

- PROJECT TITLE:** **Rapid Early Detection of Beech Bark Disease And Hemlock Woolly Adelgid in Michigan: Year 3**
- SUBMITTED BY:** Roger Mech, Michigan Department of Natural Resources  
Robert Heyd, Michigan Department of Natural Resources
- TERM OF PROPOSAL:** May 2004 – September 2004 (Year 3 of three-year project)
- AMOUNT OF REQUEST:** \$31,500
- BACKGROUND:** Exotic pests are an increasingly serious threat to Michigan's forest resource. Hemlock woolly adelgid (*Adelges tsugae*) was recently detected in two nurseries in Michigan, and beech bark disease is now well established in parts of the West-Central Lower Peninsula and in the Eastern Upper Peninsula. Prompt detection of infestations is critical to ensure effective suppression and eradication efforts.
- Hemlock woolly adelgid** Over 12 percent of Michigan's timberland contains eastern hemlock (*Tsuga canadensis*) (Heyd, 2001). Hemlock is a component of 2.3 million forested acres. The most recent Forest Inventory Analysis estimates 102 million trees with a volume of 662 million cubic feet in all size classes.
- Hemlock woolly adelgid has the potential to severely reduce or eliminate eastern hemlock from the state. Studies in New England indicate that mortality in some infested stands exceeded 95% (Orwig et al, 1998). All size and age classes are susceptible. Canopy gaps created by hemlock woolly adelgid damage significantly increased the amount of light reaching the forest floor and resulted in rapid understory vegetation responses. This has led to dramatic reductions in eastern hemlock regeneration in affected stands. This trend suggests that advanced regeneration and seedbanks will not be important mechanisms for hemlock reestablishment.
- Beech bark disease** Beech (*Fagus grandifolia*) is the only native species of the genus in North America (Heyd, 2001). Michigan has 7.16 million acres of Maple-Beech-Birch type containing 1.67 billion board feet of beech, or 138 million trees in all size classes. Of these 126 million beech trees, the 1993 Forest Survey reports 15 million beech trees greater than 9 inches in diameter, and 0.9 million greater than 21 inches diameter. In addition to being an important late successional component of Michigan's hardwood forests, it is important for wildlife. Beech is the only nut producer in the northern hardwood type. Beech mast is palatable to a large variety of birds and mammals, including mice, squirrels, chipmunks, black bear, deer, foxes, ruffed grouse, ducks, and blue jays.
- Reported "killing front" loss trends from beech bark disease place Michigan's estimated losses during this first phase of the disease at 7.5 million beech trees in the greater than 9 inches diameter category. This conservatively represents 800 million board feet of sawtimber. These figures are based on the 1993 Forest Inventory and Analysis. Dense stands of infested beech sprouts and seedlings, and a scattering of larger

residual trees in varying conditions characterize impacted forest where beech was once a dominant component. The harvest of diseased and slowly declining beech stands initiates the formation of highly susceptible thicket stands.

## OBJECTIVES

- **Continue training state and private resource professionals, including nursery producers, landscape industry professionals, consultant foresters, arborists and others to identify and report the occurrence of hemlock wooly adelgid and beech bark disease.**
- **Determine where hemlock wooly adelgid is present across the range of hemlock in Michigan.**
- **Conduct hemlock wooly adelgid detection surveys in Michigan nurseries that sell eastern hemlock.**
- **Locate and survey hemlock in proximity to these nurseries.**
- **Determine where beech scale (*Cryptococcus fagisuga* Lind) is present across the range of beech in Michigan (advancing front).**
- **Determine the relative density of beech scale in these stands.**
- **Determine where *Nectria* canker is present in association with beech scale (killing front).**
- **Produce brochures, ID cards and other information to assist the public in identification and reporting of BBD and HWA**
- **Produce digital products for GIS risk modeling and resource assessments.**

## METHODS

A systematic sample design will be used in forest stands. Thirty trees will be evaluated along a series of transects in each sample stand. Stand level information (county, ownership, TRS, GPS coordinates, habitat type, age, stocking) will be recorded. Starting points will be randomly located, and transects will be laid out to ensure representative distribution of sample trees within the stand. Presence of beech scale and/or *Nectria* life stages on beech and presence of hemlock wooly adelgid on hemlock will be recorded. Tree dieback, mortality and beech snap will be recorded. Beech scale will be given an ordinal ranking according to density.

Nurseries that sell eastern hemlock and hemlock trees within ½-mile of these nurseries will be inspected for life stages of hemlock wooly adelgid. Hemlock will be identified using a combination of ground surveys and medium-format aerial photography.

## COSTS

\$20,000

Field surveyors (2)

Travel and supplies	\$5,000
Training and materials	\$5,000
Data analysis	\$1,500

Total: \$31,500

\*In-kind services and materials will be provided by Michigan Department of Natural Resources including aerial surveys, aerial photography, supplemental travel and training, and GIS analysis.