Initial Effects of Fire and Fire Surrogate Treatments in Red Pine, Luce County, Michigan

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Objectives

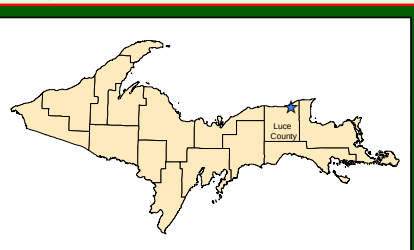
Study the effects of prescribed fire and harvesting on:

- *Dendroctonus valens, Conophthorus resinosae* and *Ips pini* activity
- Shoot blight pathogens in the genera *Sirococcus* and *Sphaeropsis*
- Ground-dwelling insect diversity
- Red pine regeneration
- Understory herbaceous vegetation diversity

Overall Treatment Goals

Develop prescriptions that may be utilized on a large scale in red pine forests resulting in:

- Structurally diverse stands
- Multi-aged trees, including large overstory red pine, red oak and super canopy white pine.



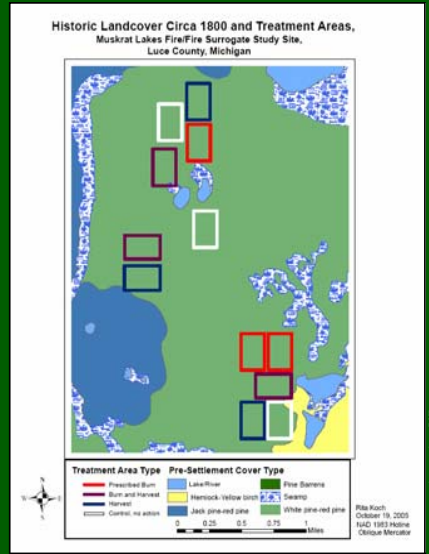


Figure 1 (top): Study site location north of Newberry, Michigan. Figure 2 (bottom): Pre-Settlement Vegetation and treatment areas, Muskrat Lakes Site, Luce County, Michigan.

Photo by Rita Koch

Figure 3: Scorched trees the day after the burn

Photo by Rita Koch

Figure 4: Red turpentine beetle pitch tube

Photo: Michigan DNR

Figure 5: View of prescribed burn from the air, May 2006

Photo: Michigan DNR

The Study Site:

Originated from a stand-replacing fire about 80 years ago. Composition of the forest is 54.2% red pine, 16.0% white pine, 11.3% jack pine and 8.9% red oak. Mean DBH of red pine is 28.7 cm and mean height is 14.9 m. The area was historically red and white pine and was not converted from another forest type.

Study design

Modified from the National Fire/Fire Surrogate study (www.fs.fed.us/ffs/).

12 treatment areas of approximately 17 hectares (40 acres) were divided into 4 treatment types:

- Untreated control
- Prescribed fire only
- Mechanical treatment only
- Mechanical treatment followed by prescribed fire

Each treatment area contains a grid of 20 plot centers 50 meters apart. Stand data were taken within a 0.04 hectare area around the plot center.

Acknowledgements

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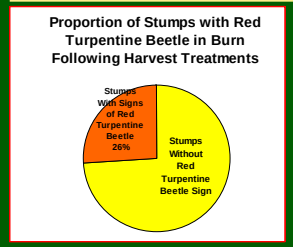
Photo by Rita Koch

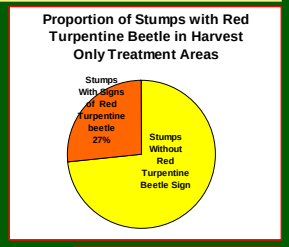
Figure 6: Sentinel seedlings

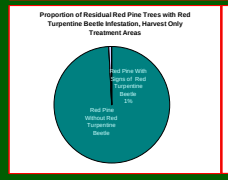
Entomology: Preliminary Red Turpentine Beetle (*Dendroctonus valens*) Results:

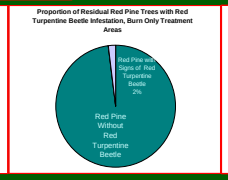
The proportion of stumps containing red turpentine beetles were similar in burned and unburned harvests

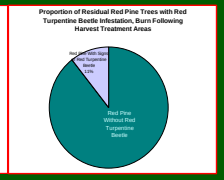
More trees are infested in treatment areas where harvesting and burns were combined than in other treatments. No red turpentine beetles were observed in control treatments

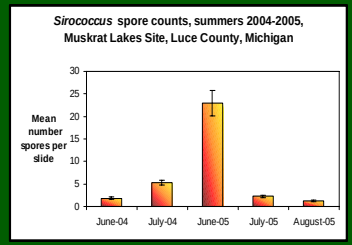












Initial Conclusion

The treatments have resulted in significant red turpentine beetle activity in stumps and some activity in standing trees. Continued monitoring will enable us to determine the extent of mortality from red turpentine beetle and other insects and disease as a result of the treatments.

Pathology: Shoot Blight Spore Trapping and Sentinel Seedlings

Spore traps were placed in each of the 12 treatment areas with 4 slides at each treatment area. Slides were exposed for 2 weeks.

2004, a mean of 1.8 *Sirococcus* spores was found per slide in June and 5.3 spores in July. 2005, *Sirococcus* high in June (mean of 23 spores per slide).

Figure 6 shows a styroblock of sentinel seedlings. 36 blocks were divided among the treatments and exposed for several weeks in 2006. Seedlings are still being analyzed for disease.

Photo by Rita Koch

Figure 7: Red turpentine beetle sign on stump