

# Stand level impacts of *Ips* and *Dendroctonus* bark beetles in pine forest types of Northern Arizona

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Record low precipitation, increased temperatures, and dense forests have led to tremendous bark beetle incidence across the Southwest. Aerial Detection Surveys detected bark beetle activity on more than 2 million acres, killing more than 20 million pine trees in Arizona during 2002 and 2003 (Figures 1 & 2). The extent and severity of this mortality, and site factors contributing to mortality, remain undetermined at the Forest and stand level. This information is needed to accurately describe ecosystem changes that are occurring and to develop predictive models for future disturbance events.



1. Quantify stand level impacts of bark beetles on ponderosa and piñon pine ecosystems in Arizona's National Forests.
2. Describe the forest and site conditions that have experienced tree mortality caused by drought and bark beetles.
3. Determine correlations between stand and site conditions and pine mortality.

- (Figures 3 & 4 show Coconino NF). Coconino, Kaibab & Prescott NF's completed 2003. Tonto and Apache-Sitgreaves NF's completed 2004. All plots on all Forests will be revisited in 2005.
2. Single (measures extent of outbreaks) and three plot clusters (stand level impacts) installed. Plots are 1/20<sup>th</sup> acre fixed radius (Figure 5).
3. Mensurational (tree size, density and damages) and regeneration (species and abundance) data collected from plots.
4. Bark beetle-attacked trees tallied in 1-a-

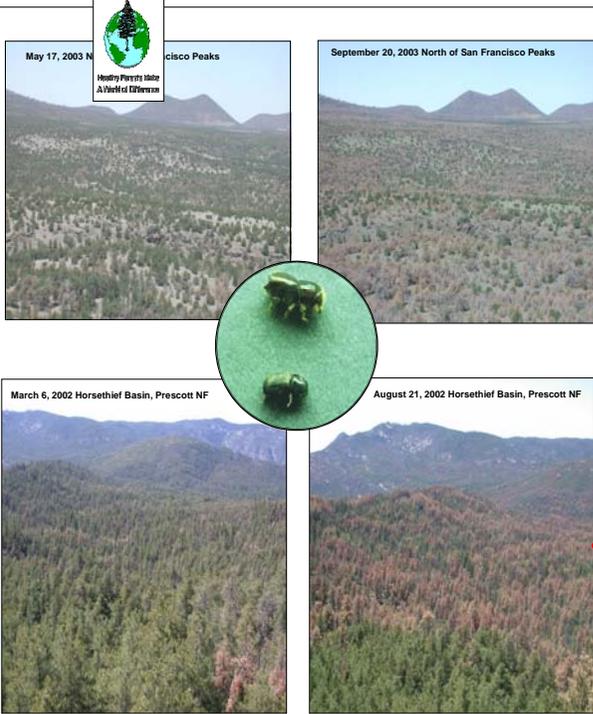
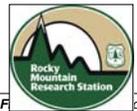


Figure 1. Bark beetle-caused tree mortality in piñon (top) and ponderosa (bottom) pine forests in Arizona. Although engraver beetles are infesting most pine species (center-top), western pine beetle (center-bottom) is also contributing to ponderosa pine mortality.

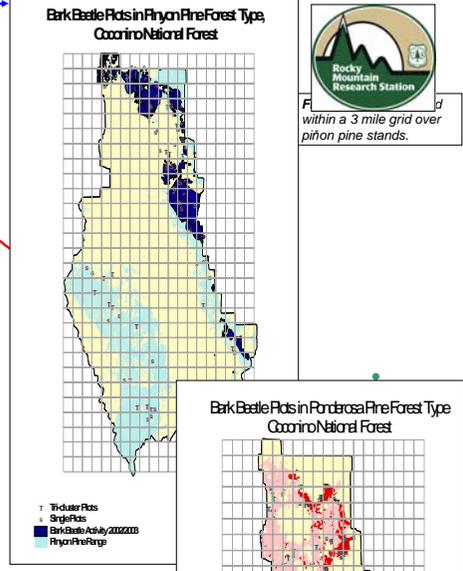
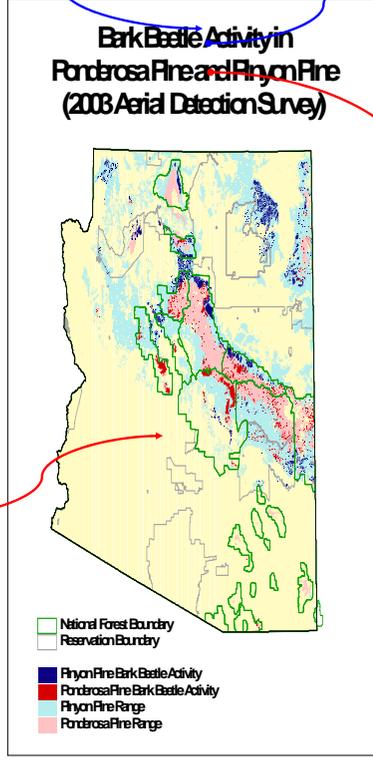


Figure 4. Plots installed within a 3 mile grid over ponderosa pine stands.

## END PRODUCTS

1. Results will be incorporated into Regional strategic communication plan to provide land managers and the public with better and consistent information.
2. Development of predictive models relating stand and site conditions to bark beetle-caused tree mortality.

## Plots established by National Forest in Arizona

1. There have been **402 Piñon pine** and **779 Ponderosa pine** plots established on five National Forests in Arizona during 2003 & 2004.
2. All **1,181** plots will be revisited in 2005.

Strategic Communication Plan  
 Southwestern Region  
**Pine Bark Beetle Infestation  
 FINAL DRAFT - May 30, 2003**  
 Public Affairs Office  
 Southwest Region  
 USDA Forest Service  
 Account Manager: Jim Payne  
 (602) 225-5294 jpayne@fs.fed.us  
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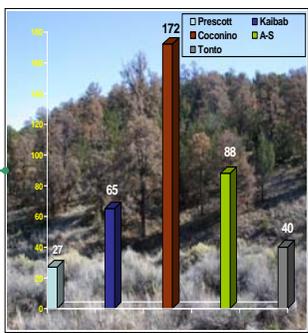


Figure 7. Number of Piñon pine plots established in each Arizona National Forest

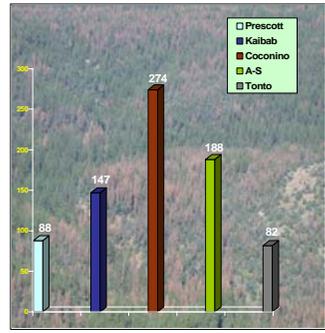


Figure 6. Number of Ponderosa pine plots established in each Arizona National Forest

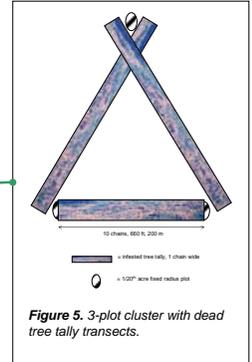


Figure 5. 3-plot cluster with dead tree tally transects.

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