FY11 Forest Health Monitoring, Evaluation Monitoring Proposal

TITLE: Multi-state beech bark disease (BBD) survey & beech scale resistance

LOCATION: Delaware, Maryland, New Jersey, West Virginia

DATE: 11-October-2010

DURATION: 1 year **FUNDING SOURCE:** Base

PROJECT LEADER: Glenn Gladders, Forest Health Specialist, Delaware Forest Service

COOPERATORS:

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FHP SPONSOR/CONTACT: Alan Iskra, USDA Forest Service, Morgantown, WV

PROJECT OBJECTIVES: The purpose of this project is twofold:

1. Initiate surveys for BBD in areas that have never been surveyed, possibly resulting in expansion of the known range of this destructive disease.
2. Evaluate the quantity of putatively resistant beech and the possible dynamic nature of BBD within discrete areas and to identify putatively scale resistant American beech.

JUSTIFICATION:

a. Linkage to FHM Detection Monitoring: **This project supplements data collected from FIA and FHM monitoring plots and could fill data gaps if BBD is detected in new areas**. BBD is recognized as a significant forest health issue due to (1) the destructive nature of the disease and (2) the broad range of beech. Figure 1 displays projected mortality in the NA due to BBD.

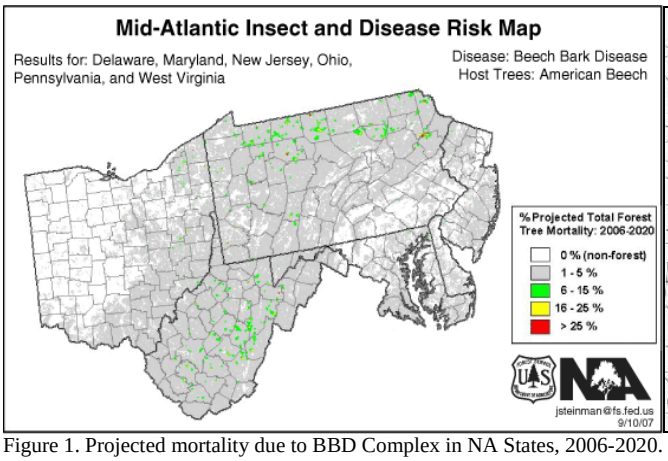

Figure 1. Projected mortality due to BBD Complex in NA States, 2006-2020.

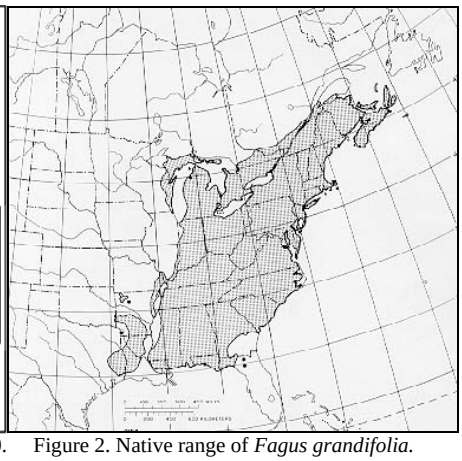

Figure 2. Native range of *Fagus grandifolia.*

b. Significance: American beech is native throughout most of the eastern United States. In the Northeast, there are estimated to be about 37 million acres of beech forest type with over 4.1 billion trees, 2.5 billion of which are in the saw timber size class (FIA estimates). BBD has been detected in several States but further surveys are required to determine both its extent and possible resistance.

c. Biological impact: American beech has considerable wildlife and commercial value. Beech is the only large-mast producer in most of the forest types in which it is a major representative and numerous wildlife species depend on its high-quality mast. In the past 5 years, more than 3 million living trees are estimated to be infected with the disease. BBD kills otherwise healthy trees and represents the most serious threat to the species in its native range.

d. Scientific Basis/Feasibility: This proposal involves additional surveys for the presence of BBD and putative resistance. It is anticipated that the project will be completed successfully.

e. Priority Issues: The purpose of evaluation monitoring (EM), as described in the RFP, is "to determine the extent, severity, and causes of undesirable changes in forest health." BBD is well-known as a serious forest health threat across the range of American beech. This project will address the issue in the following manner:

1. Extent: New surveys for BBD in previously unsurveyed areas will either result in additional new Counties/States where BBD is present, or serve as a baseline "no detection" status for 2011.
2. Severity: Research into resistance will shed light on the future of American beech in its native range.

DESCRIPTION

A. Background: Beech bark disease is a complex involving the exotic beech scale insect *Cryptococcus fagisuga* and *Nectria* and *Neonectria* fungi. BBD has been expanding west and south from Nova Scotia through the native range of beech since 1890. There are an estimated 95 million dead standing beech >5" DBH, most of which have been killed by BBD. Results from a 2009 West Virginia preliminary survey suggest that BBD might not accurately be defined as being contained within the classical three distinct zones delimited by a simple linear North to South/West spread through forests. Rather, there is some evidence at this time to suggest that the incidence and characterization of BBD might vary considerably within much smaller areas or pockets (geo-pockets) that are delimited more by geographical features and soil conditions than by simple linear movement.

Other recent surveys have focused on locating and identifying beech resistant to the insect scale. Putative resistant trees are presently being identified. It is important to identify, locate (GPS), and retain these trees. Resistant beech trees and their associated sprouts are rare commodities and need to be preserved within forests decimated by BBD. Retaining resistant beech and associated sprouts during forestry logging and maintenance operations will: 1) encourage spread of resistance through sprout and seed propagation; 2) retain permanent resistant genotypes within geographical parameters; and 3) provide an abundant resource for scion collections. Researchers at the Delaware, Ohio USFS laboratory have developed techniques where scions collected from resistant beech are grafted onto beech root stock that eventually develop into seed producing saplings. Crosses made between these saplings yield resistant beech seeds that can be used to re-plant areas affected by BBD.

B. Methods: The mid-Atlantic state cooperators within their respective states will locate beech stands. A minimum of ten (10) beech stands in West Virginia, six (6) stands in New Jersey, three (3) stands in Delaware, and three (3) stands in Maryland will be established as permanent survey sites. Survey sites will be chosen occurring in a north to south/west direction as best possible throughout the state or to the southernmost extent where beech occur. Survey sites will consist of a minimum of 20 mature beech trees greater than nine inches in diameter. Trees will be examined for the amount of scale based on a 0-5 scale rating system. Additionally, survey trees will be measured for DBH, dieback, foliar discoloration, and crown transparency. Presence of decay and associated decay fungi will be assessed. All trees including those found to be putatively resistant will be photographed and located using GPS coordinates. Stand descriptions will include elevation, aspect, general soil conditions, and prevalent

vegetative types. Any variance in scale development on infested or resistant beech will be monitored in subsequent years. Putatively resistant beech identified through this survey will be available for scion collection. During the surveys, USFS Morgantown Field Office Staff will transfer BBD survey techniques to cooperators to standardize survey techniques across the region.

C. Products:

a. Updates to known range of BBD occurrence & report on putative resistance.

D. Schedule of Activities

a. FFY 2011: BBD surveys and resistance surveys carried out. Permanent plots established and data collected as described under "Methods."

E. Progress/Accomplishments: Project has not yet begun.

COSTS: Individual State Budgets ($20,000 total request with $20,000 match. All match = State)

Budget: Delaware

Item	Requested FHM EM Funding	State Match	Total
YEAR 1			
Administration			
Personnel	$ 3,027	$ 3,364	$ 6,391
Fringe	$ 298	$ 330	$ 628
Travel	$ 500		$ 500
Procurements			
Contracting			
Equipment			
Supplies			
Indirect Costs	$ 1,175	$ 1,306	$ 2,481
Total	$ 5,000	$ 5,000	$10,000

Budget: New Jersey

Item	Requested FHM EM Funding	State Match	Total
YEAR 1			
Administration			
Personnel	$ 3,082	$ 3,082	$ 6,164
Fringe	$ 1,074	$ 1,074	$ 2,148
Travel			
Procurements			
Contracting			
Equipment			
Supplies			
Indirect Costs	$ 844	$ 844	$ 1,688
Total	$ 5,000	$ 5,000	$10,000

Budget: Maryland

Item	Requested FHM EM Funding	State Match	Total
YEAR 1			
Administration			
Personnel	$ 3,000	$ 3,000	$ 6,000
Fringe			
Travel	$ 2,000	$ 2,000	$ 4,000
Procurements			
Contracting			
Equipment			
Supplies			
Indirect Costs			
Total	$ 5,000	$ 5,000	$ 10,000

Budget: West Virginia

Item	Requested FHM EM Funding	State Match	Total
YEAR 1			
Administration			
Personnel	$ 1,800	$ 1,800	$ 3,600
Fringe	$ 702	$ 702	$ 1,404
Travel	$ 1,704	$ 1,704	$ 3,408
Procurements			
Contracting			
Equipment			
Supplies	$ 102	$ 102	$ 204
Indirect Costs	$ 692	$ 692	$ 1,384
Total	$ 5,000	$ 5,000	$ 10,000