



Integrating Effects Of Land Use Change On Invasive Plant Species Distribution Into An Invasive Plant Atlas For The Mid-South (IPAMS)

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Invasive Plants are the Problem

Invasive species represent a diffuse challenge, as evidenced by the following:

- An estimated 17,000 species of native plants occur in the United States (Morin 1995), but
- Approximately 5,000 introduced species are now found across the landscape (Morse et al. 1995).
- Invasive plants cost the economy at least \$34 billion per year in losses, damages, and control costs (Pimentel et al. 2000)
- Costs are spread across production agriculture, agroecosystems, and other natural and human-altered habitats.

Scoping the Solution

- Despite the large cumulative cost, the problem is dispersed across the landscape
- Costs are largely borne by individual landowners or resource agencies.
- Government agencies have neither the resources nor personnel to survey the entire landscape and manage all infestations of these problematic species
- The number of species is too large for a simple public awareness campaign.



Invasive Plant Atlas of the Mid-South (IPAMS)

- Train lay volunteers (citizen scientists) to identify forty common invasive weeds
- Enter data into a regional database, which is connected to a national data effort
- Utilize this and other data to predict the locations of these invasive weeds in the landscape
- Focus is the Mid-South states of AL, AR, LA, MS, and TN



Our Predecessor: IPANE



- This project is a complement to IPANE (Invasive Plant Atlas of New England)
- IPANE has:
 - Trained over 500 volunteers to detect new infestations of invasive plants (Mattrick 2005),
 - Entered over 6000 herbarium records and
 - Entered 7000 field observations into the database in four years (Mehrhoff 2005).



IPAMS' Three Components

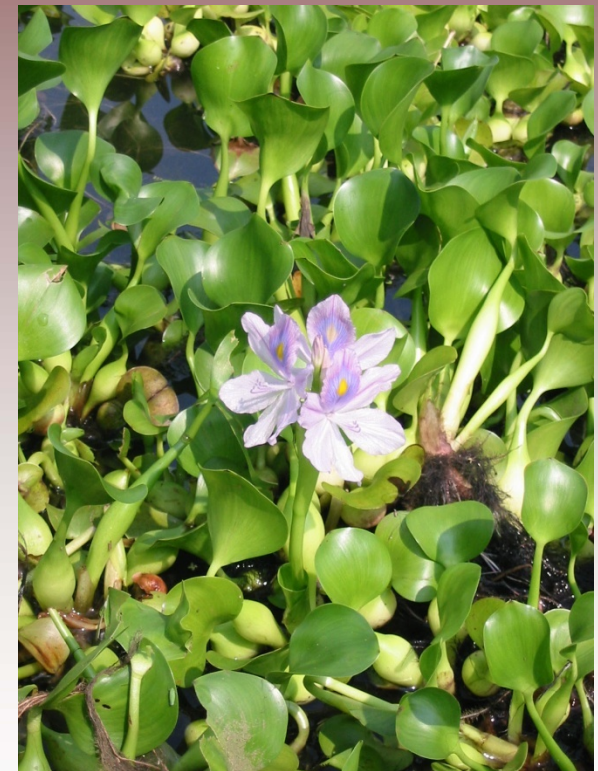
- Extension and Outreach
- Research
- IPAMS Web Portal





Extension and Outreach

- Develop training programs for lay volunteers (citizen scientists) to identify forty invasive species and report them using the IPAMS database,
- Refine search efforts for federal or state listed noxious species and other invasive species of concern in the context of EDRR, using an integrated approach including lay volunteers, professional resource managers, agency personnel, and other databases





Extension and Outreach, cont.

- Develop best management practices information and publications, and conduct workshops for the public,
- Establish rapid assessment methodology and rapid response capabilities for the region, and
- Incorporate ArcIMS capabilities into the IPAMS portal to produce distribution maps of species of interest, and produce predicted distributions of the forty selected species to guide volunteer surveys and management efforts.



Species Selection



- Species selected from six habitats:
 - Row crop
 - Pasture
 - Rights of way
 - Managed forests
 - Wildlands
 - Aquatic
- Balanced species that are common, sparse, rare, and not yet in region



Forty Species

Scientific name	Common name	Primary Habitat
<i>Amaranthus palmeri</i> S. Wats.	carelessweed (Palmer amaranth)	Row crop
<i>Carduus nutans</i> L.	nodding plumeless thistle (musk thistle)	Row crop
<i>Commelina benghalensis</i> L.	jio (Benghal dayflower, tropical spiderwort)	Row crop
<i>Galinsoga quadriradiata</i> Cav.	shaggy-soldier (hairy galinsoga)	Row crop
<i>Salsola tragus</i> L.	prickly Russian thistle	Row crop
<i>Setaria faberi</i> Herrm.	Japanese bristlegrass (giant foxtail)	Row crop
<i>Xanthium spinosum</i> L.	spiny cocklebur	Row crop
<i>Crotalaria spectabilis</i> Roth	showy rattlebox	Pasture
<i>Imperata cylindrica</i> (L.) Beauv.	cogongrass	Pasture
<i>Rosa multiflora</i> Thunb. ex Murr.	multiflora rose	Pasture
<i>Solanum viarum</i> Dunal	tropical soda apple	Pasture
<i>Sorghum halepense</i> (L.) Pers.	Johnsongrass	Pasture
<i>Sporobolus indicus</i> (L.) R. Br.	smut grass	Pasture



Forty Species, Cont.

Scientific name	Common name	Primary Habitat
<i>Alliaria petiolata</i> (Bieb.) Cavara & Grande	garlic mustard	Managed Forests
<i>Elaeagnus pungens</i> Thunb.	thorny olive	Managed Forests
<i>Hedera helix</i> L.	English ivy	Managed Forests
<i>Lonicera maackii</i> (Rupr.) Herder	Amur honeysuckle	Managed Forests
<i>Lygodium japonicum</i> (Thunb. ex Murr.) Sw.	Japanese climbing fern	Managed Forests
<i>Mimosa pigra</i> L.	black mimosa	Managed Forests
<i>Nandina domestica</i> Thunb.	sacred bamboo	Managed Forests
<i>Pueraria montana</i> (Lour.) Merr.	kudzu	Managed Forests
<i>Wisteria sinensis</i> (Sims) DC.	Chinese wisteria	Managed Forests
<i>Ailanthus altissima</i> (P. Mill.) Swingle	tree of heaven	Rights of way
<i>Albizia julibrissin</i> Durazz.	silktree (mimosa)	Rights of way
<i>Ligustrum japonicum</i> Thunb.	Japanese privet	Rights of way
<i>Ligustrum sinense</i> Lour.	Chinese privet	Rights of way
<i>Rottboellia cochinchinensis</i> (Lour.) W.D. Clayton	itchgrass	Right of way
<i>Triadica sebifera</i> (L.) Small	tallowtree	Right of way



Forty Species, Cont.

Scientific name	Common name	Primary Habitat
<i>Arundo donax</i> L.	giant reed	Wildland
<i>Cayratia japonica</i> (Thunb.) Gagnepain	bushkiller	Wildland
<i>Lonicera japonica</i> Thunb.	Japanese honeysuckle	Wildland
<i>Microstegium vimineum</i> (Trin.) A. Camus	Nepalese browntop (stiltgrass)	Wildland
<i>Vitex rotundifolia</i> L. f.	roundleaf chastetree (beach vitex)	Wildland
<i>Alternanthera philoxeroides</i> (Mart.) Griseb.	alligatorweed	Aquatic
<i>Eichhornia crassipes</i> (Mart.) Solms	common water hyacinth	Aquatic
<i>Hydrilla verticillata</i> L.f. Royle	waterhyme (hydrilla)	Aquatic
<i>Ludwigia uruguayensis</i> (Camb.) Hara	Uruguayan primrose-willow	Aquatic
<i>Lythrum salicaria</i> L.	purple loosestrife	Aquatic
<i>Myriophyllum spicatum</i> L.	spike watermilfoil (Eurasian watermilfoil)	Aquatic
<i>Salvinia molesta</i> Mitchell	kariba-weed (giant salvinia)	Aquatic



Early Detection and Rapid Response (EDRR)

- Access to up-to-date reliable scientific and management information;
- Facilitate rapid and accurate species identification;
- Establish a standard procedure for rapid risk assessment;
- Provide new and enhanced mechanisms for coordinating the efforts of Federal, State, and local agencies, tribal governments, and private entities; and
- Provide adequate technical assistance.



Workshops



- Workshops will be presented in each state to train volunteers
- Volunteers will be trained in species identification, data entry, and Best Management Practices
- Volunteers will receive a training manual and other tools
- Incentives will be presented to volunteers for entering data into the database

Research

- Conduct systematic regional vegetation surveys to assess and monitor the distribution of key invasive plants of agroecosystems and surrounding landscapes,
- Quantify, based on existing geospatial databases, recent changes in land use/cover surrounding each survey point,
- Develop probabilistic models for predicting the occurrence of the target species, based on landscape-scale environmental data,

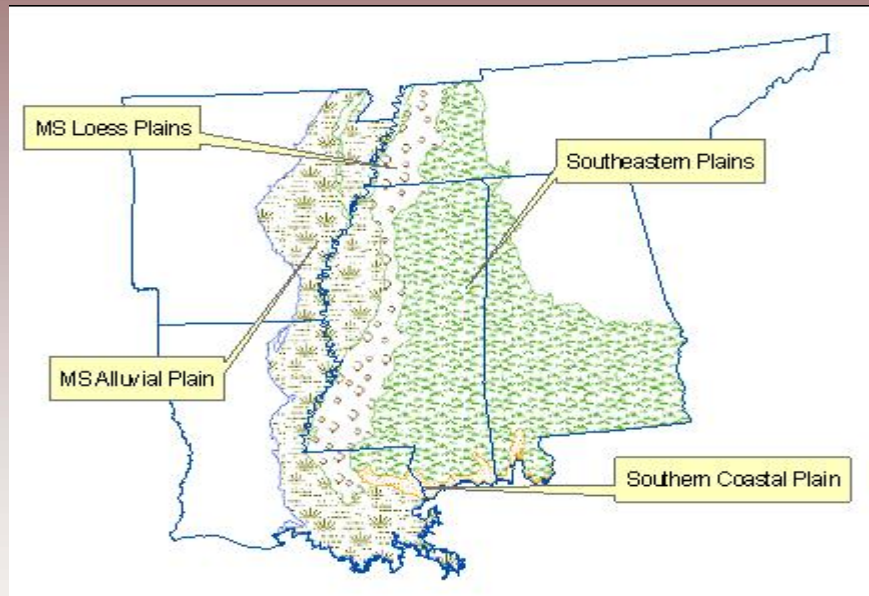


Research, cont.

- Use quantitative modeling to support refinement of search efforts for problematic invasive species, in the context of EDRR, as part of an integrated management approach, and
- Evaluate the relative effectiveness of data collected by our research team versus data acquired through volunteer surveys as the basis for predictive plant distribution models.



Stratified Data Collection

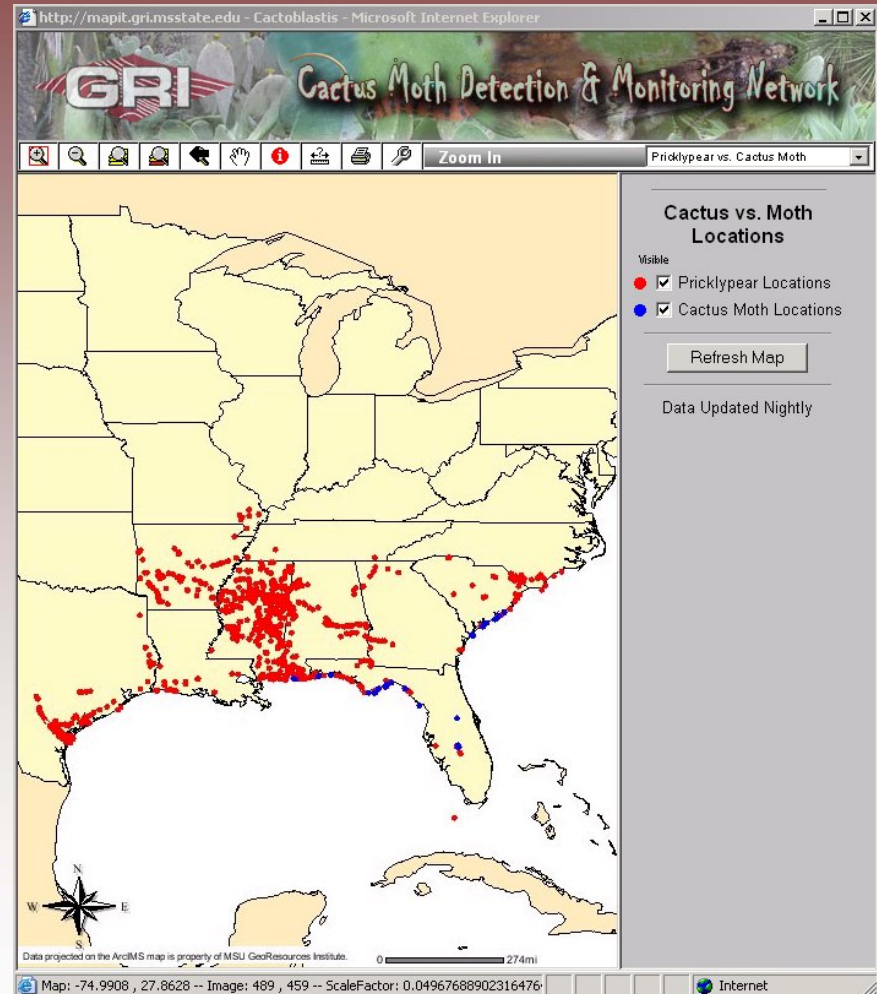


- Stratify sites by ecoregion and land use type
- Land use type initially derived from the SE GAP layer
- Points randomly selected in each land use type, but within public lands in possible

IPAMS Web Portal

- Web portal at <http://www.gri.msstate.edu/IPAMS>; to launch by May 2008
- ArcIMS server to provide map of points
- Data exchanges with NISS, NBII ISIN, NBII SAIN, USGS NAS and NAPIS as appropriate

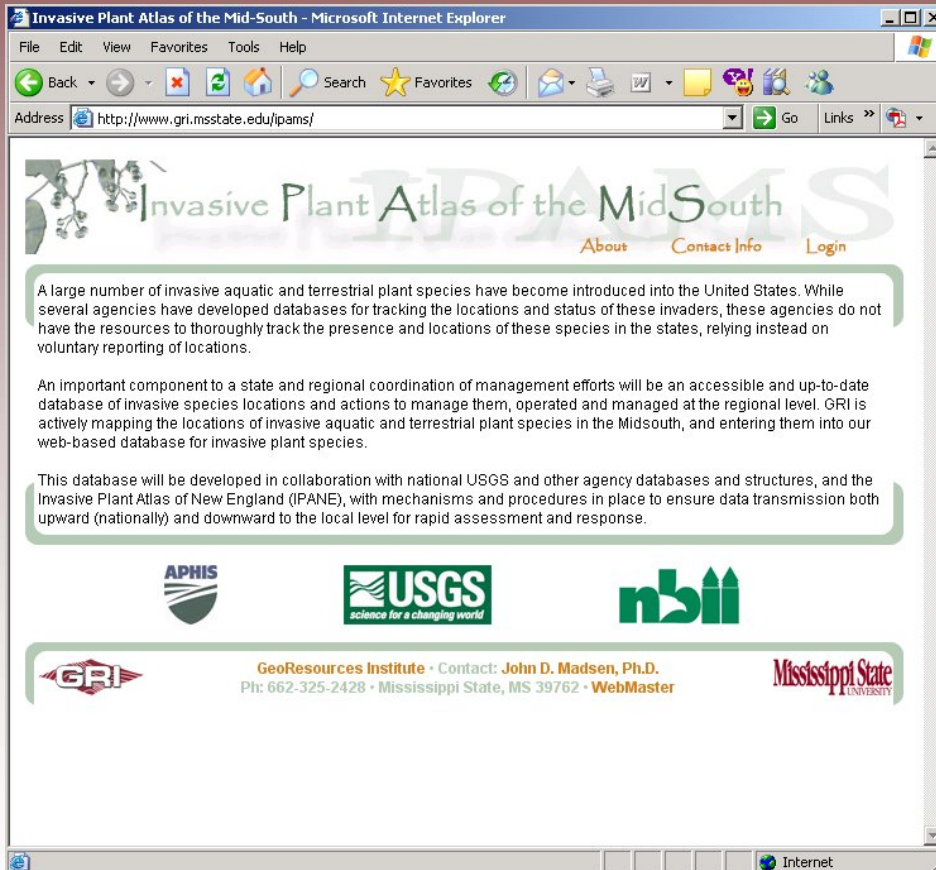
Example is of the Cactus Moth Detection and Monitoring Network at http://www.gri.msstate.edu/cactus_moth



GRI

GeoResources Institute

Web Portal



- Enter plant locations
- Provide information on the ecology and management of invasive weeds
- Mapping interface
- Registration for users and notification
- www.gri.msstate.edu/ipams

Our Team

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- Randy Westbrook, USGS, EDRR



Progress to Date



- IPAMS webpage
 - Twelve of 40 species information on page
 - Need to resolve ArcIMS issue
- Research
 - Research has already found interesting issues regarding distribution of cogongrass and other invasives
- Workshops
 - Need to complete manual and schedule workshops



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