

TITLE: INT-F-06-02 Potential fire hazard following bark beetle outbreak in piñon-juniper woodlands

LOCATION: Santa Clara Pueblo in northern New Mexico

DURATION: 1 Year **FUNDING SOURCE:** Fire Plan

PROJECT LEADER: Jerome Jenkins, Santa Clara Tribal Forester, (505)-753-7326.

COOPERATORS: Steve Haglund, Consulting Forester, Santa Clara Tribe, (512)-321-5460; John Waconda, Regional Forester, Southwestern Regional Office, Bureau of Indian Affairs, (505)-563-3360; David Conklin, Forest Pathologist, Forest Health Protection.

PROJECT OBJECTIVES: Quantify the extent, severity, and impact of bark beetles on piñon throughout the 14,000 acre woodland type on the Pueblo. Examine effects of outbreak on fuel loading and potential fire hazard (primary objective). Relate site factors--particularly elevation, stand density, and dwarf mistletoe infection--to outbreak intensity (secondary objective).

JUSTIFICATION: An extensive (and perhaps unprecedented), drought-driven piñon ips (*Ips confusus*) epidemic occurred in New Mexico (and adjacent States) from 2000-2004. Special FHP aerial detection surveys conducted in New Mexico mapped significant piñon mortality on more than 770,000 acres, with an estimated 44 million piñons killed in year 2003 alone. Nearly all this damage occurred in northern New Mexico, with the hardest-hit areas in the north-central part of the State, including Santa Clara tribal lands.

As part of a multi-state FHM assessment, ground surveys using plot clusters were conducted in New Mexico in 2003 and 2004 to determine the proportion of piñon affected across the landscape. However, no sampling was conducted on Tribal lands. Moreover, the multi-state assessment did not determine how the outbreak affected fuel loading and potential fire hazard.

For generations, members of the Santa Clara tribe have lived in close association with their woodlands, the most extensive forest cover type on the Pueblo. Piñon and juniper have long been their primary sources of fuel for heating and cooking. Piñon nuts are both a traditional food and a source of extra income for tribal members. Recreation, hunting, and spiritual values are among the other uses and benefits associated with their woodlands. This proposed evaluation monitoring project will provide specific tree mortality information and impact data to assist the Pueblo in their forest management planning activities.

Because this project will utilize an extensive network of plots installed previously by Tribal foresters, and because of the obvious self-interest/ownership of the Tribe in the results, there is a very high probability that the project will be successfully completed. Technical expertise provided by the BIA and a consulting forester should insure a quality product.

While the main justifications for this project are direct Tribal interests, FHP will also benefit because the results will be directly comparable to those of the broad-scale assessment described above. In fact, since this project would intensively sample a

single geographic area, it may better elucidate site factors related to the outbreak than the broad-scale assessment, since differences in outbreak intensity inherent in different geographic areas have been removed. Most importantly, better understanding of potential fire behavior at Santa Clara following this spectacular outbreak should have application for similarly-affected woodlands in several Western states.

DESCRIPTION:

a. Background: The project would involve remeasurement and expansion of 49 existing CFI (continuous forest inventory) woodland plots to determine the effects of the recent piñon ips outbreak. It is deemed more practical and efficient to utilize these existing plots—which effectively sample the entire 14,000 acres of commercial woodlands at Santa Clara--than to “start over” with new plots or a new sampling design. Standard forest mensuration techniques would be used, and the sampling design appropriate for most statistical analyses. Standard fuels transects would be incorporated to estimate ground fuels and support modeling of potential fire behavior. The project would largely be implemented by Tribal members and would support Tribal employment.

b. Methods: The Woodland plots at Santa Clara were installed and initially measured in 1995 using standard methods developed and adapted by both the Bureau of Indian Affairs and the Forest Service in the Southwest. These plots are located on a 750 X 750 meter grid throughout the Tribe’s 14,000 acre “commercial” woodlands. (This area includes all accessible and manageable woodland acreage at Santa Clara, but excludes a few thousand acres occurring on slopes in excess of 50 percent.) Plot design and methods are very similar to those used for New Mexico’s FIA woodland plots, but provide much more intensive coverage.

The 49 individual plots are 1/20 (0.05) acre in size and circular. All trees 3.0 inches and greater in diameter at the base are tagged and measured on these plots. Individual tree measurements include diameter at root collar (drc), height, and crown class. A 1/100 (0.01) acre subplot from the same center point is used to sample smaller trees; all piñon and juniper regeneration 1.0’ tall or greater are tallied on this subplot.

A total of 667 trees (3.0”+) were sampled on these plots in 1995, including 288 piñon. In order to better assess piñon mortality at remeasurement, each plot will be expanded to 1/5 (0.2) acre (radius = 52.7’), which is expected to provide a total sample of over 1000 piñons 3.0 inches and greater. The condition of all piñons--both on the original plot and within the expanded area--will be recorded as follows: live, live with recent bark beetle attack, dead with needles, dead without needles, dead and down. Juniper mortality will be assessed in a similar fashion using the original 1/20 acre plot only.

Down woody debris will be sampled at each plot using the standard line transect (planar intercept) method (Brown 1974). Sampling planes will be 60 feet in length, extending along cardinal directions from near plot center. Pieces (up to 100 per plot) will be tallied in the standard fire size classes: 1-hour (0-0.25 in.), 10-hour (0.25 to 1.0 in.), and 100-hour (1.0 to 3.0 in.). Pieces greater than 3 in. in diameter will be recorded by diameter and decay class. Duff and litter depth will be measured at two points along each line; cover of live and dead vegetation is also estimated at these points.

Densities, basal areas, and proportion of live and dead trees are calculated based on

plot size and trees sampled. Tons/acre of standing snags can be similarly estimated from plot data. Biomass of down woody debris, duff, and litter is determined and analyzed with FIREMON. A variety of public domain software, including Behave and FARSITE will be used to model potential fire behavior, using summaries of relevant data. In addition, piñon mortality levels will be correlated with site factors including elevation, stand density, and dwarf mistletoe intensity.

c. Products: The main product will be practical information that will be incorporated into an Integrated Natural Resource Management Plan at Santa Clara, which is presently in its final stage of completion. In addition to directly assisting the Tribe's Fire Management program, the assessment will determine where a piñon seed source remains, where it may be most appropriate for Tribal members to cut firewood, and where piñon nuts might be collected in the future. An FHP technical report based on this assessment will compare results with those of the broad-scale assessments conducted in New Mexico and other States, as well as discuss implication of this massive outbreak in terms of potential fire behavior.

d. Schedule of Activities: The Santa Clara Tribe and their cooperators want to complete this assessment as soon as possible. It is anticipated that the plots would be remeasured and fuels transects run as soon as these areas become accessible in the spring of 2006. It is expected that one plot per day will be accomplished by a 2 or 3 person crew, over an estimated 8 to 12 weeks of sampling. Data input and analyses would be conducted during the summer of 2006 so that the results can be incorporated immediately into the Tribe's Natural Resource Management Plan.

COSTS:

| | Item | Requested FHM EM Funding | Other-Source Funding | Source |
|-----------------------|-------------|--------------------------|----------------------|--------------|
| YEAR 2006 | | | | |
| Administration | Salary | | \$2,000 | BIA/FHP base |
| | Overhead | | | |
| | Travel | | | |
| | | | | |
| Procurements | Contracting | \$22,500 | | |
| | Equipment | | | |
| | Supplies | | | |
| | | | | |