



Testing the influence of land-use history and forest stand age on distributions of parasitic plants

Marion Andrews Holmes

Department of Biology

University of Pittsburgh

Forest history

Most eastern forest is second-growth

Modern forests carry land-use legacies



1620



1900



present

Williams 1989, Foster et al. 2003, Flinn and Marks 2004

Land-use history and forest plants

Homogenization

Loss of structural diversity

Species loss



Vellend et al. 2007, Holmes and Matlack 2018

Land-use history and forest plants

Colonization

Environmental filtering

Species relationships?



What about the parasites?

Land use disrupts host relationships

Model system to test partner-limitation

Do distributions reflect land-use history?

Bergman et al. 2006, Chaer et al. 2009, Tsai and Manos 2010



Hypotheses

1. Parasitic plant presence and abundance will reflect land-use legacies
2. Host abundance
3. Environmental filtering



Study species

Conopholis americana (Orobanchaceae)

Perennial, parasitic on *Quercus*



Epifagus virginiana (Orobanchaceae)

Annual, parasitic on *Fagus grandifolia*

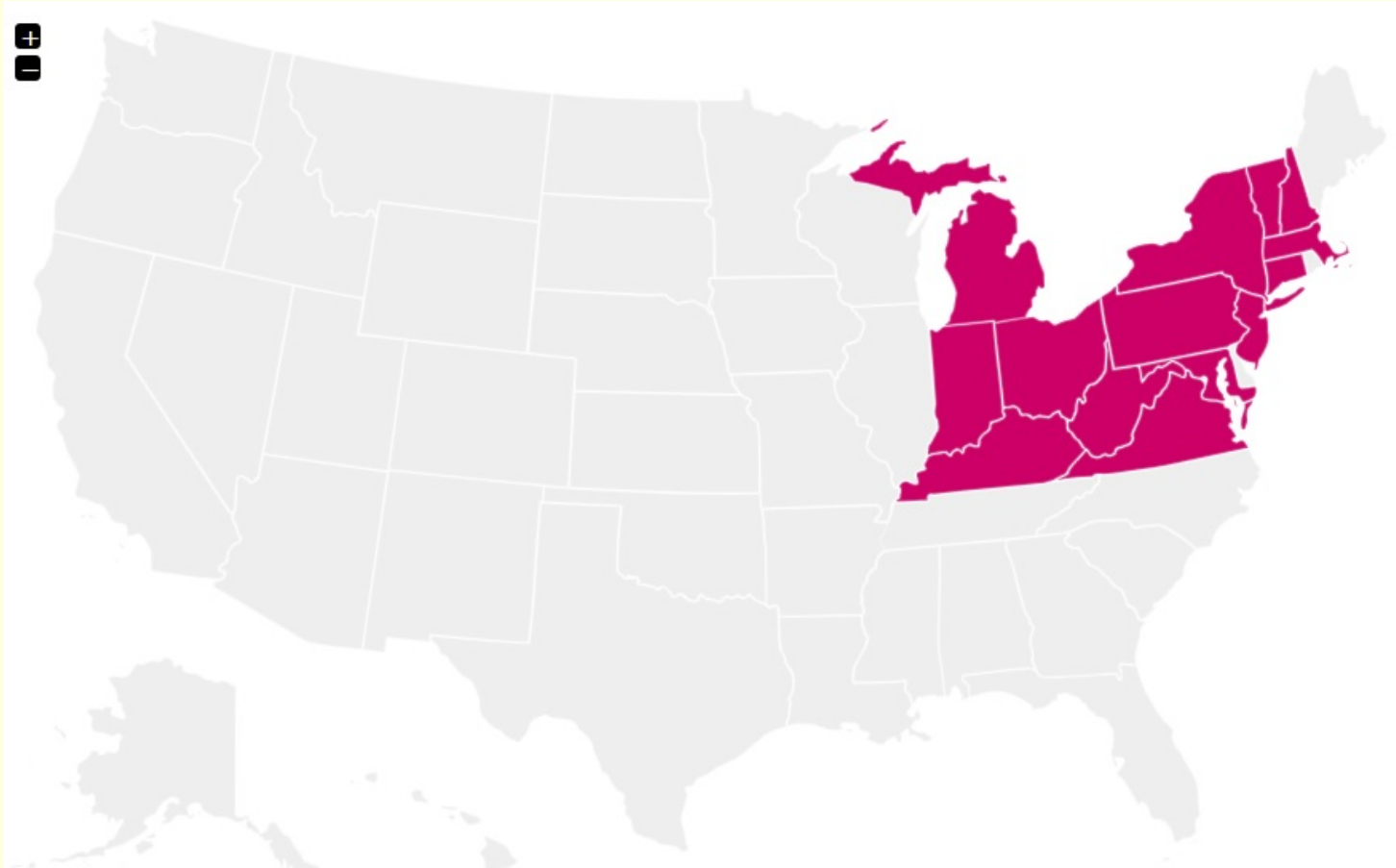


Monotropa uniflora (Ericaceae)

Perennial, mycoheterotroph



Study area



Data collection

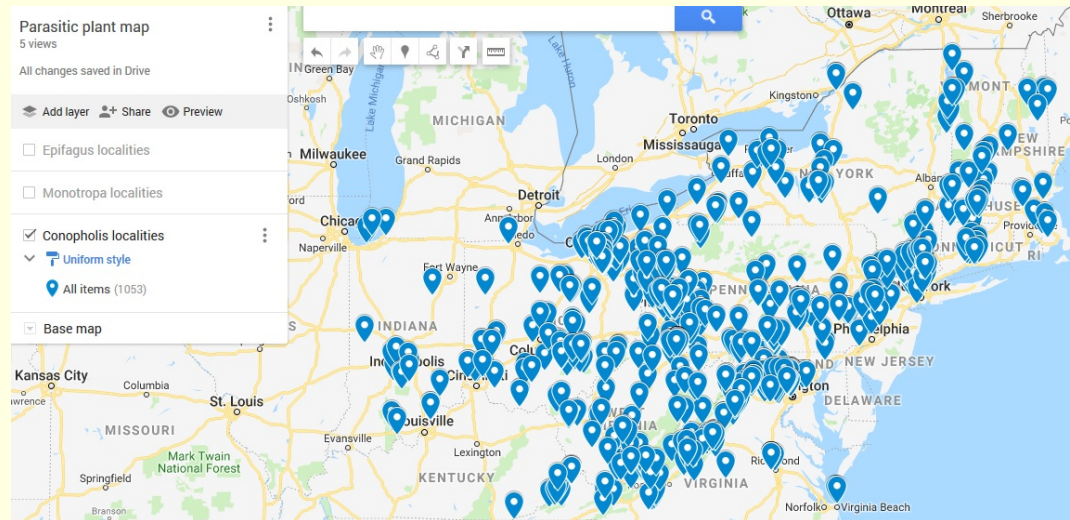
CNH
Consortium of Northeastern Herbaria

Herbarium specimens

Georeferenced, collected since 1980

Aggregated from Consortium of NE/Midwest Herbaria

iNaturalist data



Forest history

Age and land-use history determined from aerial photos

Most states have photos dating to late 1930's, some archived online

Sources include PennPilot (PA), Historic Aerials

Post 1960-imagery: USGS Earth Explorer

Valuable source of data for ecological studies

What digital data can't tell us

Abundance

Host data: abundance, density, size

Plant-scale variation



Fine-scale analysis

Paired replicated chronosequence

Ridge/upper slope and valley sites

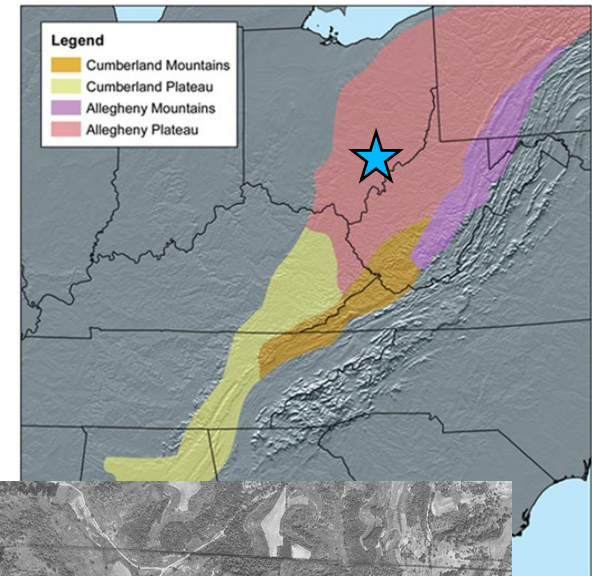
5 stand ages

40-60 years

60-80 years

80+ years

130+, no agricultural legacies



Fine-scale analysis



Target species abundance

Predictor variables:

host abundance

host size (total/mean BA)

environmental variables

Community data



First impressions

Host presence

Host size

Landscape position

Land-use history?



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**New England
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