

**Title:** Regional and Local Distribution of Native (*Rhododendron* Spp., *Kalmia* Spp., and *Lindera Benzoin*) and Exotic (*Lonicera* Spp., *Rosa Multiflora*, and *Berberis Thunbergii*) Interfering Shrub Species in West Virginia, Ohio and Pennsylvania Forests along a Soil Fertility Gradient

**Location:** Monongahela, Wayne, and Allegheny National Forests of West Virginia, Ohio, and Pennsylvania

**Funding Source:** Base

**Duration:** Year 1 of a 2 year project

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**Project Objective:** The objective of this project is to relate current distribution of three native and three exotic interfering shrub species with a possible soil pH and fertility gradient. This regional environmental gradient may then help predict local areas most likely to be affected by secondary drivers of invasion of these species, including herbivory, pathogen/insect caused canopy openings, harvesting, and fire.

**Methods:** Five 1 km transects will be randomly located along an east-west bearing within each of the three National Forests. Along each transect a 100 m<sup>2</sup> plot will be placed every 100 m in forested areas (of which age may vary), totaling ten 100 m<sup>2</sup> plots (each mapped using GPS) per transect or 150 plots for the entire study. The transect will be extended in length such that non-forested (i.e., roads, old fields) along the transect are excluded. Forest stand history will be determined from the National Forests' records. Four 10 m<sup>2</sup> plots will be nested within each of the 100 m<sup>2</sup> plots and cover of all shrub species will be estimated. Canopy and subcanopy trees will be tallied from each plot center using a 10-factor wedge prism. Four soil cores of the upper B horizon will be taken from each of the cardinal directions just outside each of the 10 m<sup>2</sup> plots. Soil samples will be mixed and combined by 100 m<sup>2</sup> plot such that a total of 10 mixed soil samples will be collected per transect or 150 soil samples across all National Forest study sites. Elevation, slope, aspect, relative position from nearest ridge and/or stream valley, and canopy opening (using hemispherical photography) data will be taken at the center of each 100 m<sup>2</sup> plot. Soils will be analyzed by the University of Maine Analytical Lab for pH, acidity, total C/N, NH<sub>4</sub>Cl, Ca, K, Mg, P, Na, Fe, Mn and NO<sub>3</sub>. Additional samples will be taken from one 100 m<sup>2</sup> plot per transect (selected after a preliminary analysis of the original combined soils data) in which the soils are not combined (16 x 10 total samples), in order to compare variation of soil fertility at the local scale with that at that regional scale. Finally, 10 additional 100 m<sup>2</sup> plots per state will be established in locations of known *Kalmia* spp. and *Rosa multiflora* populations within forested sites from which 16 mixed soil samples will be collected and analyzed. The same light and topography data will also be taken from these 30 plots. Precipitation data (from NOAA climatological data; for a moisture gradient comparison) will be evaluated across each transect.

**Products:** At least one peer-reviewed publication will be produced in addition to presentations at the Ecological Society of America Meetings and the FHM Annual Working Group Meeting in 2008. We also hope to present at the MidAtlantic Chapter of the American Rhododendron Society in 2008.

**Schedule of Activities:**

FY 2007

May-Sept. Collect vegetation data and soil samples.

Sept-Nov. Prepare soil samples.

Nov-April. Analyze soil samples and begin analysis of overall data.

FY 2008

May-Sept. Collect more intense soil samples from randomly selected 100 m<sup>2</sup> plots to compare local variation to regional variation; collect vegetation data and soil samples from 30 plots with known populations of *Kalmia* spp. and *Rosa multiflora*.

Sept-Nov. Prepare soil samples.

Nov-April. Analyze soil samples and complete analysis of overall data.

**Costs:**

	Item	Requested FHM EM Funding	Other-Source Funding	Source
<b>Year 2007</b>				
Administration	Salary (2 GS 4/5 Technicians for 4 months)	\$4000	\$8000 (technician) \$26,000 (10% of the 4 scientists' time)	NRS budget
	Overhead	0	0	
	Travel	\$4200	0	
Procurements	Soil Analysis Contract	\$4500	0	
	Equipment (2 additional soil cores; collection bags)	\$550	\$700 (existing soil core, tapes, compasses etc.)	NRS budget
<b>Total for 2007</b>		<b>\$13,250</b>	<b>\$34,700</b>	
<b>Year 2008</b>				
	Salary (2 GS 4/5 Technicians for 4 months)	\$4000	\$8000 \$26,000	NRS budget
	Overhead	0	0	
	Travel	\$6000	0	
Procurements	Soil Analysis Contract	\$5400	0	
	Equipment	0	0	
<b>Total for 2008</b>		<b>\$15,400</b>	<b>\$34,000</b>	
<b>Total Requested</b>		<b>\$28,650</b>	<b>\$68,700</b>	

**Accomplishments:**

As of Sept 21, 2007, four transects in each of the three states were established and sampled for vegetation, topographic data, and soil. On each of these transects, one plot was intensely sampled such that all four subplots will have soil samples analyzed separately instead as a combined sample. Funds were obligated for soil analyses in November. Depending on any patterns found from the transect data, an additional fifth transect may be sampled or additional (more than 10 for two species in each state) intensely sampled plots will be sampled next fiscal year.

Transects generally took one day to complete with six people (four GS 4 technicians, one GS 7 botanist, and one GS 13 research botanist), depending on the rockiness of the site.

Preliminary observations confirm that *Rhododendron* sp. and *Kalmia latifolia* are most abundant in West Virginia (two out four transects had some present), somewhat abundant in Pennsylvania (one out four transects had some present), and missing from the Ohio transects. However, the Ohio transects appear to have more shrub species than both West Virginia and Pennsylvania. It was noted that *Viburnum* spp. (*V. prunifolium* and *V. acerifolium*) in Ohio appear to be dying, possibly from a pathogen outbreak. There are reports of such die-back in Pennsylvania as well, but it could not be confirmed with the transect observations (too few shrubs to make such an assessment at this time). Exotic shrub species (primarily *Rosa multiflora*) are also more likely to be found along the Ohio transects than the West Virginia or Pennsylvania transects.

All soil samples are currently being stored in a walk-in cooler and will be processed and sent for analyses over the next few months. Vegetation data need to be entered and analyzed.

Requested budget for FY 2008 has not changed (see table above).