

TITLE: The Impact of Balsam Woolly Adelgid (*Adelges piceae*) on Balsam Fir (*Abies balsamea*) Stands in New England

LOCATION: Northern Region – New England

DURATION: Year 2 of 2-year project

FUNDING SOURCE: Base

PROJECT LEADER: Henry Trial Jr., Maine Forest Service, Forest Health & Monitoring, 207- 827-1813, henry.trial@maine.gov

FHP SPONSOR: Margaret Miller-Weeks, mweeks@fs.fed.us, 603-868-7712, Durham, NH,

COOPERATORS: FIA/FHM regional program manager (for associated plot and tree level data); University of Maine Dept. of Forest Ecosystem Science (cooperative graduate research project)

PROJECT OBJECTIVES: The primary objective of this project remains to determine the magnitude of loss to the balsam fir resource caused by the current infestation of the balsam woolly adelgid (BWA) in Maine. Secondary objectives are to analyze the BWA population and damage patterns to develop a hazard rating system for currently infested/threatened stands and predictive risk model to map infestation susceptibility and vulnerability based on stand characteristics, which would be applicable regionally across the range of balsam fir. Preliminary results from the first field season indicate the project has a high probability of success attaining these objectives on schedule.

JUSTIFICATION: The initial Maine BWA evaluation monitoring proposal (2002), was based on results of aerial survey of the pest impacts conducted in 2002 and on recent years' FHM and FIA plot data. These monitoring results reveal a patchy pattern of adelgid damage ranging in severity from light gouting and scattered individual tree decline/mortality to stands where more than 75% of the stems had died. Adelgid damage is most severe within 10 miles of the coast in eastern Maine but areas of significant damage occur well outside this zone, extending in the other northern New England states. The rate of new mortality has increased significantly since the 2000 season (a trend that continues in 2003). [See 2002 Project Proposal for additional details.]

Recognition that the softwood resource that supports much of Maine's east coastal counties' economy is in poor condition resulted in MFS recently being awarded a Forest Health/SIP grant designed improve coastal softwood stands. Where balsam fir is a large component of these forest resources, the BWA assessment methods being developed in this FHM Evaluation Monitoring project, while still preliminary iterations, are already being used to evaluate and prioritize proposed SIP activities.

DESCRIPTION:

a. Background: [See 2002 Project Proposal for these details.]

b. Methods: This project is employing an augmented FIA/FHM methodology on a subset of FIA/HM plots, and ancillary destructive and nondestructive sampling on off-plot locations.

On the FIA/FHM plots, Maine's field crews trained in FIA/FHM methods are currently collecting plot data including (since July 03) additional variables specific to BWA. These data are to be analyzed and reported by MFS staff.

- The standard FIA/FHM plot footprint and data set will be used to establish the fir volume lost to and damaged by BWA.

- Standard data for regeneration and ground cover will be used to classify sites.
- Crown, soils, lichen, and DWD data will be available for further assessment on Phase 3 plots.

Current FIA and/or FHM damage rating codes are collected for all trees. Additional data fields (shown below) have been added to the current FIA/FHM PDR program to more specifically define BWA infestation levels and host damage patterns.

BWA Data Fields

Tree level Population		Point Level	Tree Level Damage	
Gout	Trunk Phase	Population	Top Damage	Whole tree damage
Absent/	Absent	Seedlings- Gout: pres/abs	Absent	Absent
Present wt normal branch/	Trace	Saplings-	Live wt gout	Gout only (no mort)
Present wt short branch/	Light	Gout: pres/abs	Live deformed (flat top)	Trace Branch mort
Dead Branches	Heavy.		Live above dead	5-25% Branch mort
			Dead spire	26-50% Branch mort
			Dead deformed	51-75% Branch mort
			Dead Broken	76-99% Branch mort
				Recent Dead tree
				Old Dead tree

At off-plot stands: In November and December of each season three areas of moderate and three areas of heavy BWA damage will be destructively sampled to examine whole tree stems for the occurrence of trunk phase insect populations in the mid and upper crown. BWA populations in mid and upper crowns have been reported but have not been studied.

Additional off-frame plots along zonal transects will be established if on-plot data demonstrate an apparent damage gradient but provide insufficient data to develop a risk model.

c. Products: Data will be analyzed to produce a report that describes the impact of BWA in terms of tree mortality and the amount of damage present on “survivors”. Maps of current population and damage patterns will be prepared. Plot data will be analyzed to determine potential association between population/damage patterns and plot level variables such as proximity to the coast, stand type, and various site factors. If applicable, a risk model will be developed.

d. Schedule of Activities:

Year 1

Through November 2003 - field data collection on panel 5 FIA plots.

November and December 2003 - Off plot stem analysis.

January through March 2004 - Data analysis and preliminary report - March 31, 2004

Year 2

April through October 2004 - field data collection on panel 1 FIA plots.

November and December 2004 - Off plot stem analysis/transect studies.

January through March 2005- Data analysis and Final report - March 31, 2005

e. Progress/Accomplishments:

- The initially selected tree condition criteria have been field tested and refined (see above).
- A Photo Guide displaying the various BWA damage classes has been developed and is in use by MFS survey crews and other interested parties.
- Tree and site level BWA damage/condition data for FIA/FHM plots from eastern Maine are being collected; sampled zone is south of the line of the southern Aroostook County border extended, and east of the Kennebec River - approximately 5.5 mm acres. Although there are over 175 Panel 5 FIA plots in this zone, because production field work on this evaluation did not begin until July after alteration of FIA data recorder programs, not all eligible plots have the BWA damage data collected.
- When, in April 2003, a local industrial landowner asked the MFS to assist them in assessing BWA damage and hazard to their fir on 250,000 acres of company holdings, this "production" evaluation was used a practical test of the applicability/utility of the current BWA assessment method. After an initial trial on mapped stands (maps provided by the company), we found that stand level estimates of *the percentage of trees* in the various tree damage categories (vs *individual tree assessments*) for each individual stand increased crew productivity while providing sufficient detail to rate stand condition. This approach will not replace the individual tree data being collected on FIA plots, which we are using to develop the hazard/risk relationships, but it does fill an operational niche. The company is currently using the results generated by the stand evaluations to prioritize current and future management activities. We are monitoring their success and satisfaction as a practical assessment of hazard rating utility. The final rating systems generated by this Evaluation Monitoring project will incorporate any lessons we learn from this industrial experience.
- Foresters in the MFS's Forest Policy and Management Division have been similarly trained to identify and assess BWA-impacted stands. This training is being used in various landowner assistance activities and in assessing requests for variances from harvest limitations associated with Maine's Forest Practices Act. Additionally, the preliminary BWA assessment methods developed in year 1 of this project, are being used to prioritize activities associated with a recently awarded Forest Health/SIP grant designed improve Maine's coastal softwood stands.
- The University of Maine (UMO) ands MFS are sharing costs for a graduate student to work on this project. The student's research is to be focussed on investigating BWA population dymanics/ impacts as a function of site and climatic characteristics. This effort will augment internal MFS capabilities to analyze hazard rating assessment results to produce a risk map.

COSTS:

	Item	Requested FHM EM Funding	Other-Source Funding	Source
YEAR 2 (thru 3/31/05)				
Administration	Salary	26612	34025	MFS/UMO
	Overhead	3015		
	Travel	1800	10200	MFS
Procurements	Contracting	12000		
	Equipment			
	Supplies	300		
Total		\$43727	\$44225	