



Outline

- Invasive Basics
- Previous Studies
- Confounding Issues
- Future Directions
- References
- Interrogation

Exotic, Invasive Species

- Florida -\$7 Million terrestrial invasive control
- Salt cedar costs \$450-2,800 in water loss and \$7,400 in removal and restoration costs per 2.5 acres.
- \$50 Billion annually “in reduced crop yields, livestock range loss, and lawn, garden, and golf course maintenance.” (NPS 2010)

Why do we care?

Stimulus

Mutation

Adaptation

Environmental Changes

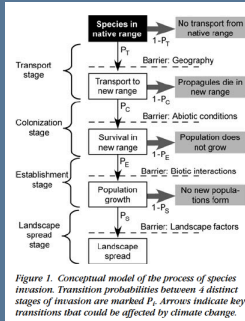
- Exotic, invasive species tend to exclude more valuable native species (Hoffman 2004)
- Alter natural dynamics of systems where present

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graph LR; WV[WOODY VEGETATION] -- Land clearing --> FIRE; FIRE -- Selection for grass --> GS[GRASSLAND/ SAVANNA]; INT[Introduction of nonindigenous grasses] --> SG[Selection for grass]; FIRE --> INT; FIRE --> MF[Microclimate feedback]; GS --> MF; GS --> FR[Flammability/rapid regrowth feedback]; FR --> FIRE;
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Environmental Changes

- Exotic, invasive species tend to exclude more valuable native species (Hoffman 2004).
- Alter natural dynamics of systems where present
- Effect habitat suitability for wildlife species (Schlossberg 2010).

Roadblocks to Success



Location, Location, Location

- Disturbed areas (Hobbs 1992, Vitousek 1996)
- Increased light (Vitousek 1990)
- Proximity to roads (Watkins 2003, Aikio 2012)



Location, Location, Location

- Disturbed areas (Hobbs 1992, Vitousek 1996)
- Increased light (Vitousek 1990)
- Proximity to roads (Watkins 2003, Aikio 2012)
- Deciduous forests, pastures, grasslands (Ibañez 2009)

Complicating Factors

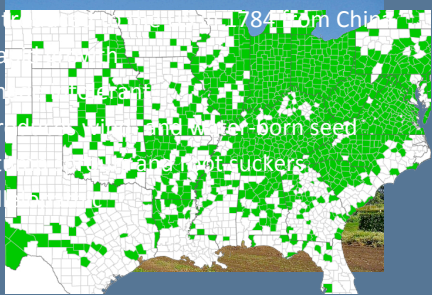
If we know areas prone to invasion why are we not better at finding and controlling exotic, invasive species?

Complicating Factors

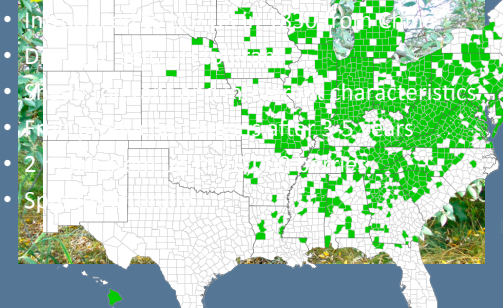
Numerous invasive plant species to worry about

Tree-of-heaven (*Ailanthus altissima*)

- Introduced 1784 from China
- Rapid growth
- Shrub-like tree
- Produces wind-borne seed
- Still considered a weed
- All

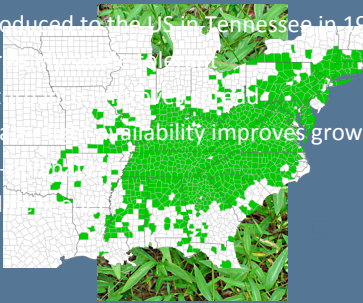


Autumn olive (*Elaeagnus umbellata*)



Japanese Stilt Grass (*Microstegium vimineum*)

- Introduced to the US in Tennessee in 1919
- Extr
- Dist
- Great availability improves growth
- Self
- Pro



So?

- Lespedeza bicolor*
- Sorghum halepense*
- Pueraria montana*
- Veronica arvensis*
- Paulownia tomentosa*
- Bromus racemosus*
- Lespedeza cuneata*
- Melilotus officinalis*
- Rosa multiflora*
- Persicaria longiseta*
- Lespedeza cuneata*
- Festuca arundinacea*
- Stellaria pallida*
- Lonicera japonica*
- Lonicera maackii*
- Galium aparine*
- Leucanthemum vulgare*
- Albizia julibrissin*
- Trifolium campestre*

So?

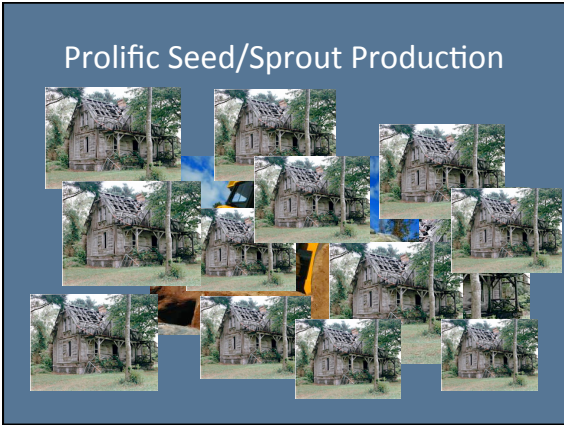
- ~411 exotic plant species in Tennessee
- 14 listed as noxious weeds
- ~2480 exotic plant species nationwide

Complicating Factors

- Disturbance benefits establishment but conditions relating to success vary (Spence 2011)
- Little investigation into species specific success factors

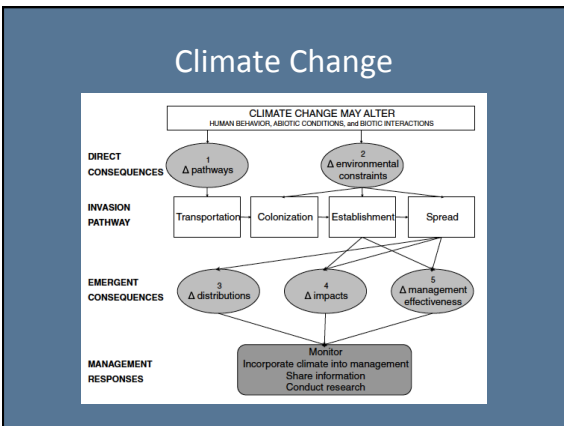
Control

- Biotic controls
- Species respond differently
- Most invasive plant species cannot be controlled or removed completely (Norton 2009)
- Cost
- Differences between private and public land



Climate Change

- Climate change is predicted to have drastic effects on species ranges, interactions and ecosystem processes
- Could exacerbate the problem increasing range of exotic, invasive plants
- Also, might allow more exotic plants to become invasive (Hellmann 2008)



Future Directions

- Promote education and public awareness (Moser 2009)

Future Directions

- Promote maintenance or implementation of natural disturbance regimes (Hobbs 1992)
- Constant control of exotic, invasive plants
- Balance exotic, invasive plant presence with native plant presence in restoration

Picture Sources

- 1) Hellmann, J.J. from Five potential consequences of climate change for invasive species: pg. 536
- 2) <http://simpsons.wikia.com/wiki/Blinky>
- 3) Mack, R.N. from Biotic Invasions: Causes, Epidemiology, Global Consequences, and Control: pg. 699
- 4) http://commons.wikimedia.org/wiki/File:Ailanthus_altissima_001.JPG
- 5) <http://www.edmaps.org/distribution/uscounty.cfm?sub=3003>
- 6) people.duke.edu/~cwc00k/trees/lisi.html
- 7) <http://www.edmaps.org/distribution/uscounty.cfm?sub=3035>
- 8) <http://forageporage.files.wordpress.com>
- 9) <http://www.edmaps.org/distribution/usstate.cfm?sub=3051>
- 10) www.currituckbeachlight.com
- 11) www.constructionequipment.com
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Questions?