Herbarium specimens show patterns of wild fruit ripening across New England, from the 1800's to present

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Why fruits?

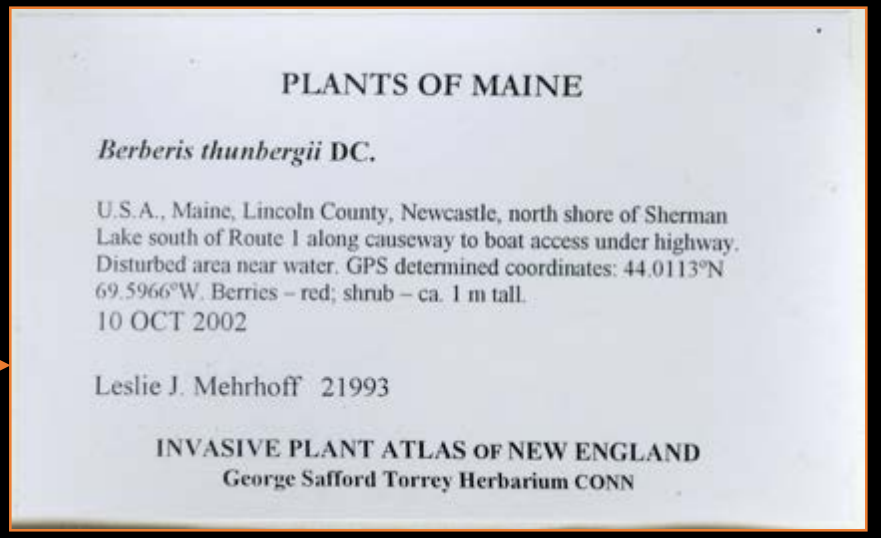
Questions:

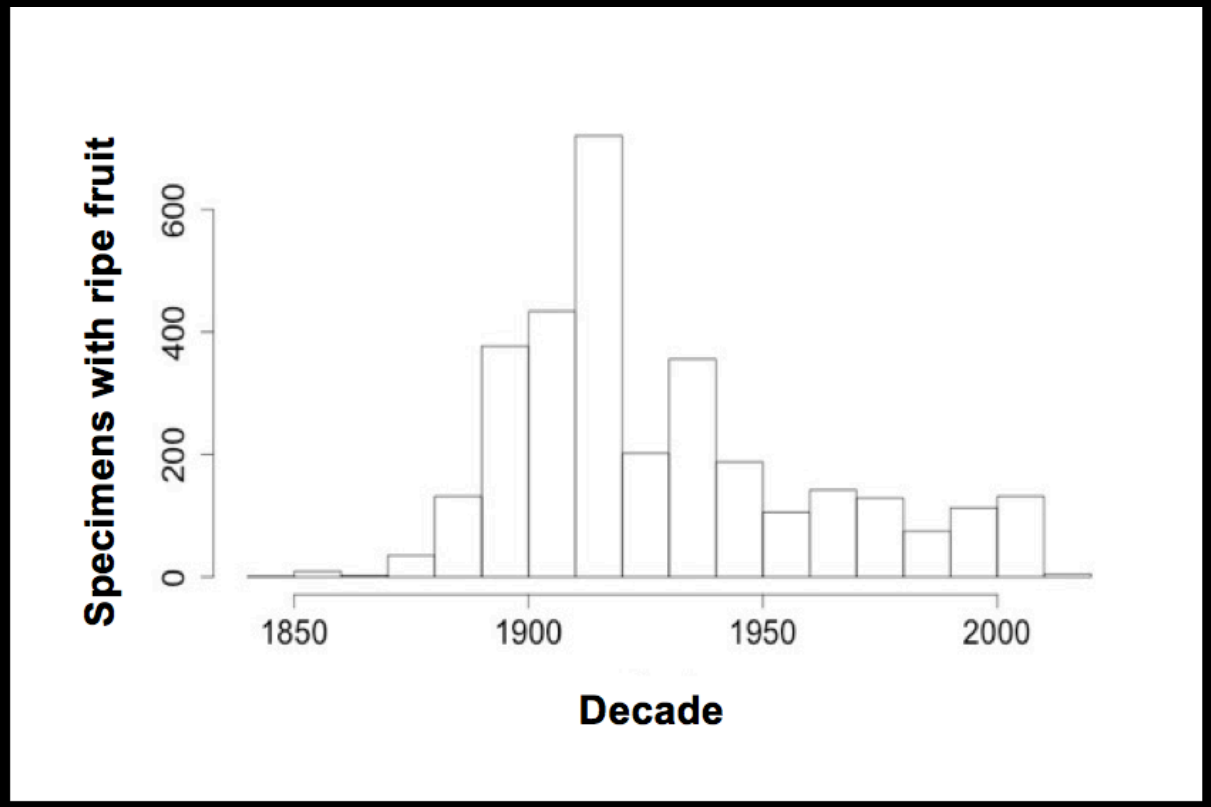
- What are the patterns of fruit ripening in New England?
  - Geographic patterns
  - Native vs. invasive species
- How are fruiting times responding to climate change?
- What are late-season migrant birds eating?

Herbarium specimens & fruit phenology

Why use herbarium specimens?

- Broad geographic range
- Broad temporal range
- Abundant specimens
- Increasingly available online



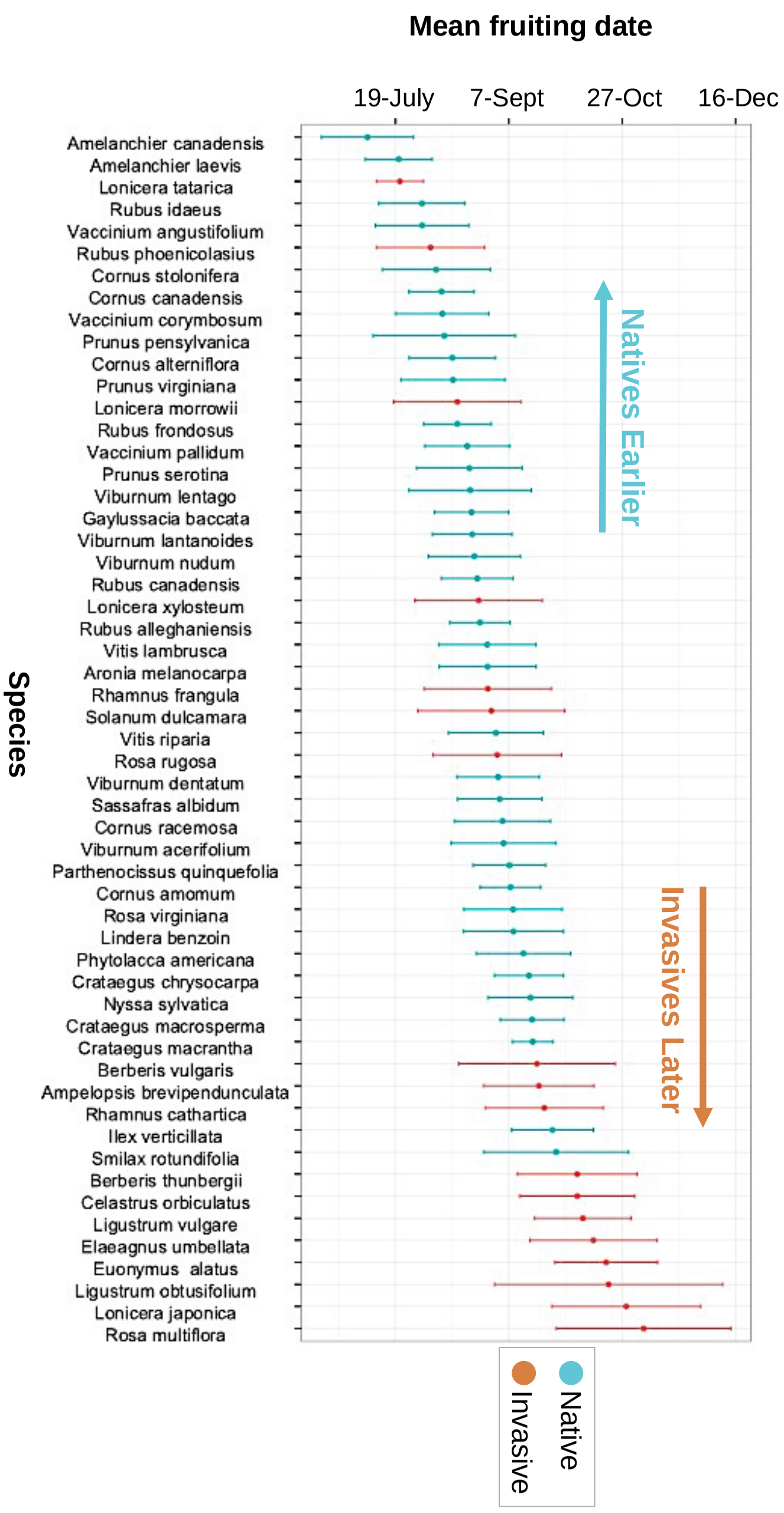


Specimen Distribution

- 55 species: 37 native, 18 invasive
- 3177 specimens with ripe fruit

Analysis

- Native vs. non-native
- Latitude/Longitude
- Changes with temperature
  (integrated local + annual)


Mean fruiting date
19-July
7-Sept
27-Oct
16-Dec
Species
Amelanchier canadensis
Amelanchier laevis
Lonicera tatarica
Rubus idaeus
Vaccinium angustifolium
Rubus phoenicolasius
Cornus stolonifera
Cornus canadensis
Vaccinium corymbosum
Prunus pensylvanica
Cornus alterniflora
Prunus virginiana
Lonicera morrowii
Rubus frondosus
Vaccinium pallidum
Prunus serotina
Viburnum lentago
Gaylussacia baccata
Viburnum lantanoides
Viburnum nudum
Rubus canadensis
Lonicera xylosteum
Rubus alleghaniensis
Vitis lambrusca
Aronia melanocarpa
Rhamnus frangula
Solanum dulcamara
Vitis riparia
Rosa rugosa
Viburnum dentatum
Sassafras albidum
Cornus racemosa
Viburnum acerifolium
Parthenocissus quinquefolia
Cornus amomum
Rosa virginiana
Lindera benzoin
Phytolacca americana
Crataegus chrysocarpa
Nyssa sylvatica
Crataegus macrosperma
Crataegus macrantha
Berberis vulgaris
Ampelopsis brevipendunculata
Rhamnus cathartica
Ilex verticillata
Smilax rotundifolia
Berberis thunbergii
Celastrus orbiculatus
Ligustrum vulgare
Elaeagnus umbellata
Euonymus alatus
Ligustrum obtusifolium
Lonicera japonica
Rosa multiflora
Natives Earlier
Invasives Later
Native
Invasive

Effects of geography & climate change on fruit phenology

For the most common species, trends were weak or non-significant.

Latitude: 2/8 species fruit significantly later at higher latitudes. (R^2<0.1)

Longitude: 2/8 species fruit significantly later at eastern longitudes. (R^2<0.1)

Warming effects: 2/8 species are earlier, 1 species is later. (R^2<0.2)

Challenges of using herbarium specimens

- Fruit ripening is an extended process
- Standardizing criteria for ripeness, across observers and species
- Fewer specimens from recent years

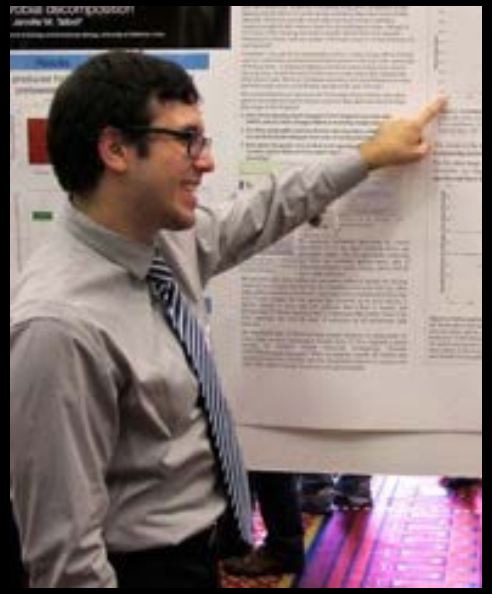
Summary

- Invasive species fruit later than native species
- Weak patterns with temperature and geography

Future Directions

- How should we evaluate fruiting specimens?
- Are late migrating birds eating more invasive fruits?

Acknowledgments



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Mobilizing New England Vascular Plant Specimen Data to Track Environmental Changes

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1865 THE UNIVERSITY OF MAINE

HARVARD UNIVERSITY HERBARIA

Yale University Herbarium

University of Connecticut

UNIVERSITY OF MASSACHUSETTS AMHERST 1863 UMASS AMHERST

UNIVERSITY of MAINE HERBARIA

BROWN UNIVERSITY Herbarium

UNIVERSITY OF NEW HAMPSHIRE Hodgdon Herbarium

Thank you!

Questions?