

Developing a Coordinated Plan for Ash (*Fraxinus*) Seed Collection in North America

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Conserving the Biodiversity of Economically-important Plants

- In nature and traditional agricultural production systems
- In gardens (private collections, nurseries, botanical gardens and arboreta)
- In genebanks

Presenter comments can be viewed by hovering mouse over bubble, when present.



The US National Plant Germplasm System (NPGS)

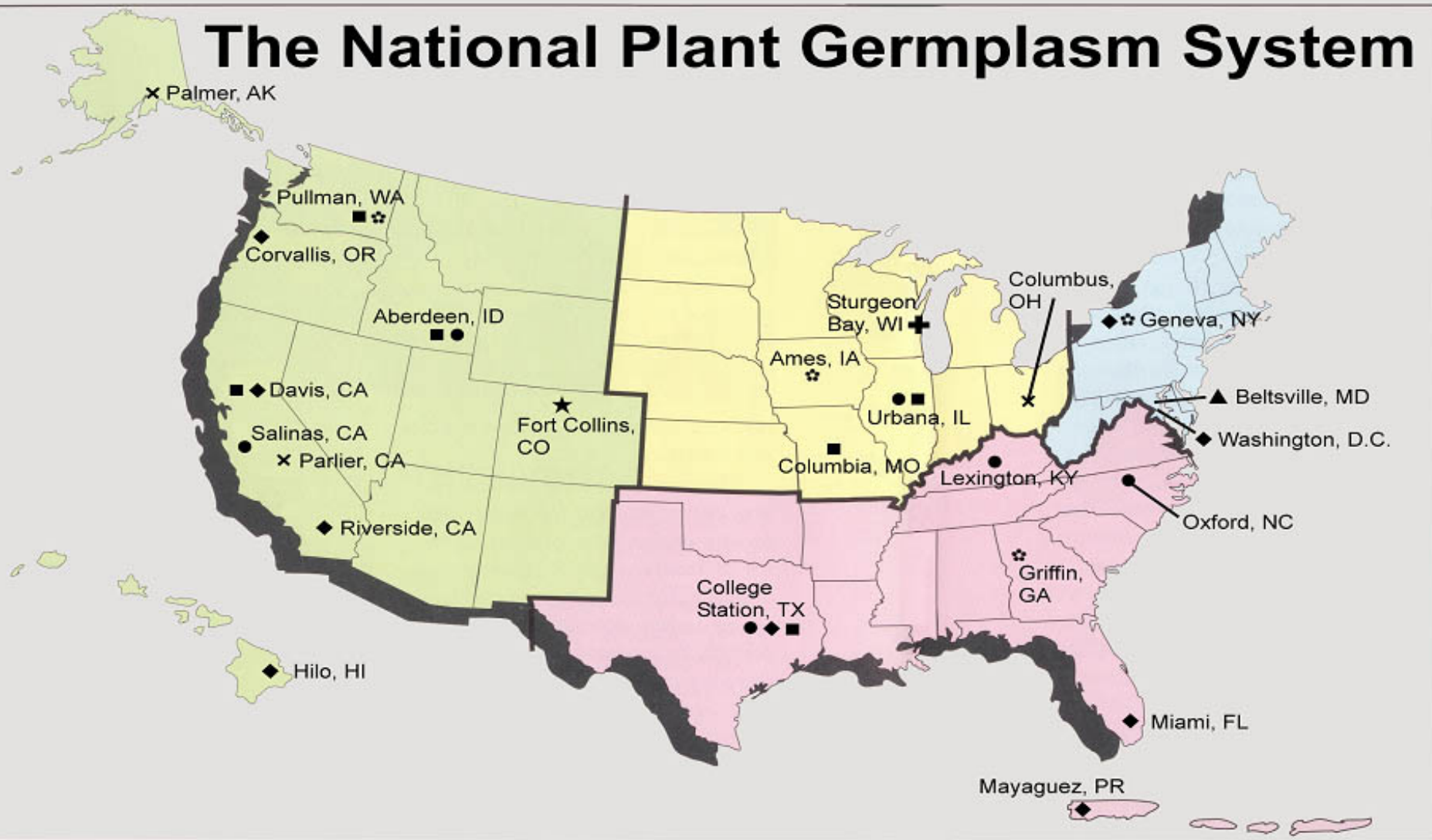
- A network of genebanks coordinated by USDA-ARS
- Including...
 - Regional Plant Introduction Stations
 - Clonal Repositories and Crop-specific Collections
 - National Center for Genetic Resources Preservation
 - Germplasm Resources Information Network (GRIN)



NPGS Goals

- Long-term conservation of plant germplasm
- Collection and conservation of associated information (passport and evaluation)
- Making that germplasm and information widely available to support research, education, and agricultural production

The National Plant Germplasm System



- ✱ Regional Plant Introduction Station
- Crop-specific seed collection
- Crop-specific genetic stocks collection
- ◆ National Clonal Germplasm Repository

- ★ National Seed Storage Laboratory, Fort Collins, Colorado
- ✚ National Potato Introduction Station, Sturgeon Bay, Wisconsin
- ▲ National Germplasm Resources Laboratory, Beltsville, Maryland
- ✕ National Plant Germplasm Quarantine Center, Beltsville, Maryland
- ✕ Developing Site



Active Sites and Base Collection



Conserving Germplasm

- As seeds





Conserving Germplasm

- As plants



Conserving Germplasm

- Cryogenic storage



Key NPGS Units for *Fraxinus*

- North Central Regional Plant Introduction Station, Ames, IA (*Fraxinus* active site)
- Woody Landscape Plant Germplasm Repository at the US National Arboretum, Beltsville, MD
- Plant Exchange Office, Beltsville, MD
- National Center for Genetic Resources Preservation, Fort Collins, CO

The Key NPGS Contacts for *Fraxinus*

- NCRPIS, Ames, IA
 - Mark Widrlechner and Jeff Carstens
- WLPGR, Beltsville, MD
 - Kevin Conrad and Martin Scanlon
- PEO, Beltsville, MD
 - Ned Garvey and Karen Williams
- NCGRP, Fort Collins, CO
 - Dave Ellis and Gayle Volk



First NPGS Steps to Respond to the Threat of EAB

- Incorporate *Fraxinus* into the NCRPIS's 2008-2013 Project Plan (acquiring Asian and North American populations)
- NCGRP entered into agreements to store *Fraxinus* for USFS, NRCS, and tribal agencies
- 2007 New England collections (trial run)
- 2008 IL and MO collections
- Development of collection protocol document
- Collaborate with others working on conservation



Recent Field Collections



Collaborations

- Key to success
- A massive task at hand involving...
 - Unclear taxonomy
 - Wide geographic ranges
 - Time constraints (urgency)
 - Poorly characterized genetic structure and breeding systems
- Many potential partners with various missions, priorities and resources

What do we know? and Where are the gaps?

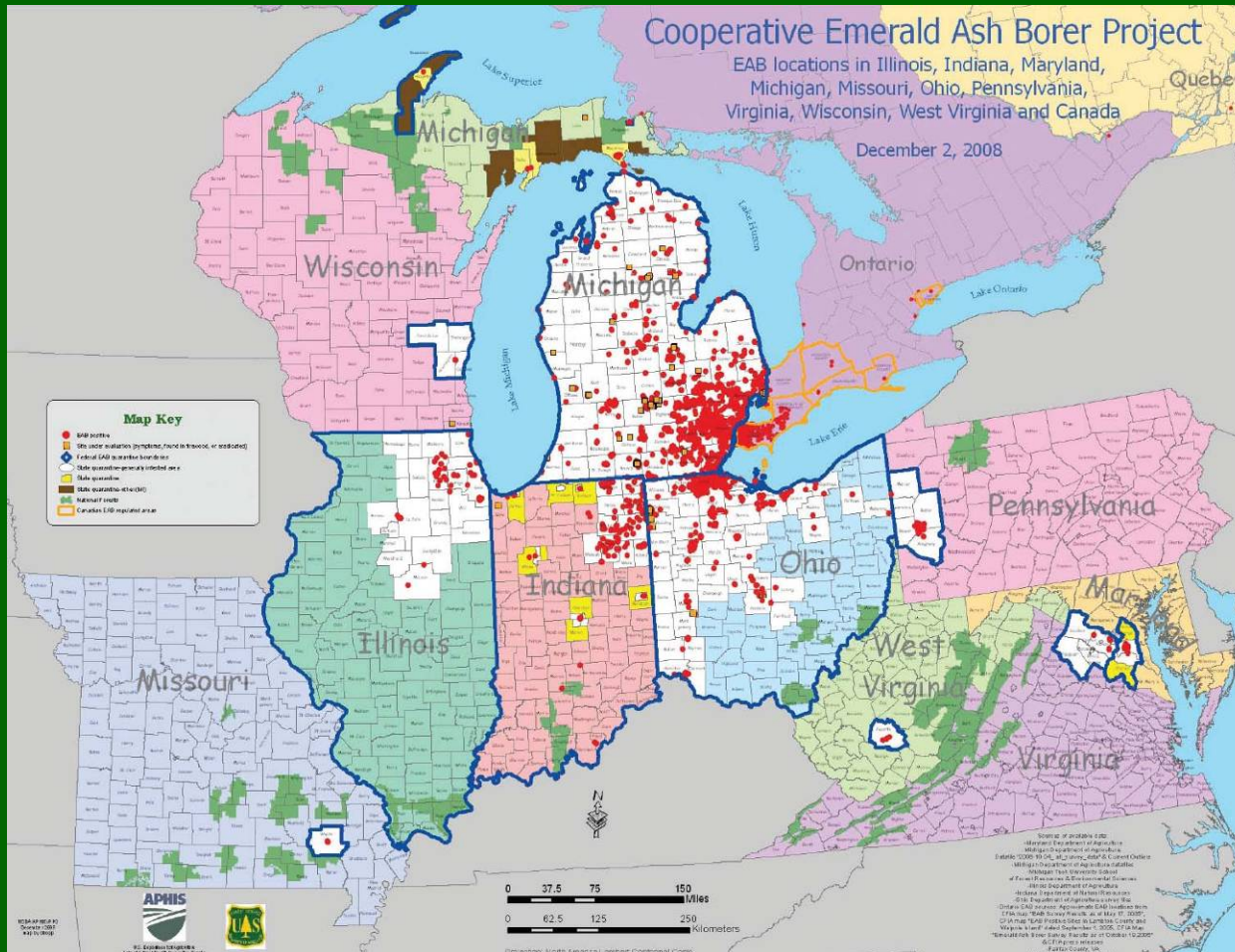
- Taxonomy and keys (FNA, Miller, 1955)
- Geographic ranges and environmental diversity (Little, Omernik)
- Genetic diversity and structure
- Conservation methods
- Available resources



NCRPIS Progress

- Focusing on five species in Eastern North America
- Consulting with Morton Arboretum and Beijing BG on Asian collections
- So far, have acquired 150+ accessions from North America, 16 from Asia, and 30 from Europe
- Collaboration on development of cryogenic storage protocol

Staying Ahead of EAB

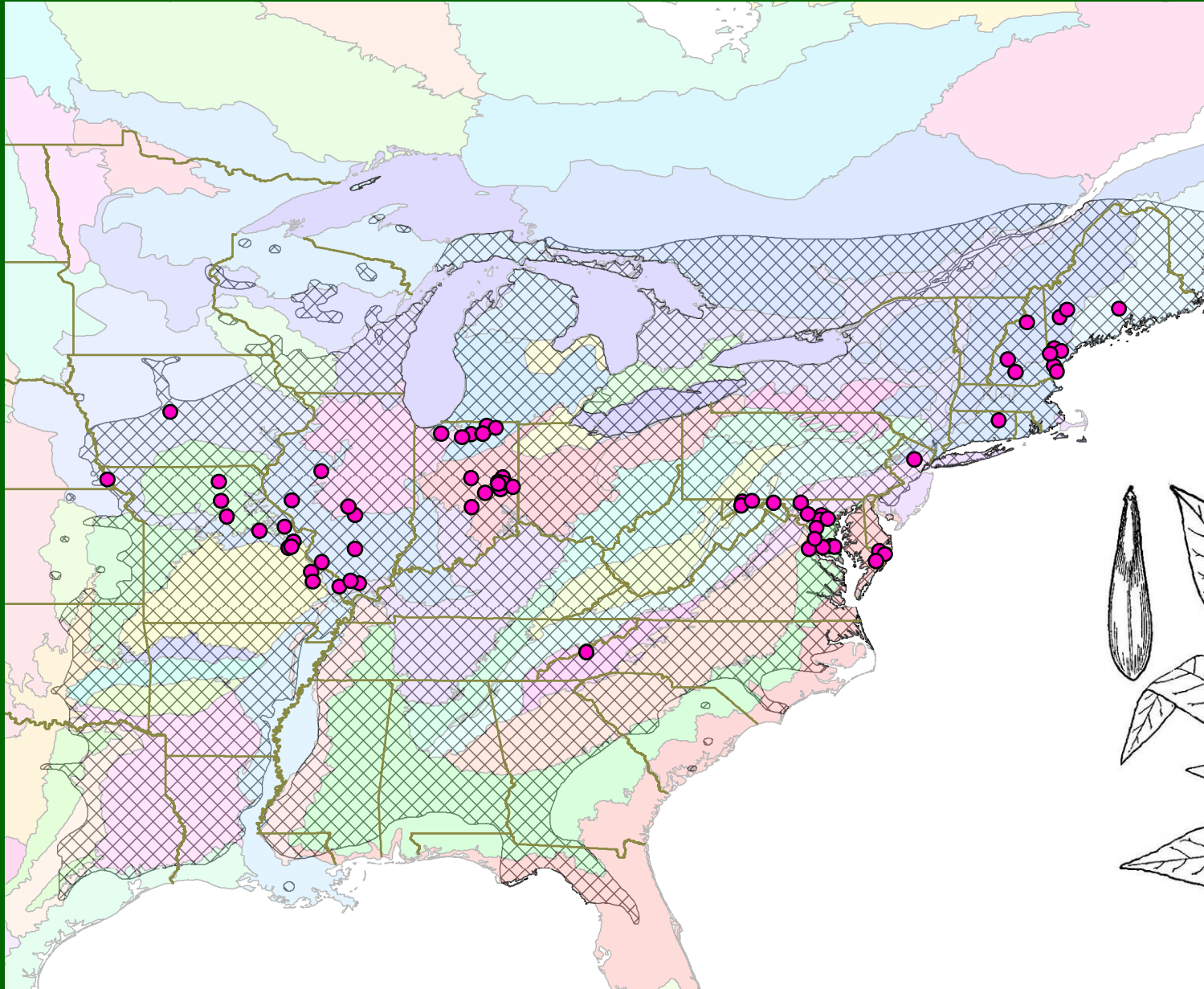


<http://www.emeraldashborer.info>

Environmental Diversity (Omernik Level III Map)

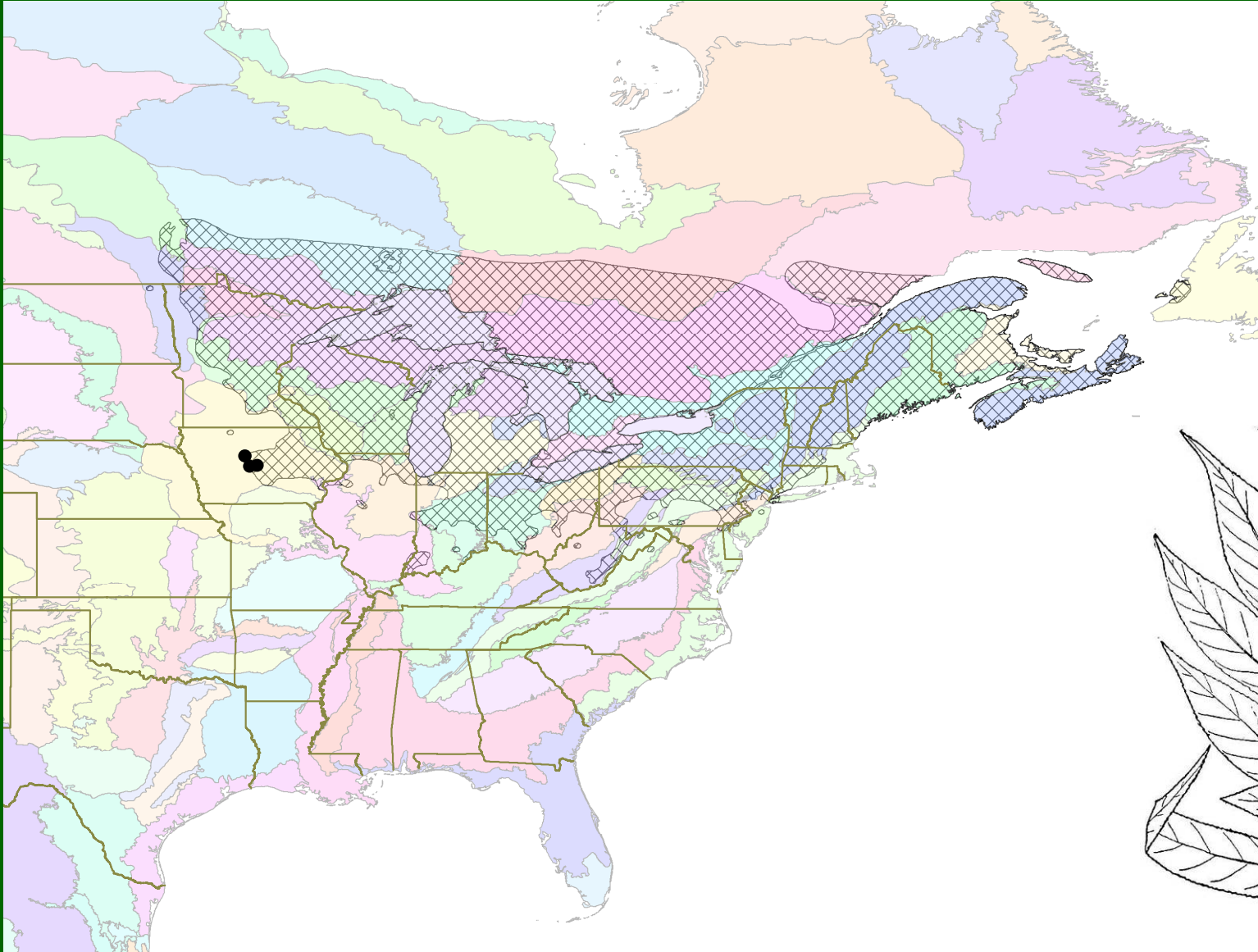


Fraxinus americana

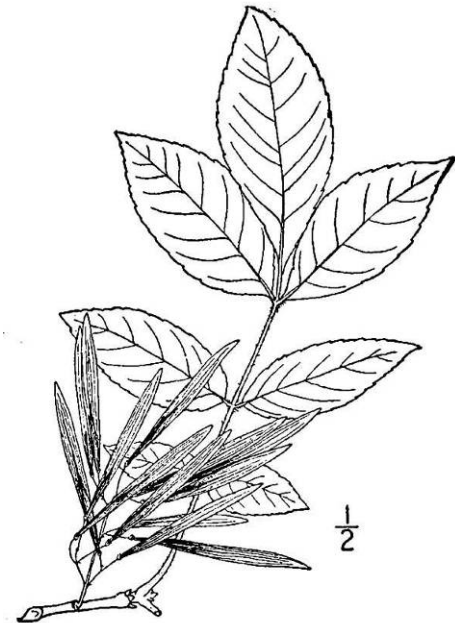
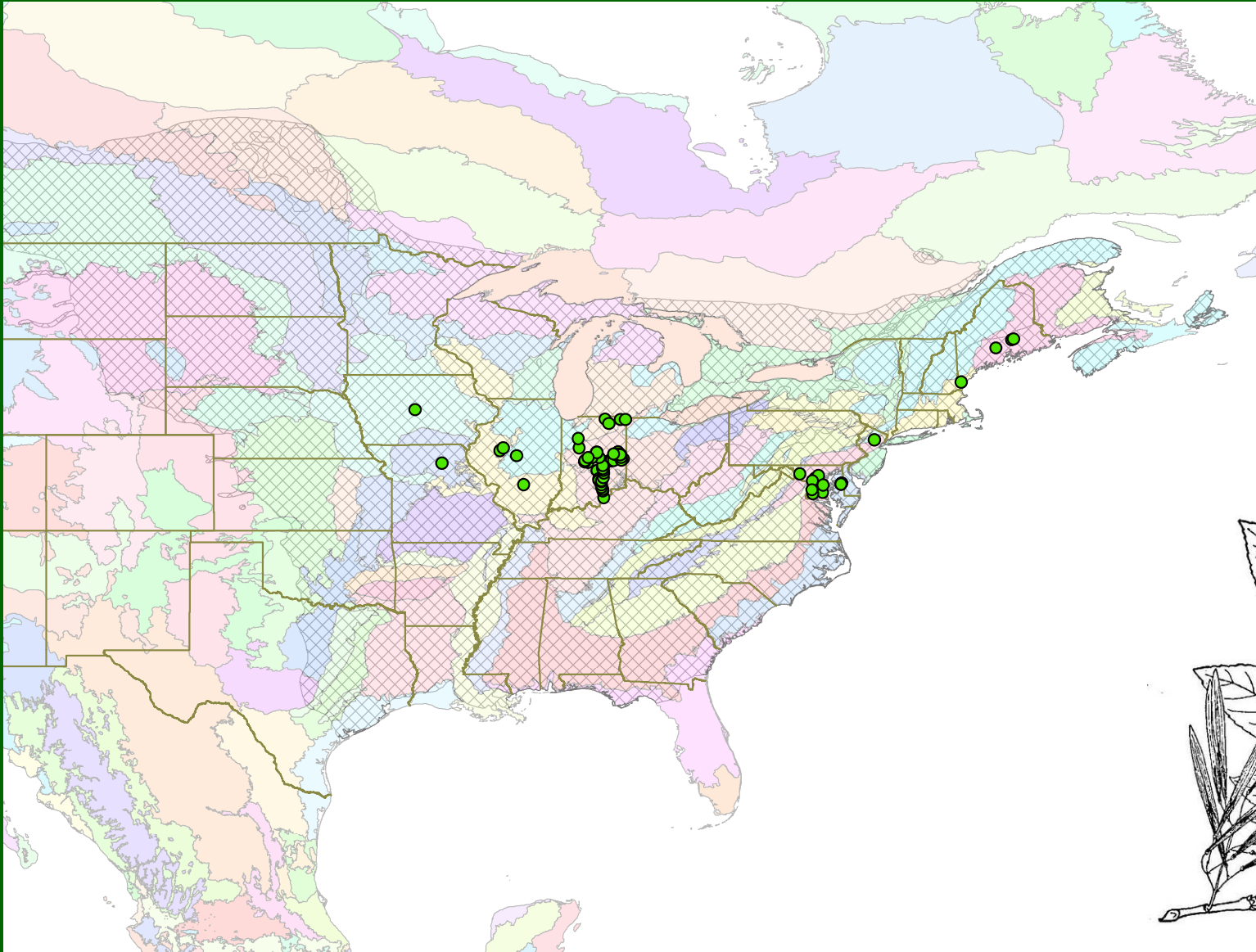




Fraxinus nigra

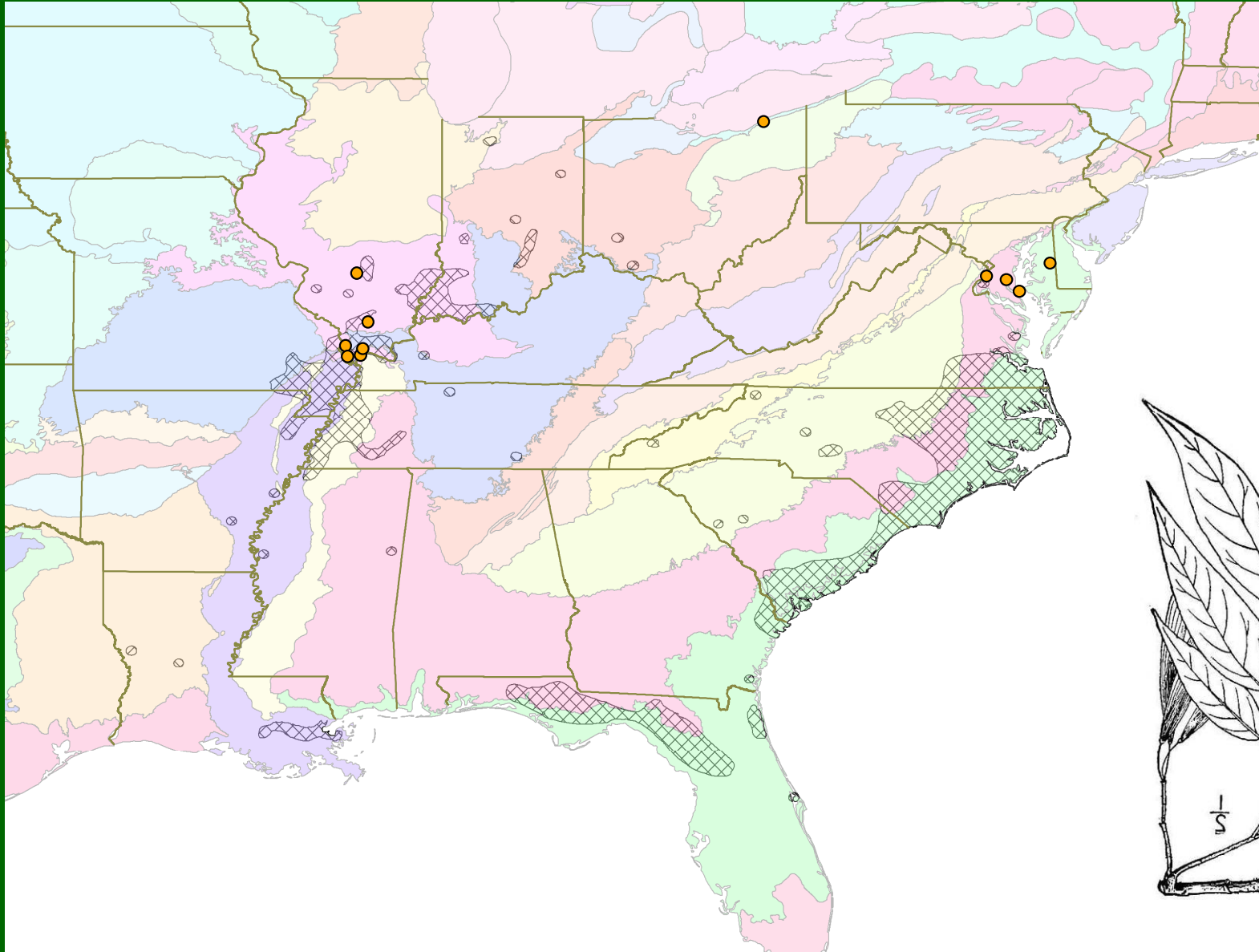


Fraxinus pennsylvanica

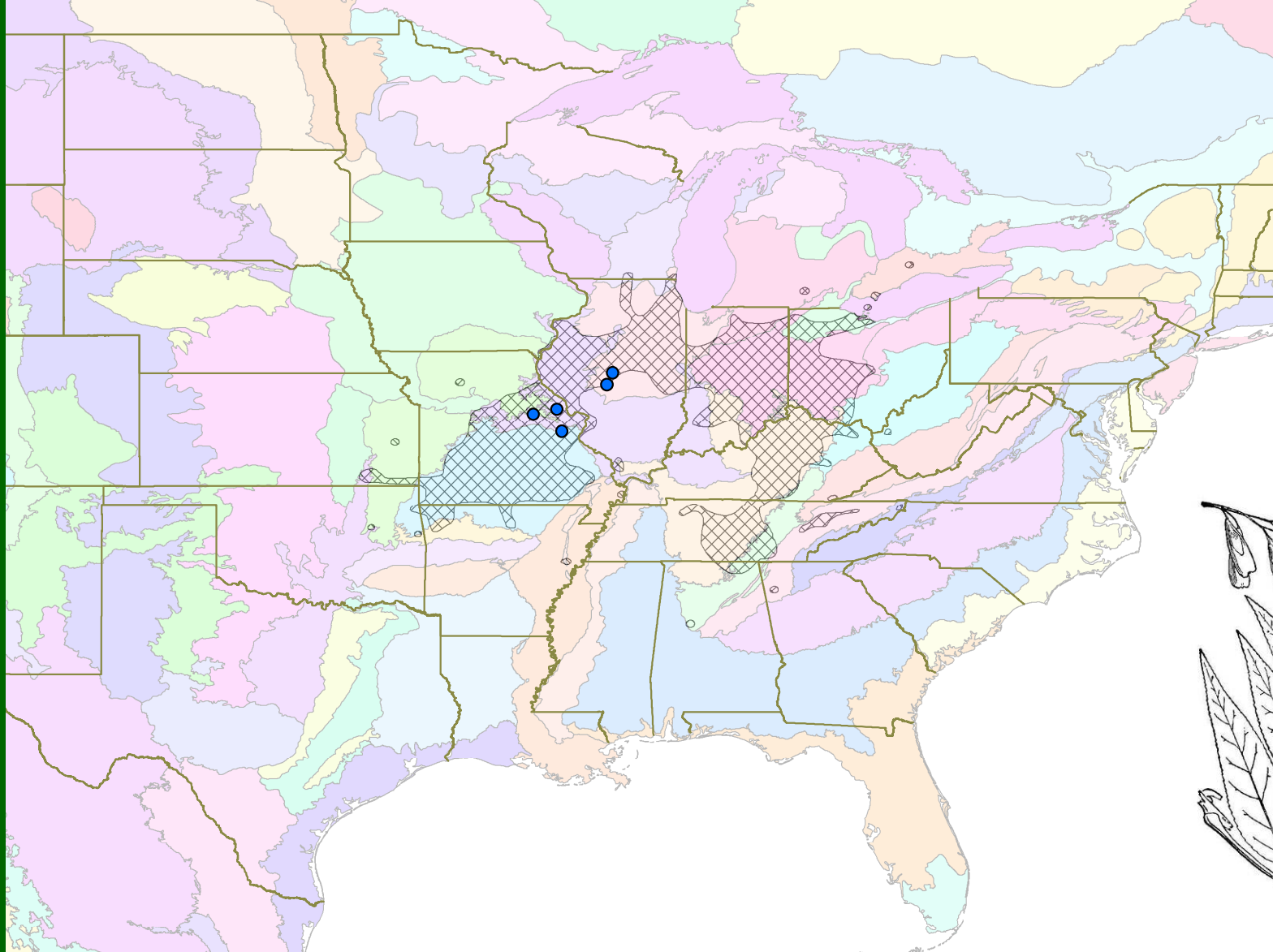




Fraxinus profunda



Fraxinus quadrangulata





How to Build These Collections Most Efficiently

- Staying ahead of EAB
- Recognizing year-to-year variation in seed production and altering collection plans to take advantage of it
- Meeting partners' needs while advancing the breadth and quality of the NPGS collection



How to Build These Collections Most Efficiently (cont.)

- Ensuring seed quality
- Ensuring proper taxonomic IDs
 - Species-specific DNA marker development
- Obtaining good passport data
- Optimizing sampling strategies
 - Number of mother trees to sample per site
 - Distance between sites
 - Maximize diversity sampled



How to Build These Collections Most Efficiently (cont.)

- Setting a strategy and priorities
 - Collection plans
 - Filling information gaps
- Developing and supporting an on-the-ground network
- Keeping good lines of communication open

Sources for Maps and Images

- EAB status <http://www.emeraldashborer.info>
- Omernik Level III Map <http://www.epa.gov/wed/pages/ecoregions.htm>
- Range Maps <http://esp.cr.usgs.gov/info/veg-clim/>
U.S. Geological Survey, 1999, Digital representation of "Atlas of United States Trees" by Elbert L. Little, Jr.
- Plant Images <http://plants.usda.gov>
USDA-NRCS PLANTS Database / Britton, N.L., and A. Brown. 1913. *An illustrated flora of the northern United States, Canada and the British Possessions*.