

## *Developing a Regional Risk Assessment Model for Invasive Woody Plants in the North Central United States*

### **PRINCIPAL INVESTIGATORS:**

Mark P. Widrlechner, USDA-ARS, NCRPIS, Ames, Iowa, and Jan Thompson, Iowa State University, Ames, Iowa.

### **ADDITIONAL INVESTIGATORS:**

Emily Kapler, Matt O'Hearn, Philip Dixon, and Jeff Iles, Iowa State University.

### **PROJECT OBJECTIVES:**

Our team has been involved in the step-wise development of a risk-assessment approach that integrates species' life-history traits and native-range data to predict naturalization of non-native woody plants on a regional scale. Our current project has three main objectives. First, we are working to refine initial predictive models that we developed for non-native woody plants cultivated in Iowa. Second, we will evaluate these models to determine their usefulness for identifying potentially invasive pests, in other words going beyond simple naturalization. Our third objective is to ensure that the refined, regional-scale models that we do develop are both accurate and practical to use. The ultimate goal of our work is to produce valid risk-assessment models that can be applied by all parties evaluating new woody-plant introductions in the North Central region.

### **ACCOMPLISHMENTS:**

We recently completed a collaborative project with personnel at the Chicago Botanic Garden in which we tested four risk-assessment models first evaluated on 100 non-native woody species in Iowa to assess their applicability to 193 non-native species common in the Chicago region (see Technology Transfer, below). In this work, we evaluated the classification rate (the proportion of species classified by the models), the biologically significant error rate (the number of false negatives), and the horticulturally limiting error rate (false positives) of one continental-scale model and three regional models. Only one of the regional models produced an increase in classification rate and a decrease in horticulturally limiting errors compared to the continental model without producing additional biologically significant errors. Thus, further work to develop better and more accurate predictive models is warranted.

More recent efforts have focused on identifying an appropriate geographic scope for model validation and development. In addition to Iowa and the Chicago region, we will focus on parts of Minnesota and Missouri for further study. We are developing a large database of information on non-native woody plants that have been widely cultivated in those areas. This activity has included updating the species list for Iowa (first used in 2000/2001) to include additional species known to have been in cultivation for approximately 50 years, and updating information on naturalization records by examining voucher specimens at the Ada Hayden Herbarium (Iowa State University) and working with Iowa collaborators (see below). New species on these lists will be used to validate previously developed models.

Lists of candidate species for neighboring states have been developed by examining horticultural texts and nursery catalogs to identify non-native species commonly used in the landscape during the same time period and through verification of their use with local collaborators (see below). For species thought to naturalize in Minnesota, project investigators and local collaborators visited the University of Minnesota Herbarium and examined voucher specimens to verify naturalization status. Similar activities are planned with local collaborators in Missouri (species lists are still being developed for Missouri). Concurrently, our team has been assembling information for all species in our database on their life-history traits and native ranges (to calculate geographic-risk ratios). One notable preliminary finding related to our regional database is that the *proportion* of non-native woody species that naturalize increases steadily and substantially along the north to south gradient from central Minnesota to central Missouri.

**TECHNOLOGY TRANSFER/IMPACT:**

Project personnel participated in the “Invasive Plant Research and Partnerships with Ornamental Horticulture and Natural Resource Management” workshop at the National Arboretum to provide input for the establishment of priorities in invasive plant research. We also gave presentations to the Iowa Weed Commissioners’ Meeting and the Iowa Nursery and Landscape Corporation’s Research Corporation Meeting, to update local partners on progress in risk-assessment modeling. In collaboration with personnel at the Chicago Botanic Garden, we completed a scientific article scheduled for publication later this year in the Journal of Environmental Horticulture, based on an earlier phase of our research (Widrechner, M., J. Thompson, E. Kapler, K. Kordecki, P. Dixon, and G. Gates. 2009. A test of four models to predict the risk of naturalization of non-native woody plants in the Chicago region.).

**ADDITIONAL FUNDING/EXTERNAL SUPPORT:**

Additional support for this project has come largely through in-kind contributions of project investigators’ time (Iowa State University Departments of Horticulture, Natural Resource Ecology and Management, and Statistics, and the USDA-ARS NCRPIS.)

**COLLABORATORS:**

Deb Lewis (Ada Hayden Herbarium, Iowa State University), Mark Vitosh (Iowa Department of Natural Resources), Jimmie Thompson (Iowa Native Plant Society), Welby Smith (Minnesota Department of Natural Resources), Gary Johnson and Jeff Gillman (Forestry and Horticulture, respectively, University of Minnesota), Harold Pellett (Landscape Plant Development Center, Minnesota), George Yatskievych (Missouri Botanical Garden), and Chris Starbuck (University of Missouri) are collaborators on this project. Additional assistance has been provided by Eric Bergeson (Bergeson Nurseries, Minnesota), and personnel at the Anderson Horticultural Library (Chanhassen, Minnesota).