FY 2008

Item	Requested 08 Funding $	Other-Source 08 Funding $	Description /Source for other funds
Salary - 2 person Crew 130 days	$28,000	$4,000	4 weeks -FHP personnel to select sites, train, and guide field crew
Travel -100 days 20 days FHP	$20,000 $ 2,000	$1,000	FHP travel from base funds
Other –vehicle for crew	$ 2,000	$1,500	FHP vehicle for FHP personnel
Contracting			
Equipment			
Supplies		$ 500	Field supplies donated by FHP
Other (specify)			
Totals	$52,000	$7,000	

Year 2: 2009 Funding

$52,000 (same breakdown as 1st year)
$10,000 additional potential contract costs to fly to remotes areas (if deemed necessary)
$62,000 total

Literature cited available upon request