

**A COMPARISON OF SILVICULTURAL PRACTICES FOR CONTROLLING
MOUNTAIN LAUREL IN THE MIXED-OAK FORESTS OF PENNSYLVANIA
(JFSP 00-2-13)**

Demonstration Sites to Showcase Potential Solutions to Shrub Dominance

Final Progress Report
to the
JOINT FIRE SCIENCE PROGRAM

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Abstract:

The near elimination of the historic fire regime (occasional to frequent, low-intensity surface fires) from the mixed-oak forests of the Appalachian Mountains has allowed mountain laurel (*Kalmia latifolia*) to expand to the point that it is creating hazardous fuel and forest management problems. Mountain laurel is a long-lived, ericaceous, evergreen, shade-tolerant, clonal shrub capable of creating vast dense thickets in oak-dominated forests. These thickets are fire hazards because they burn with extreme intensity, turning simple surface fires into stand-replacing events, and forest diversity and regeneration obstacles because they replace the herbaceous flora and exclude the establishment and development of oak reproduction. Foresters sometimes avoid managing or mismanage such thickets because of uncertainty over which silvicultural practice (timber harvesting, timber stand improvement, herbicide application, or prescribed fire) will be most

effective and economic at controlling the shrub while establishing and/or promoting oak regeneration and herbaceous flora diversity.

To help alleviate this problem, a pair of demonstration sites is proposed to the Joint Fire Science Program for funding consideration. These sites would showcase seven singular or combination treatments for addressing the mountain laurel problem and their subsequent ecological effects. Treatments will be crushing with a commercial timber harvest, basal herbicide, prescribed fire, cutting (mastication), cutting followed by herbicide, cutting followed by fire, and a control. The sites would be located in two different parts of the state so as to be easily accessible to practicing foresters, other natural resource professionals, elected officials, research scientists, students, members of the environmental community, and the general public and will be maintained for at least seven years.

These demonstration sites will help fire and forest managers understand the strengths and weaknesses of each silvicultural practice in regards to controlling mountain laurel for fire safety or forest management reasons as well as associated effects on the forest community.

Promised Deliverables and their Status:

1. Demonstration sites with trails signed for natural resource managers and the general public maintained over at least seven years.

This project has grown from what was originally envisioned as the opportunity for a third demonstration site in the Pocono Mountains region of northeastern Pennsylvania arose shortly after the project began. This region is extremely popular with tourists and vacationers, contains abundant thickets of mountain laurel, and has an emerging WUI problem. To take advantage of this unique opportunity, the funding was spread over three sites, not two as was originally proposed.

Treatment implementation was slowed due to several extraneous circumstances. In 2002 and 2003, the Bureau of Forestry sent several 20-person handcrews to western states to help fight wildfires. Their absence negatively impacted treatment installation, especially with the addition of a third site. The last two years in Pennsylvania have been exceeding rainy (2004 was the wettest year ever and 2003 was the fourth wettest). Consequently, the prescribed fire treatments could not be implemented in a timely manner. They were also delayed while the Bureau of Forestry developed internal prescribed fire policy as there were serious questions regarding the legality and liability of controlled burning given the current law. Presently, only the demo site at Clear Creek State Forest is fully installed with trails and deer exclosure fences. The demo sites on the Delaware and Rothrock State Forests are fenced and have their cutting, basal herbicide, cutting with herbicide, commercial harvest, and control treatments in place. They also have partial trails as well as easy roadside access. All three sites have temporary signage (see attached files) while they wait completion of their long-term signs. The Delaware and

Rothrock sites lack their prescribed fire and cutting/fire treatments. They should be burned this fall or next spring, if conditions permit.

2. Annual progress reports delivered to the JFSP in November, including summaries of annual measurements and activities, including technology transfer.

Pre-treatment measurements of mountain laurel coverage, density, height, and loading were collected in 2002 at all sites. Post-treatment measurements are slated for summer 2005 at all sites. Increment cores were obtained from overstory trees and cross sections from the mountain laurel at each site. Both data sets will be developed into peer-reviewed manuscripts in 2006. These data are currently used to educate various forest-user groups that tour the sites about disturbance ecology of mountain laurel thickets.

Progress reports were sent to JFSP in 2002 and 2003. These highlighted the technology transfer activities (numerous field tours to various forest user groups) at each demo site.

3. Hard-copy brochures and tour fact sheets for the demonstration sites.

Tour handout sheets are available for the Clear Creek site (see attached files) and comparable ones will be made once this summer's inventory work is completed.

4. A virtual-tour web site.

Photo points were selected in each treatment at each site and pre-treatment photographs taken. These have not yet been digitized. Post-treatment photographs are to be taken this summer in all completed areas. At this time, the development of a virtual tour on my lab's web site is unclear as our part-time web designer has returned to college to earn a graduate degree.

5. A technical publication in either a Forest Service outlet or the Northern Journal of Applied Forestry describing the sites and the costs of treatments.

I anticipate these publications over the next few years as my experience indicates that these responses are best assessed after about five years.

Knowledge Gained from these Demo Sites

The implementation of these demo sites was an education for me as well as my cooperators in the Bureau of Forestry. We underestimated just how much labor and time would be required in getting them fully installed and sampled. Now that the end of the installation phase is in sight, just two prescribed burns to go, we're beginning to see the benefits of the work in terms of educating various forest user groups on mountain laurel ecology and hazardous fuel mitigation. We had also underestimated just how much demand there was, and still is, for this knowledge and the demo sites offer an ideal

environment to convey the message of the value of scientific forest management. Specific things we learned along the way are:

1. Mountain laurel is a major fire hazard that can burn with tremendous intensity. While my cooperators and I knew this, I don't think we fully appreciated the shrub's flammability until we implemented the prescribed burn at Clear Creek. Thermocouplers recorded temperatures > 1500 F and rate-of-spread was calculated at 25 chains/hour. Observed flame lengths were 15 – 30 feet. Clearly, this is not a shrub for landscaping purposes in the WUI.
2. Mountain laurel is a formidable obstacle in the oak regeneration process. The fall 2001 acorn crop across much of Pennsylvania was exceptionally heavy, the kind that only occurs once a decade or so, resulting in thousands of new oak seedlings in 2002. In the control treatments, these seedlings lived only a couple of years because of the dense shade and intense root competition. In the treated areas, they are still alive and developing.
3. Mountain laurel is a difficult shrub to control. Its stem is flexible so breaking it with logging equipment is not easily done. Mountain laurel sprouted from the root collar following all the burning and cutting treatments. It was not controlled by herbicides. Because of its waxy, evergreen leaves, foliar herbicides are not absorbed. The shrub appears to only have active growth for a few weeks in late spring so it is difficult to treat the emerging foliage before it forms the waxy cuticle. Basal herbicides are difficult to apply due to the crooked, twisted stem. The cut stump treatment worked best but was the most labor intensive.