

Special Technology Development Program Progress Report

Complete a copy of this form for: 1) each multi-year project active in the current fiscal year and not requesting funds, and 2) each project requesting funds to extend into the following fiscal year. Add lines within the form as necessary. Delete all that does not apply.

PROJECT NUMBER: NA-2001-02

PROJECT TITLE: Development of landscape level models of forest risk to selected exotic pests in the eastern US.

PROJECT STATUS:

Continuing (funds are being requested for the next fiscal year to continue the project)

EXPECTED PROJECT DURATION: 2 years

ORIGINAL EXPECTED COMPLETION DATE OF THE PROJECT FY-02

EXPECTED COMPLETION DATE OF THE PROJECT FY-02

SUBJECT: Risk and Hazard (1), Invasive Species (2)

STATUS OF SUBJECT SPECIES: non-native

PROJECT OBJECTIVES:

- 1) Develop an interpolated map of historical tree mortality rates over the previous 15 years for the eastern US (regions 8 & 9) using FIA eastwide plot data
- 2) Develop statistical models for estimating the component of historical regional mortality (estimated under objective 1) that can be attributed to damage by the gypsy moth, beech bark disease, and hemlock woolly adelgid using historical survey data.
- 3) Use the statistical model from objective 2 along with models of range expansion to map future risk to these invasive species and integrate these estimates in the national pest risk mapping effort.

BRIEF DESCRIPTION OF THE PROJECT:

Our work to date on this project has primarily focused on objectives one and two.

Work under Objective 1: We brought together all of the eastwide FIA data into a single database. A posting of percent standing basal area dead is shown in <http://www.fsl.wvu.edu/~randy/fiadead.jpg>. One interesting feature that is evident from this map is the tree mortality apparently caused by hurricane Hugo (<http://wchs.csc.noaa.gov/images/hugopath.gif>) in 1989. We are still planning on using these data to generate an interpolated 1 km pixel map of percent standing dead but we first need to solve a few problems. The biggest problem that we have encountered is that overall levels of mortality appear to be quite different among different states. We are still trying to determine if this is an inherent artifact of the fact that data from different states were collected in different years or if it is because FIA used different data procedures in different states. Evidence to date indicate the latter situation and we are looking into methods for correcting these differences.

Work under Objective 2: We also brought together all of the eastwide FIA data (>90,000 plot locations) to generate a map of forest susceptibility to the gypsy moth. For each plot we calculated the percentage basal area composed of species preferred by the gypsy moth using the criteria developed by Liebhold et al. (1995). (this publication is available at

<http://www.fs.fed.us/ne/home/publications/scanned/gtr211.pdf>). A posting of these values can be seen at <http://www.fsl.wvu.edu/~randy/fiagm.jpg>. One issue that we had to resolve was whether we could use the “scrambled” geographical coordinates (FIA does this to protect landowner confidentiality) of each FIA plot or whether it was necessary to obtain the original coordinates. We tested this by taking a sample of ca 300 plots in Vermont and in Pennsylvania and comparing kriged estimates from the original and “scrambled” coordinates. We found that the difference between the two estimates amounted to less than 5% of the mean on average and concluded that it was not necessary to use original coordinates. Another issue that we addressed was whether variograms varied among the various deciles of the frequency distribution for our variable of interest. We found that there was not a substantial difference among these variograms for data from at least two ecoregions and this allowed us to adopt the logistically more simple interpolation procedure, median indicator kriging, over multiple indicator kriging.

The median indicator kriging procedure was repeated separately for each ecoregion in the east and the results were mosaiced together to form a single map, which is shown at <http://www.fsl.wvu.edu/~randy/gmrisk1.jpg>. The interpolation procedure that we used was applied only to forested FIA plots and we adjusted estimates for forest density using a percent forest map derived from the Multi-Resolution Land Characteristics Consortium (MLRC) map data (<http://www.epa.gov/mrlcpage>). First we classified each MLRC land use as either forest or non-forest and then aggregated this image from an original 30 m pixel to 1 km pixels to calculate a percent forest for each pixel (the resulting forest density map is shown at <http://www.fsl.wvu.edu/~randy/fordens.jpg>). These values were then multiplied by the gypsy moth susceptibility map to adjust for forest density. The adjusted gypsy moth susceptibility map is shown at <http://www.fsl.wvu.edu/~randy/gmrisk2.jpg>.

CHANGES TO ORIGINAL PROJECT SCOPE OR OBJECTIVES

We do not anticipate any substantial changes to the project scope. Because of data problems in interpreting FIA standing dead values (see above) we decided to move on to objective 2 with the plan to still come back to the standing dead mapping.

ADDITIONS TO ORIGINAL PROJECT SCOPE OR OBJECTIVES:

We have come to realize that the gypsy moth susceptibility map will be of considerable use for a variety of FHP efforts (Slow the Spread, and suppression activities) and therefore we plan on developing a publication describing the map data and their development in more detail.

FHP LEAD CONTACT (FHP person submitting proposal):

<u>Name</u>	<u>Affiliation (Office or Dept.)</u>	<u>Phone, E-mail, Fax</u>
Dan Twardus	NA-FHP, Morgantown, WV	(304) 285-1545 dtwardus@fs.fed.us (304) 285-1505 FAX

FHP LEAD INVOLVEMENT

<u>Role</u>	<u>Time Commitment</u>
Overall coordination, provide input on FHP needs, provide Input on FHM relationships	5%

PRINCIPAL INVESTIGATOR(S) :

<u>Name</u>	<u>Affiliation (Office or Dept.)</u>	<u>Phone, E-mail, Fax</u>
Andrew Liebhold	NE, RWU-4557, Morgantown, WV	(304) 285-1512 aliebhold@fs.fed.us
Andrew Lister	NE, FIA, Newtown Square, PA	(610) 557-4038 alister@fs.fed.us (610) 557-4250 FAX
Kurt Gottschalk	NE, RWU-4557, Morgantown, WV	(304) 285-1598 kgottschalk@fs.fed.us

(304) 285-1505 FAX

PRINCIPAL INVESTIGATOR(S) INVOLVEMENT (add lines as necessary):

<u>Name</u>	<u>Role</u>	<u>Time Commitment</u>
Liebhold	daily supervision of GS-9 Computer Assistant. determines specific direction of project activities	10%
Gottschalk	provides input on forest risk models	5%
Lister	provides input on use of FIA data and Geostatistical and GIS methods	5%

COOPERATORS (contributing to, but not leading, the project) (add lines as necessary):

<u>Name</u>	<u>Affiliation (Office or Dept.)</u>	<u>Phone, E-mail, Fax</u>
Eugene Luzader	NE, RWU-4557, Morgantown, WV	(304) 285-1524 gluzader@fs.fed.us (304) 285-1505

COOPERATOR INVOLVEMENT (add lines as necessary):

<u>Name</u>	<u>Role</u>	<u>Time Commitment</u>
Luzader	provides assistance on various GIS aspects of the project	5%

PRODUCTS AND DUE DATES (from original application form):

Oct. 1, 2001 – historical mortality map complete
June 1, 2002 – spread /defoliation / mortality prediction maps complete
Oct. 1, 2002 – Station paper and journal article complete

STATUS OF PRODUCTS/PRESENTATIONS:

The mortality map is shown at <http://www.fsl.wvu.edu/~randy/fiadead.jpg> however we still plan to develop this as an interpolated 1 km raster map. As mentioned above, we are still working out problems of data inconsistencies among FIA inventories for different states but still expect to overcome these problems and develop an interpolated mortality map.

The gypsy moth forest susceptibility map (shown at <http://www.fsl.wvu.edu/~randy/gmrisk2.jpg>) has been completed ahead of schedule. We are also making progress on developing similar maps for beech bark disease and hemlock woolly adelgid. (see percent beech data posting at <http://www.fsl.wvu.edu/~randy/fiaab.jpg>)

ACCOMPLISHMENTS TO DATE:

Products: The gypsy moth forest susceptibility map is complete

Publications: none

Technology Transfer: none

FIRST FISCAL YEAR FUNDED: FY01

FUNDS OBLIGATED FROM BEGINNING OF PROJECT THROUGH CURRENT FISCAL

YEAR: (include both monetary and in-kind, excluding FHP base funding and salaries) (extend table as needed):

	Item	Requested Funding	Received Funding	Expended Funding	NE Contribution
PREVIOUS YEAR FY 20001					
Administration	Salary	\$18,000	\$18,000	\$18,000	\$30,000 *
	Overhead	\$3,220	\$3,220	\$3,220	
	Travel	\$500	\$500	\$500	
Procurements	Contracting	0	0	0	
	Equipment	0	0	0	
	Supplies	\$1,500	\$1,500	\$1,500	
YEAR TOTALS		\$23,220	\$23,220	\$23,220	\$35,000

CURRENT YEAR FY 2002					NE Contribution
Administration	Salary	\$19,000			\$35,000 *
	Overhead	\$3,220			
	Travel	0			
Procurements	Contracting	0			
	Equipment	0			
	Supplies	\$1,000			
YEAR TOTALS		\$23,220			\$35,000

* NE contribution represents salary/fringes of Liebhold (10%), Lister (5%), Gottschalk (5%), and Luzader (5%; GS-11 computer assistant)

Enclosure 3 continued

FY 2003		Requested FHP STDP Funding	Other Source Funding	Source
Administration	Salary			
	Overhead			
	Travel			
Procurements	Contracting			
	Equipment			
	Supplies			
YEAR TOTALS				
PROJECT TOTALS				

FUNDS NOT USED FROM PREVIOUS FISCAL YEAR (If there are unused funds, what is the reason for not using them? How will the project continue without these funds?)

Fiscal Year	STDP Funding Allocated	Funds Obligated	Funds Unused

EXPECTED BUDGET FOR NEXT FISCAL YEAR: (include both monetary and in-kind, excluding FHP base funding and salaries) (extend table as needed):

	Item	Requested FHP STDP Funding	Other-Source Funding	Source
Administration	Salary			
	Overhead			
	Travel			
Procurements	Contracting			
	Equipment			
	Supplies			
Totals				

DIFFERENCE BETWEEN ORIGINAL AND AMENDED REQUESTS AND JUSTIFICATION: We do not anticipate any significant difference between our original proposal and what we are planning to do in FY02

STDP FUNDING NEEDED:

Fiscal Year	STDP Funding	Other- Source Funding	Source
FY02	23,220	\$35,000	NEFES