A new era for the Hardwood Tree Improvement and Regeneration Center (HTIRC)

Carrie Pike, Northeast Area
Regeneration Specialist
USDA Forest Service State and Private Forestry
Based at Purdue University

Established 1998

1. A unit of the USDA Forest Service Northern Research Station

2. A collaboration of scientists at Purdue University and at other NRS units whose research focuses on central hardwood trees and/or ecosystems

Mission

The HTIRC mission is to advance the science and application of tree improvement, management, and protection to improve hardwood forests, with emphasis in the Central Hardwood Region.

What is the central hardwood region?

Fralish, 2003.
IN: Van Sambeek, J.W.; Dawson, J.O.; Ponder, F., Jr.; Loewenstein, E.F.; Fralish, J.S., eds. 2003. Proceedings, 13th Central Hardwood Forest conference; 2002 April 1-3; Urbana, IL. Gen. Tech. Rep. NC-234. St. Paul, MN: U.S.Department of Agriculture, Forest Service, North Central Research Station. 565 p.

New Leadership

- Dr Mark Coggeshall, Project Leader for NRS-14 Hardwood Tree Improvement and Regeneration Center.
- Dr Bob Wagner, Department head of Forestry and Natural Resources Department at Purdue (formerly from University of Maine)
- Dr Matt Ginzel, Professor of Forest Entomology, and Co-director

Scientists & Staff

USDA Forest Service Scientists

Keith Woeste - Molecular geneticist
Paula Pijut – Plant physiologist
Shaneka Lawson - Plant physiologist
Aziz Ebrahimi – Molecular geneticist
Carrie Pike – Tree Improvement (S&P)
Jenny Juzwik – Plant pathologist

Supporting scientists

Jim McKenna – Tree breeder
Jim Warren – Biological scientist

Purdue University Faculty

Songlin Fei - Measurements & GIS
Doug Jacobs – Ecophysiology
Mike Jenkins – Forest ecology
Rick Meilan - Genetics
Mike Saunders - Silviculture

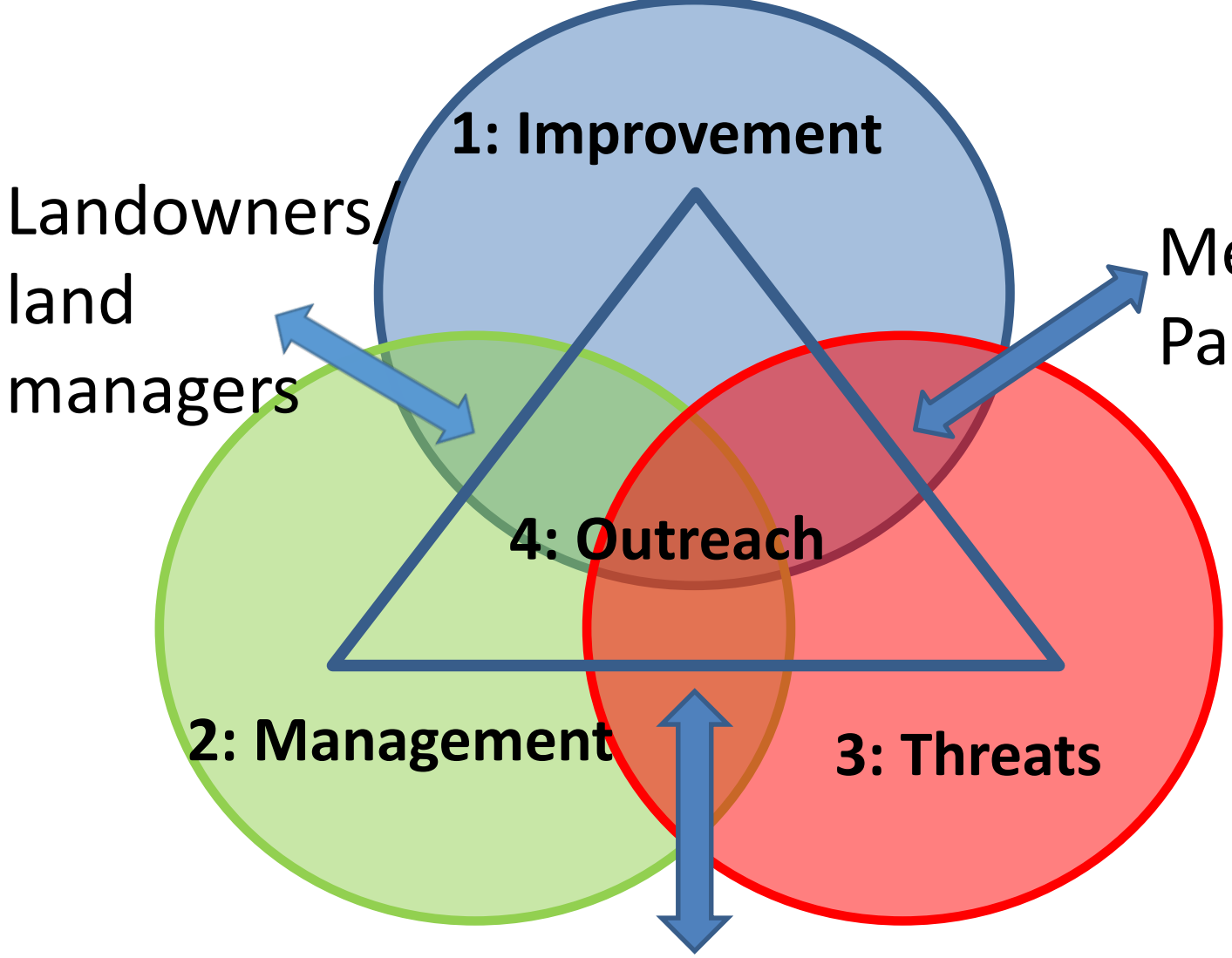
Staff

Lenny Farlee – Extension specialist
Liz Jackson – Engagement specialist
Lydia Utley – Database developer
Janis Gosewehr – Admin Ass't
Nathan Hilliard – Laboratory Manager

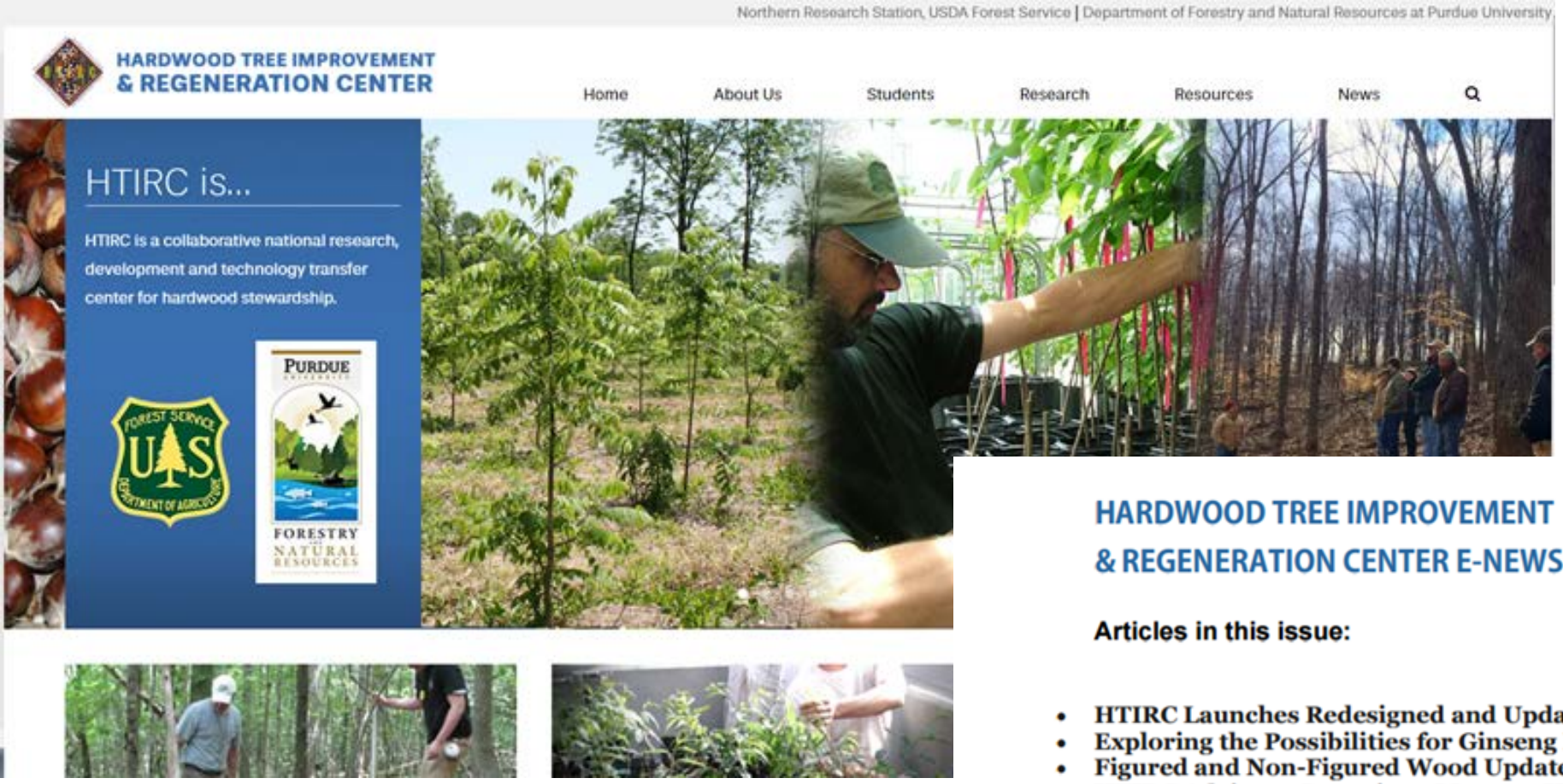
Post docs (2), and Graduate Students (9 MS and 7 PhD) through Van Eck $

Primary Stakeholders

- Indiana Department of Natural Resources
- Walnut Council
- IN Hardwood Lumberman's Association
- American Chestnut Foundation
- IN Forestry & Woodland Owners Association
- National Hardwood Lumberman's Association
- Arbor America, Inc.
- Steelcase, Inc.
- American Forest Management, Inc.
- Nelson Irrigation



HTIRC program model from new strategic plan



www.htirc.org

HARDWOOD TREE IMPROVEMENT & REGENERATION CENTER E-NEWSLETTER - December 2016

Volume 9 Issue 2

Articles in this issue:

Our species

Basic tree improvement

- Black walnut
- Northern red oak (new push)

Secondary species

- Black cherry
- White oak

Restoration

- Butternut, *Juglans cinerea*

Supporting research on:

- Chestnut
- Beech
- Elm

HARDwood tree improvement

- Silviculture is usually uneven-aged
- Natural regeneration is often favored over tree planting
- Fire, once an important component to forests, is absent
  - Regeneration of native oaks, hickories is hindered by lack of fire.
  - HEE: Hardwood Ecosystem Experiment is studying effects of fire on forests in southern Indiana

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Markets for hardwoods are HIGH VALUE: veneer, cabinets/dimensional lumber

Goal is to produce:

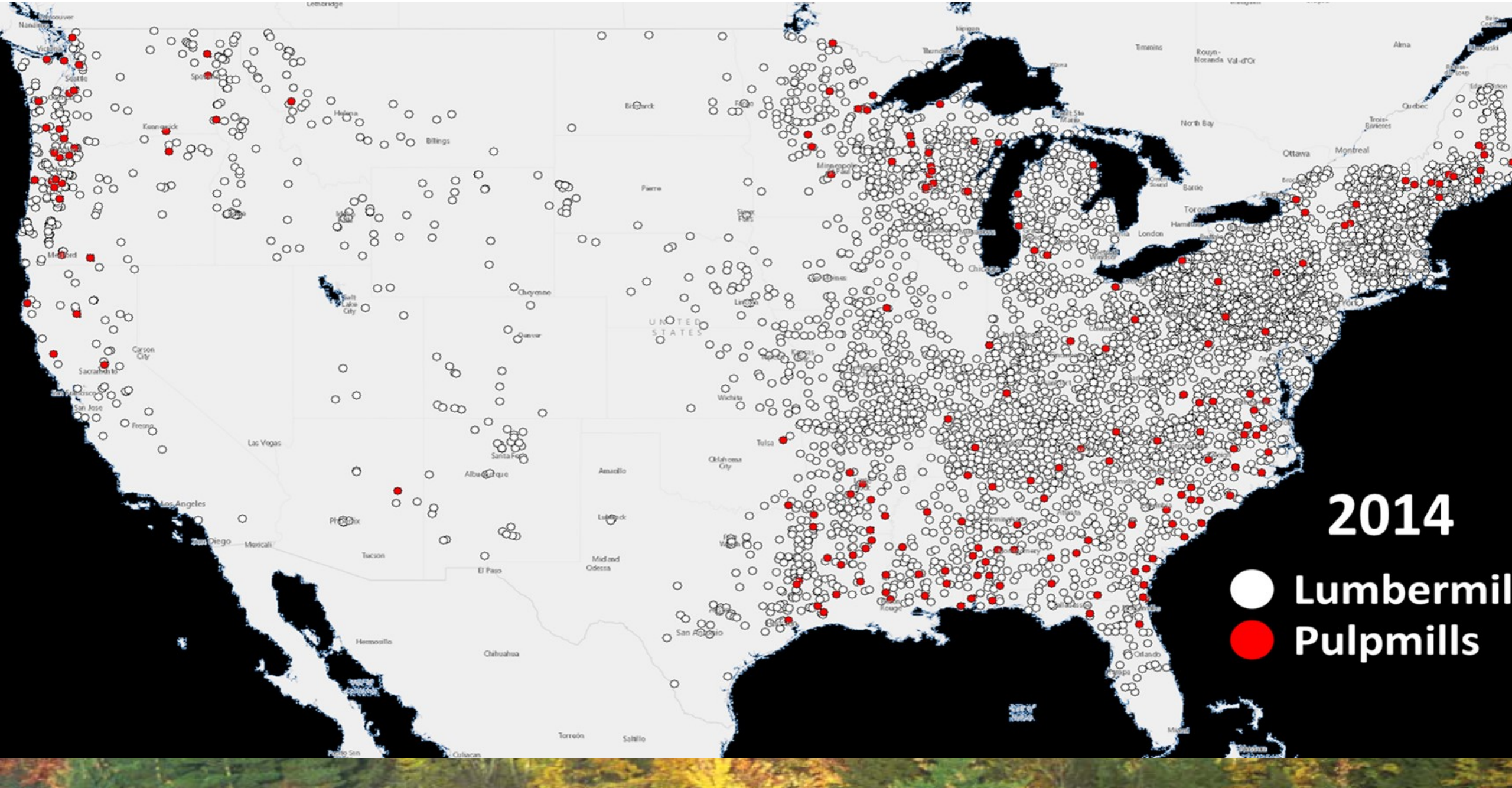
BIG

FAT

CLEAN

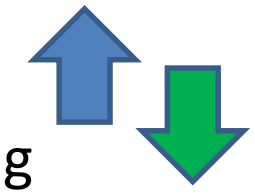
STRAIGHT

BOLES


2014
Lumbermil
Pulpmills

But first, you must overcome:

- Weeds
- Deer
- Variation in prices of annual commodities
  - Corn prices
  - Tree planting



- Matching species to soil
  - Looks like a good site
  - Smells like a good site
  - Turns out to be a lousy site.
    - Hardpans, flooding, etc.
- Insects and disease

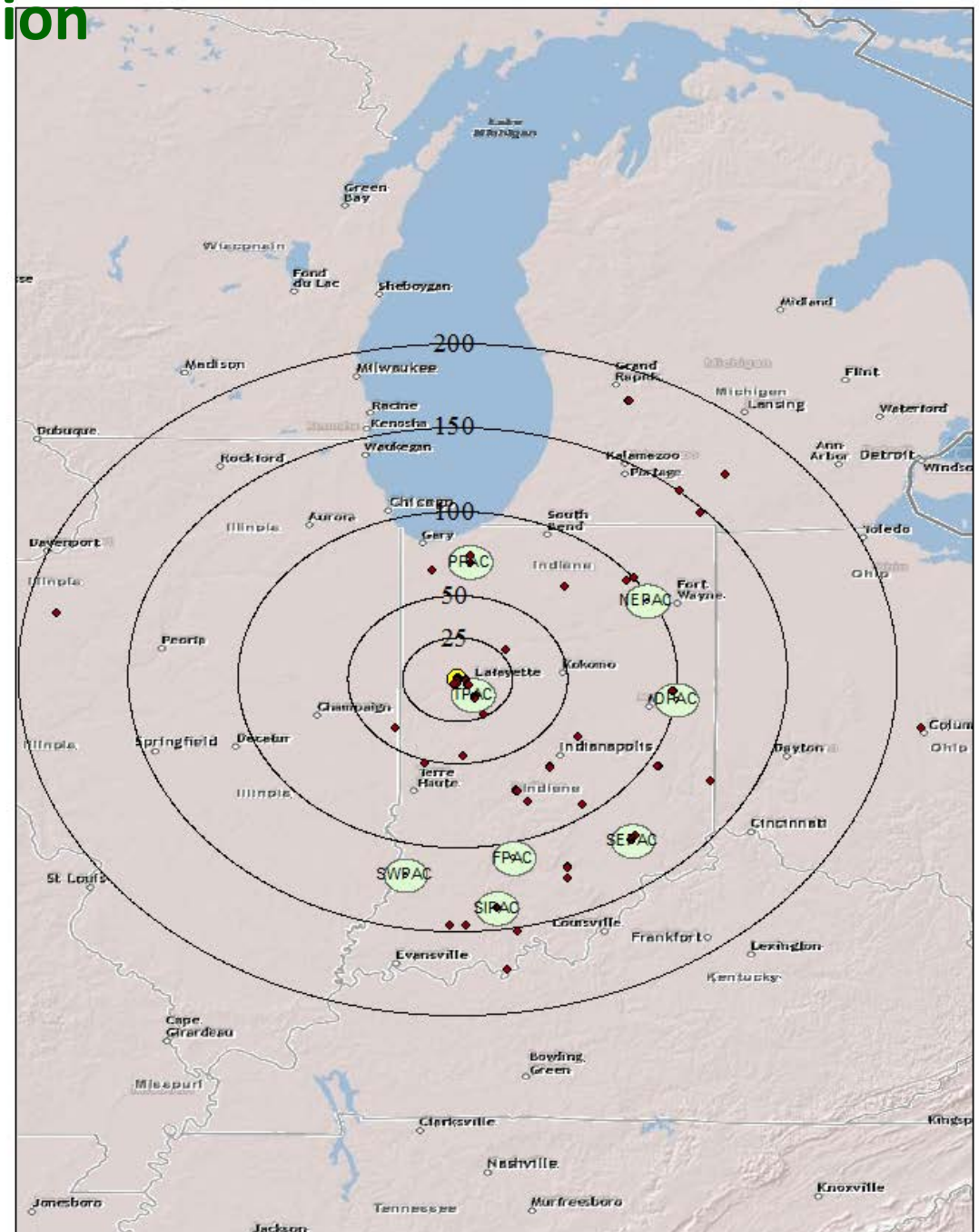
The good news about hardwood tree improvement

- Stem quality is heritable
  - Red oak: 0.70 h^2f, 0.35 h^2i
  - Black walnut: 17% improvement
- Progeny tests are approaching or past 10 years of age
  - We can start estimating breeding values for growth traits
- Costs for genomics have decreased.
  - We have well-equipped laboratories at Purdue
  - We have the phenotypic information: need to identify genes associated with traits of interest.

Hardwood Tree Improvement and Regeneration Center (HTIRC): # field trials in place

Species	Locations	Years
Black Cherry	16	2003-2010
Black Walnut	29	2002-2010
Butternut	11	2004-2011
Chestnut	4	2010-2011
Red Oak	11	2002-2009

HTIRC Planting Sites



Hardwood Tree Improvement and Regeneration Center (HTIRC): Accomplishments

- 2200 accessions
- 117,939 trees planted in common gardens
- 147/195 plantings in database (75%)

PLANS FOR THREE MAIN SPECIES

Black walnut

- Measure and analyze progeny tests to make selections (forward and backwards)
  - Account for spatial variation
  - Focus on stem form, volume
- Expand mapping populations
- QTL analysis of the mapping populations

Northern red oak

- Goal: establish second-generation orchards
  - Use SSR markers to identify unrelated full-sibs
  - vegetatively propagate selections
- Measure, analyze progeny tests to make selections

Butternut

- Develop mapping population (full sibs) between parents with high and low resistance to canker
- Identify genes associated with resistance
- Select and propagate trees with improved resistance.

We are seeking collaborators and partners!
Questions?