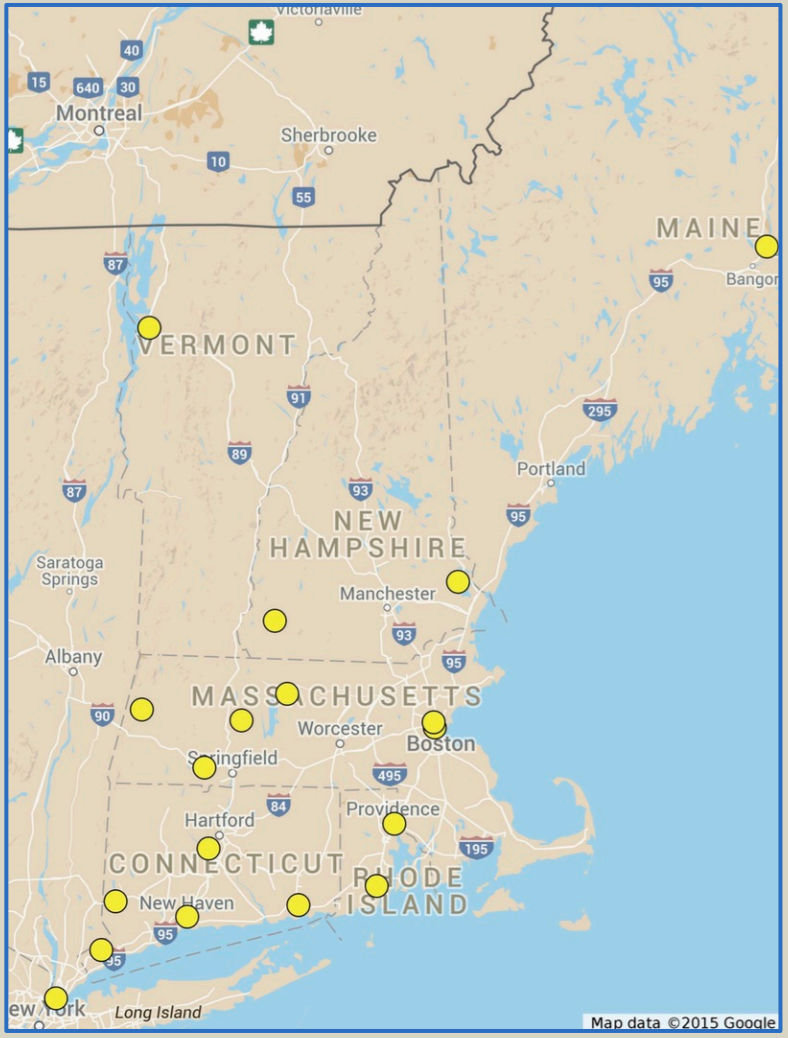
Mobilizing New England Vascular Plant Specimen Data to Track Environmental Changes

Patrick W. Sweeney
Yale University Herbarium
Peabody Museum of Natural History

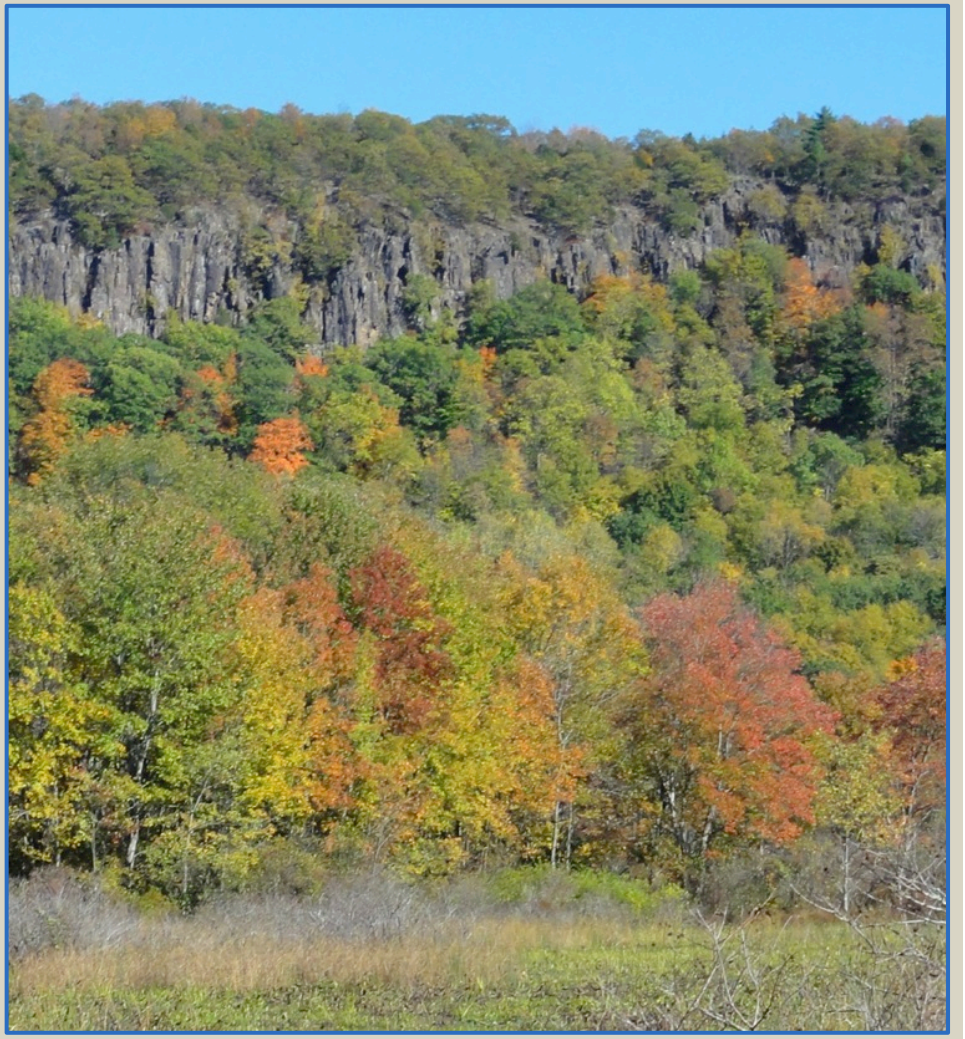
OVERALL OBJECTIVES

- Digitize over 1 million New England vascular plant specimens from 18 regional herbaria



RATIONALE

- The main goal of this TCN is to provide data to support the study of the consequences of climate change and land use history in the New England region over the last two centuries



RATIONALE: THEME

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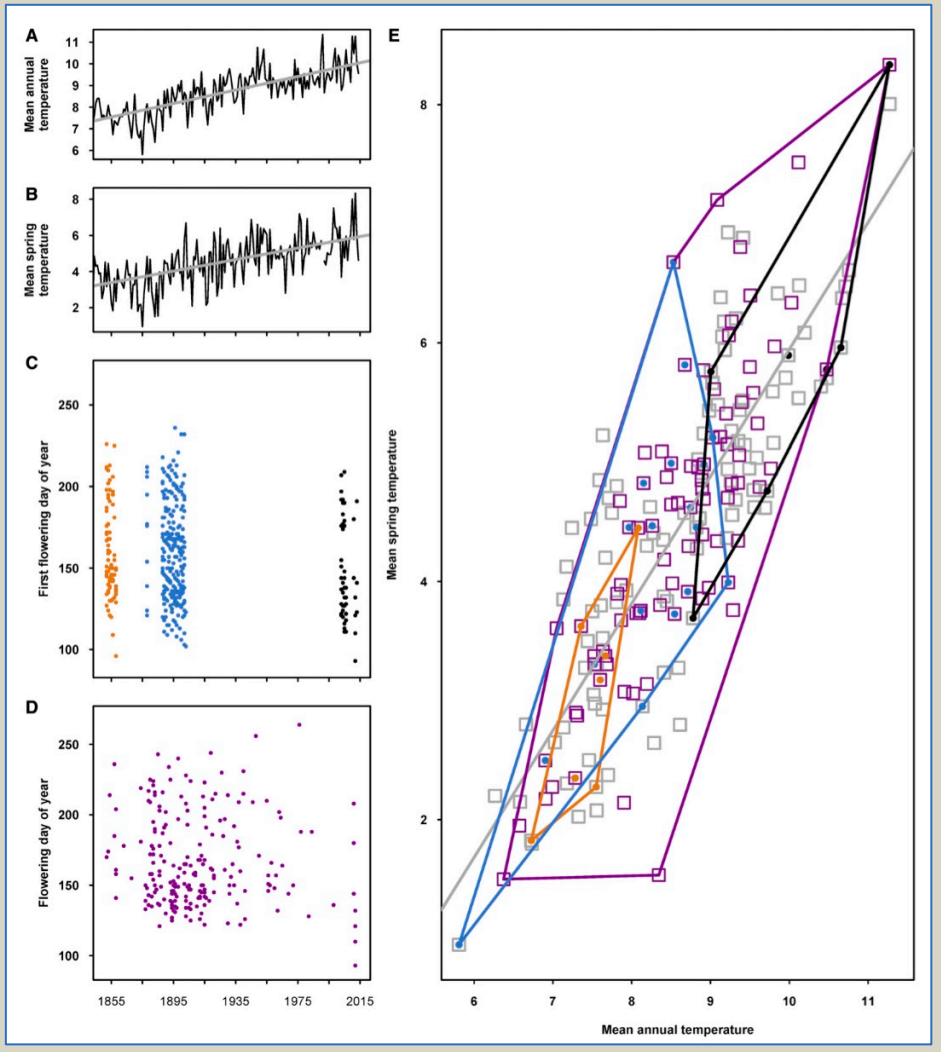
RATIONALE: THEME

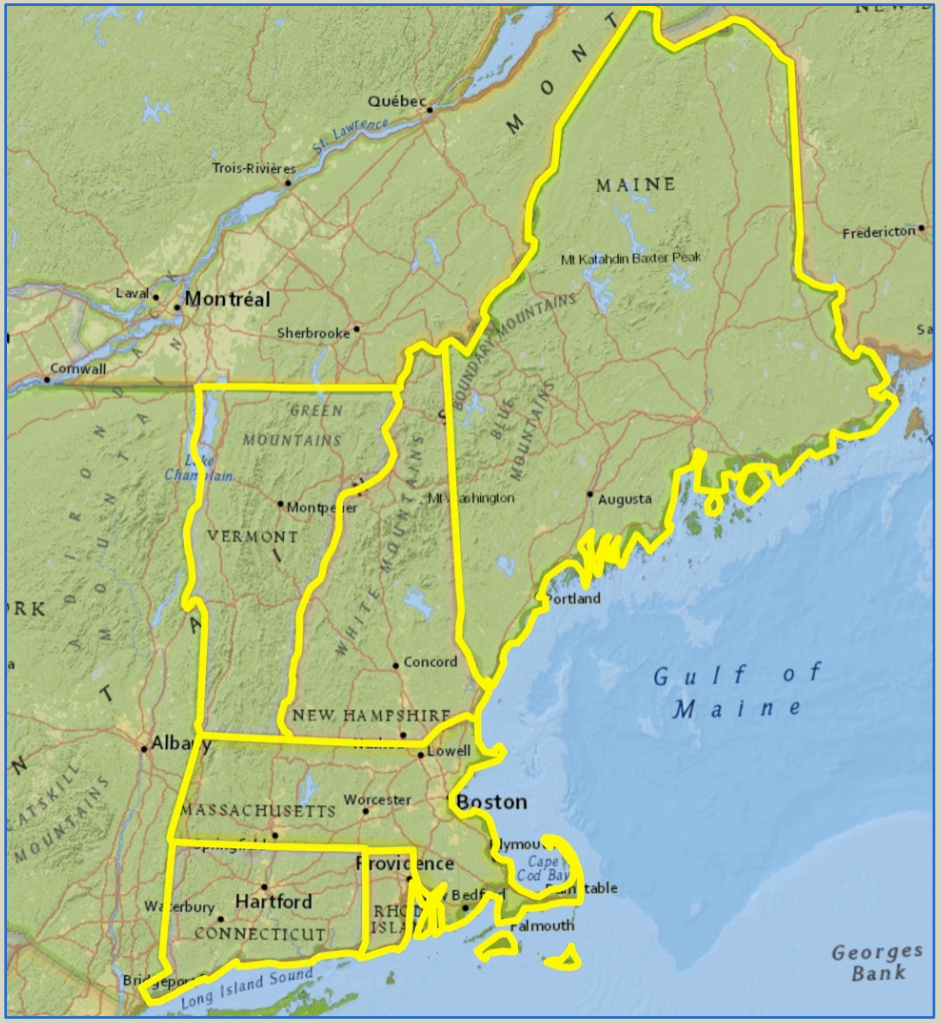
Davis, C. C., Willis, C. G., Connolly, B., Kelly, C., & Ellison, A. M. (2015). Herbarium records are reliable sources of phenological change driven by climate and provide novel insights into species' phenological cueing mechanisms. *American Journal of Botany*, *102* (10), 1599-1609.



RATIONALE: NEW ENGLAND

Why New England?

- Herbaria
- Landscape
- History
- Scientists



RATIONALE: THEME

Climate Change

- Plant phenological observations play an important role in the effort to understand the effects of rising temperatures
- Our project will cater to climate-change studies by capturing phenology (flowering and leafing-out stage) data
- We will develop controlled vocabularies for flowering stage

RATIONALE: THEME

Land-use history

- Herbarium specimens, representing thousands of species with diverse ecological ranges and tolerances can add critical insights into the long-term consequences of past land-use

- We will capture habitat data for a subset of taxa targeted for their particular importance to land-use studies

PARTNERS

- Brown University (BRU)
- Harvard University (HUH)
- U. of New Hampshire (NHA)
- U. of Massachusetts Amherst (MASS)
- U. of Vermont (VT)
- Yale University (YU)

- Bartlett Arboretum (BART)
- Berkshire Museum (BERK)
- Boston University (BSN)
- Central Connecticut State U. (CCSU)
- Connecticut College (CCNL)
- Harvard Forest (HF)
- Keene State (KESC)
- U. of Rhode Island (KIRI)
- Western Connecticut State U. (WCSU)
- Westfield State U. (WSCH)

PENs:

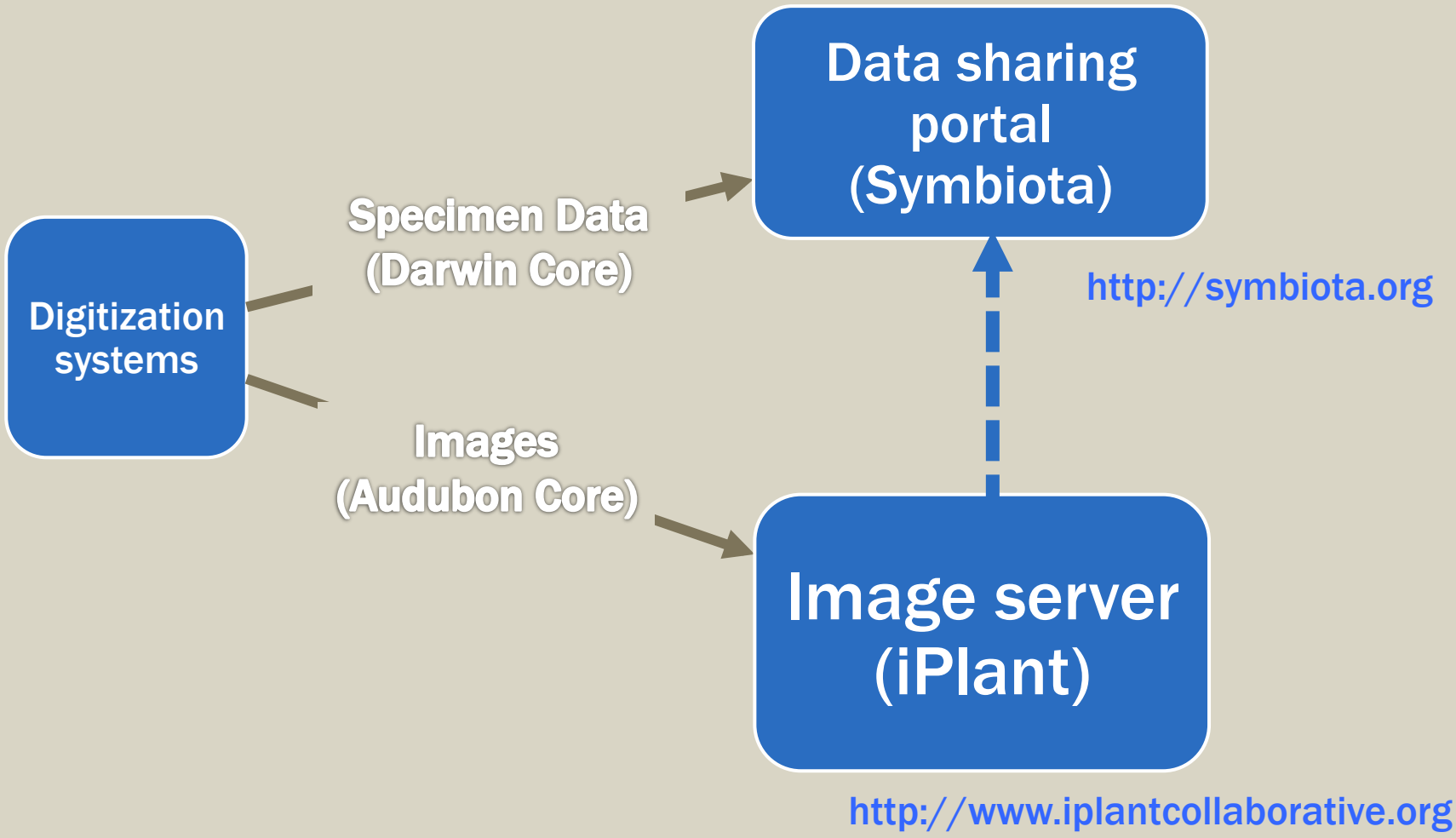
- U. of Maine (MAINE)
- New York Botanical Garden (NYBG)

DIGITIZATION

- Capture an image, a barcode number, a subset of label data:
  - State
  - Town
  - Collection Date
  - Collector
  - Collection No.

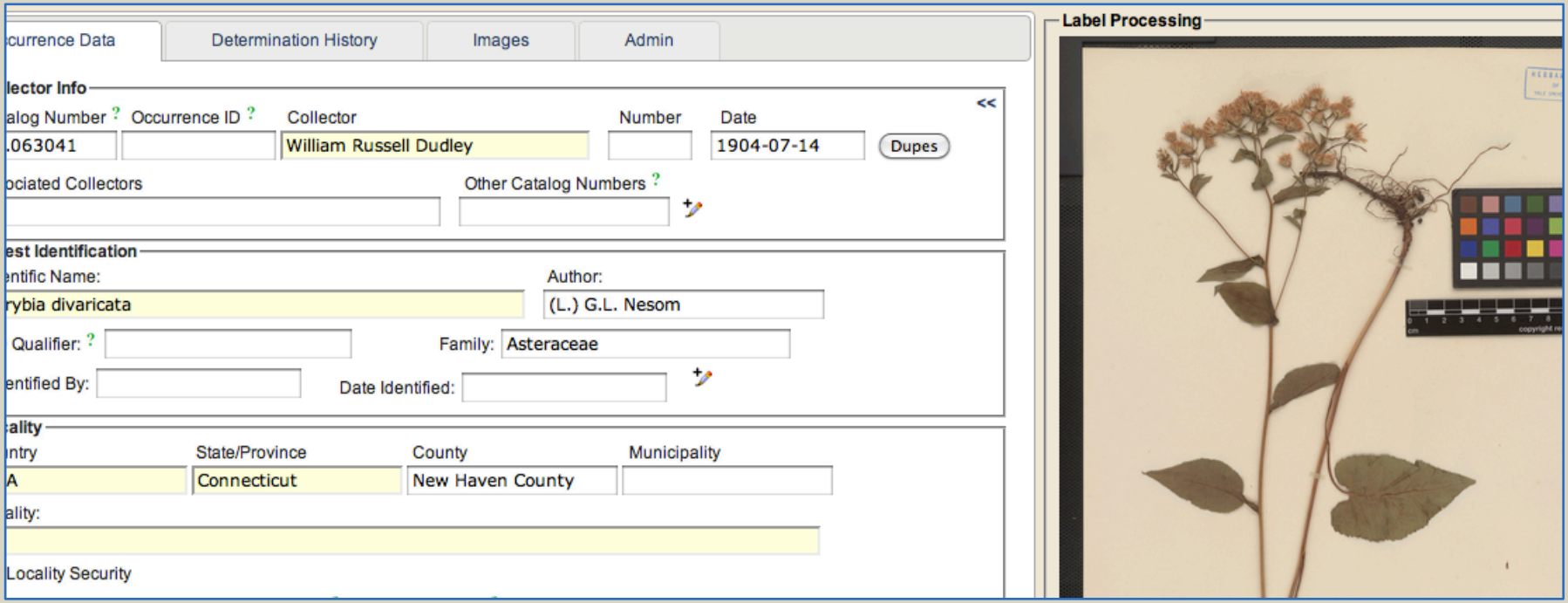
DIGITIZATION

DATA FLOW


Data sharing portal (Symbiota)
Specimen Data (Darwin Core)
Digitization systems
http://symbiota.org
Images (Audubon Core)
Image server (iPlant)
http://www.iplantcollaborative.org

PHENOLOGY

- Score phenology and habitat from images of specimens and labels.



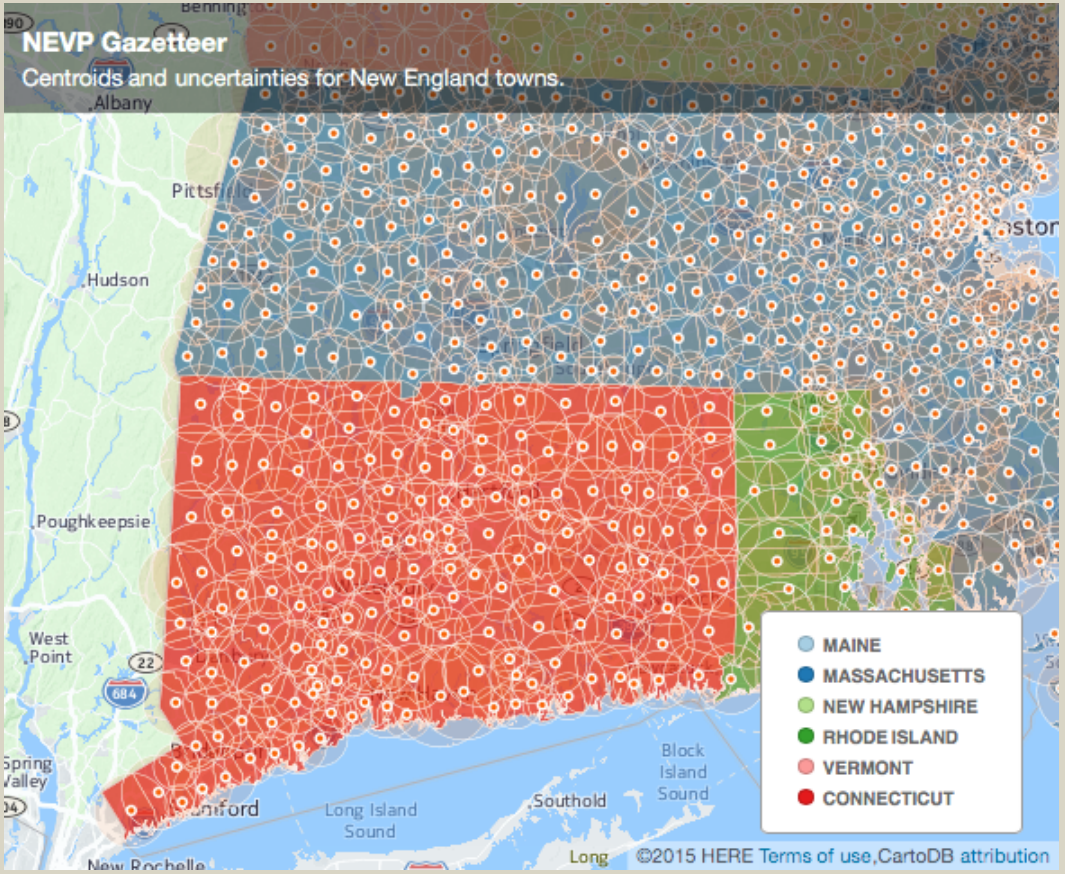
PHENOLOGY

NEVP terms:

NEVP Term Set (Angiospermae)	NEVP Definition
vegetative – no flowers, flower buds, or fruits	No reproductive structures present.
flowering - mostly buds (<1/2 open)	Mostly flower buds with few, if any, open flowers.
flowering – mostly open (>1/2 open)	Mostly open flowers with few flower buds or old flowers that have lost their petals.
flowering – mostly old (<1/2 open)	Mostly old flowers that have lost their petals.
fruiting – mostly young fruits (a few mature)	Mostly young fruits present (often smaller than mature fruits, or green in color).
fruiting – mostly mature fruits (full)	Mostly mature fruits present.
fruiting – fruits past maturity (past full)	Fruits fallen from stalks, withered, or dehisced and lacking seeds.

GEOREFERENCING

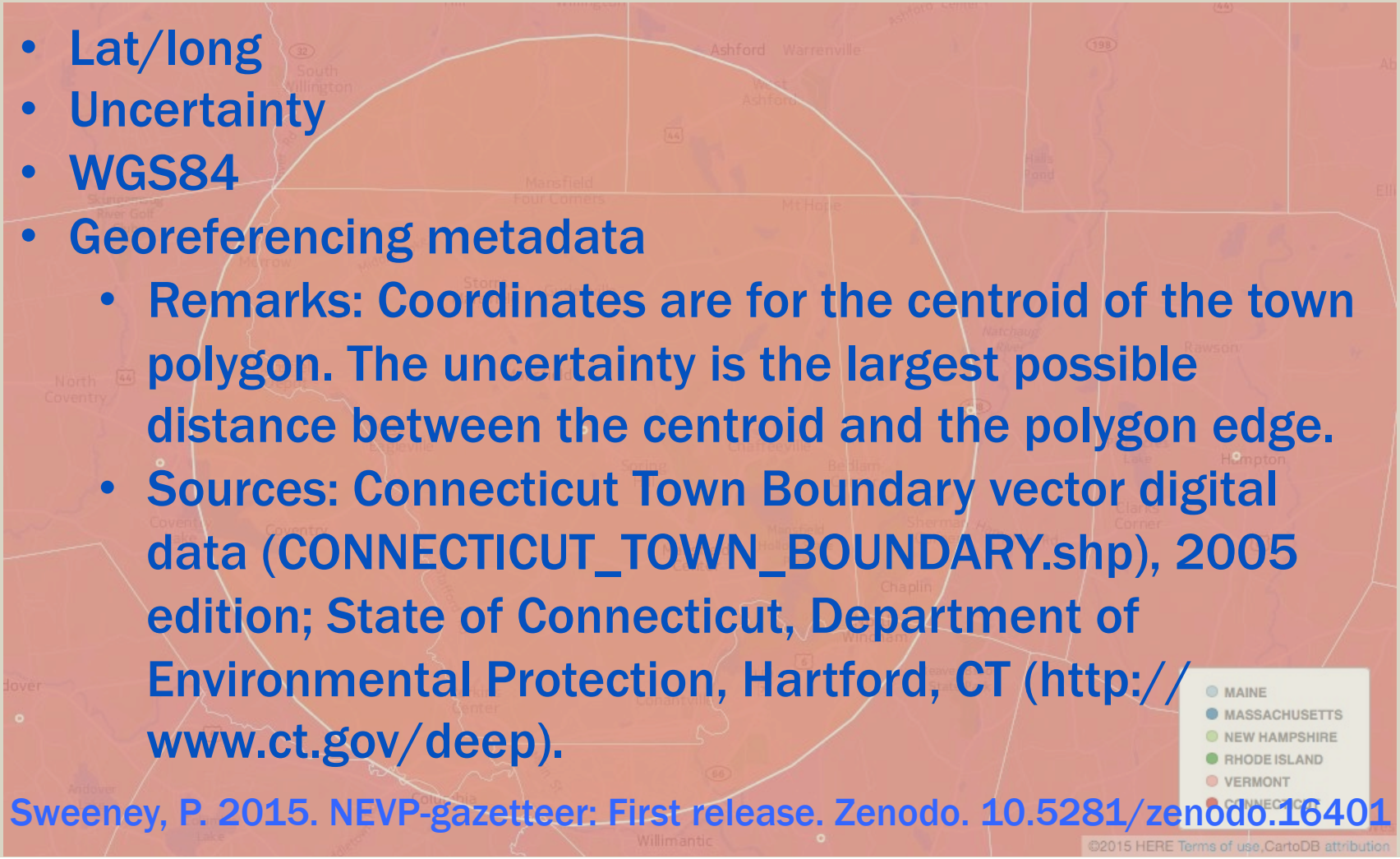
- Georeference (lat & long) to at least town level
- Town-level New England gazetteer versioned and available on GitHub: https://github.com/psweeney-YU/NEVP-gazetteer



Sweeney, P. 2015. NEVP-gazetteer: First release. Zenodo. 10.5281/zenodo.16401

GEOREFERENCING

- Lat/long
- Uncertainty
- WGS84
- Georeferencing metadata
  - Remarks: Coordinates are for the centroid of the town polygon. The uncertainty is the largest possible distance between the centroid and the polygon edge.
  - Sources: Connecticut Town Boundary vector digital data (CONNECTICUT_TOWN_BOUNDARY.shp), 2005 edition; State of Connecticut, Department of Environmental Protection, Hartford, CT (http://www.ct.gov/deep).



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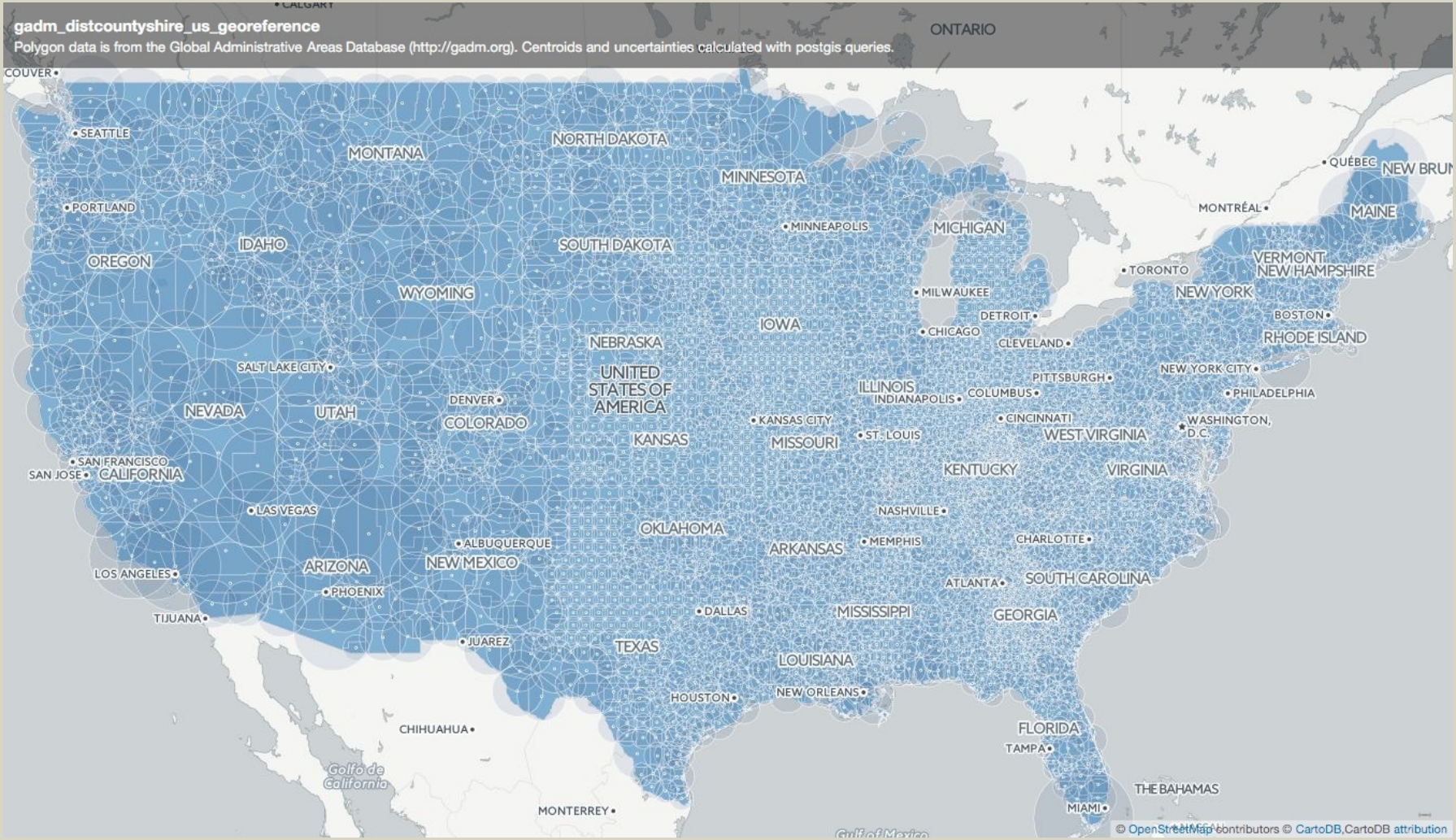
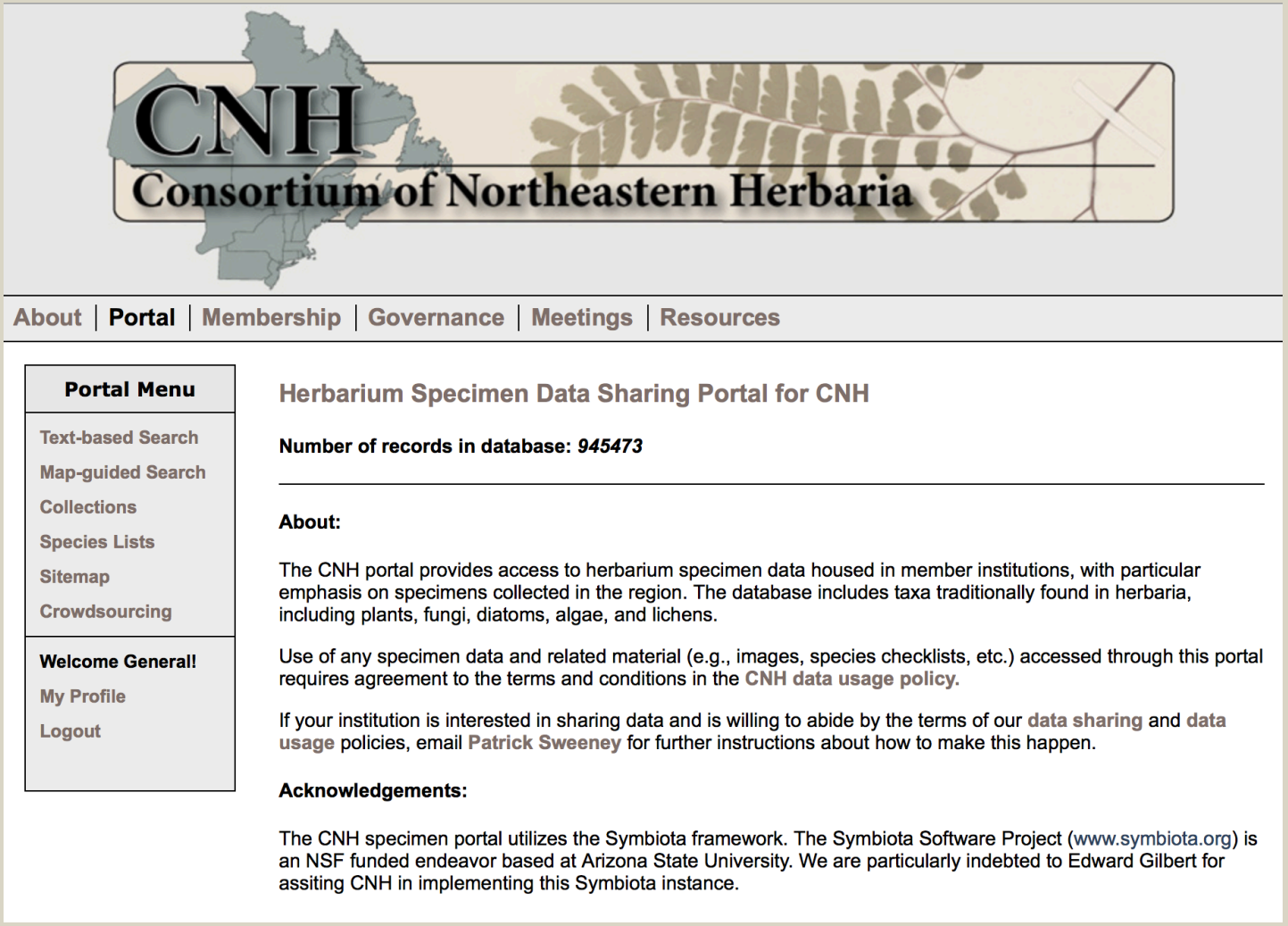


DISSEMINATION

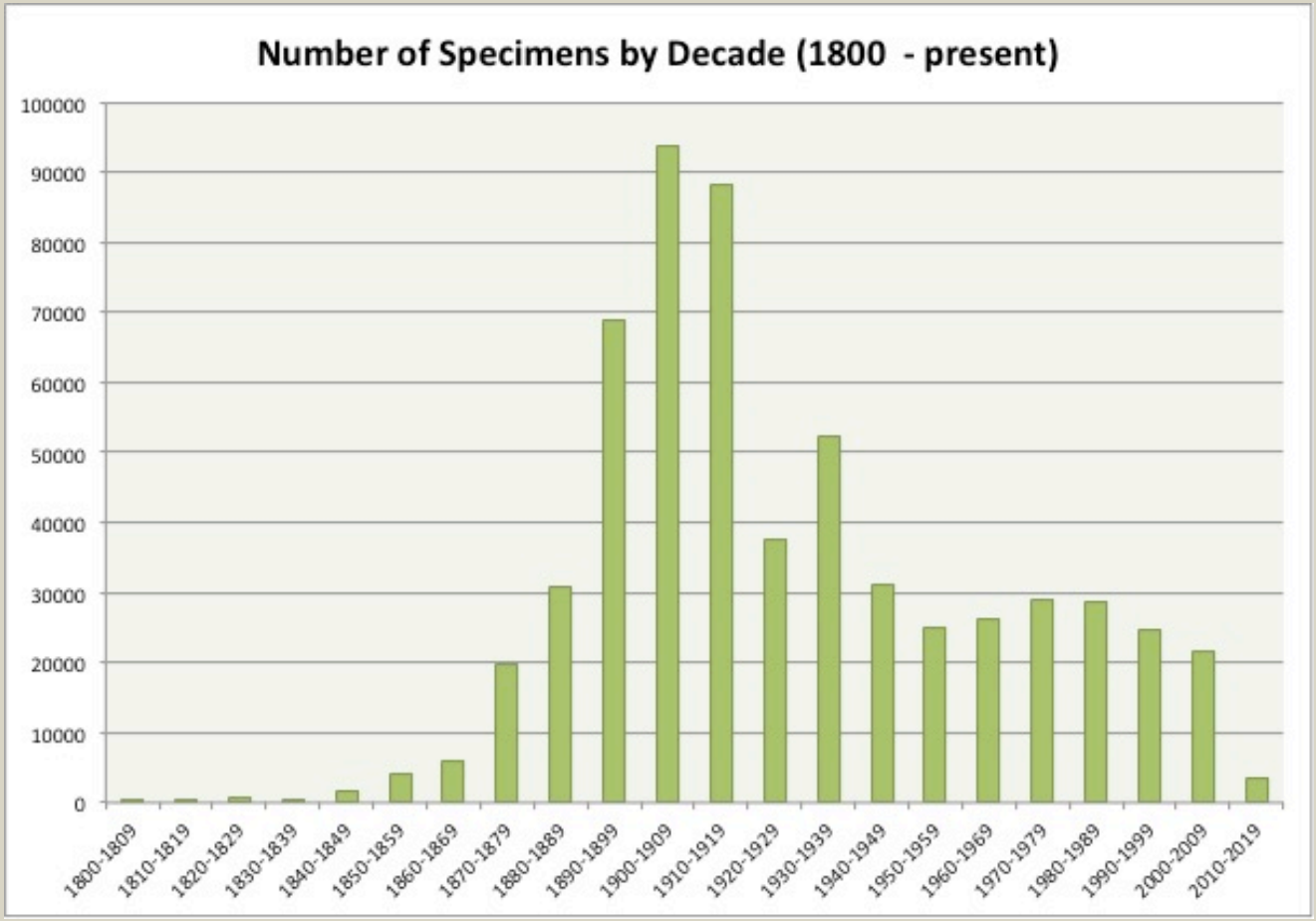
- All of the data and images are available to public through *Consortium of Northeastern Herbaria* (CNH) portal
  & iDigBio

http://portal.neherbaria.org

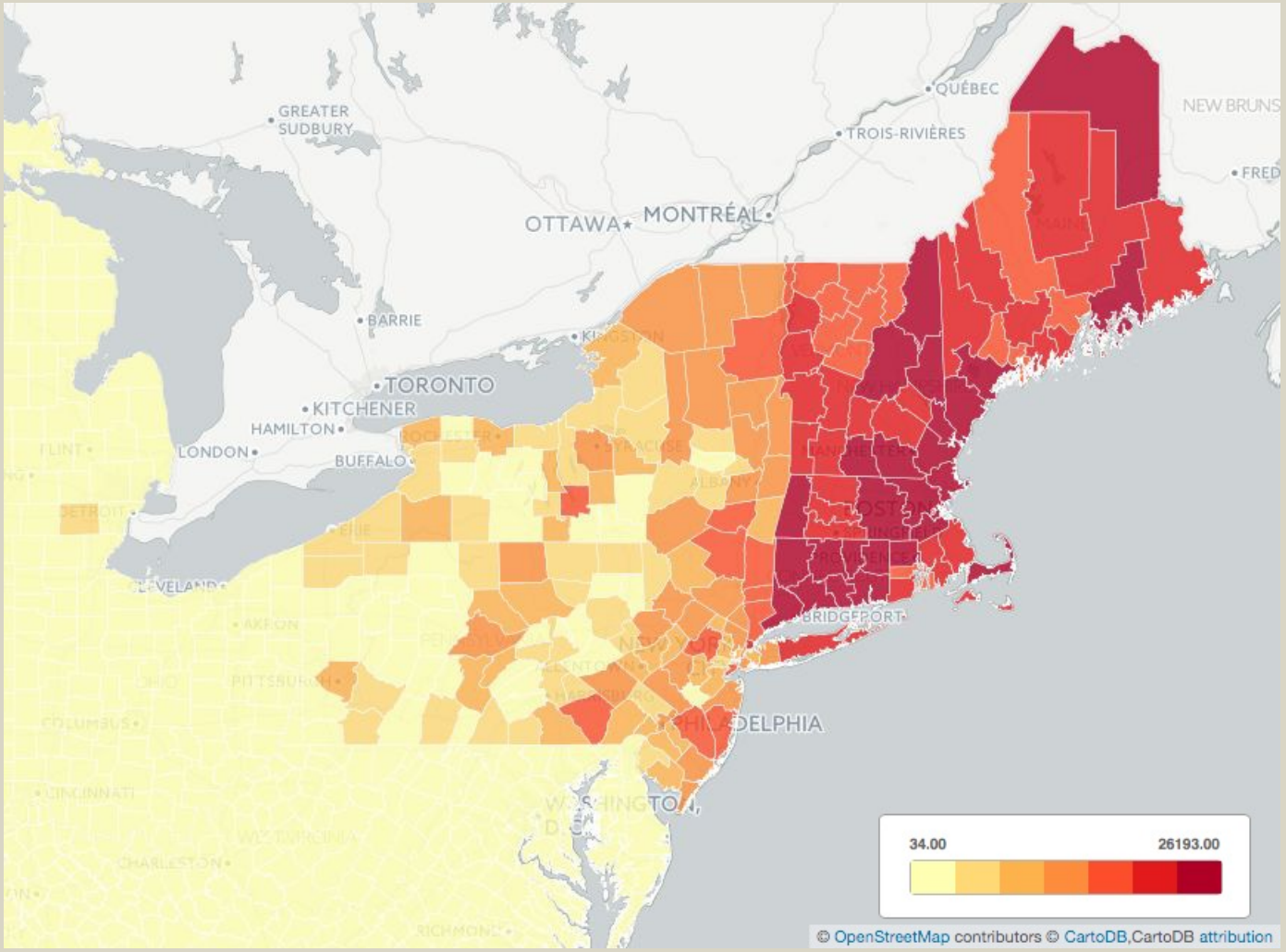
DATA


CNH
Consortium of Northeastern Herbaria
About | Portal | Membership | Governance | Meetings | Resources
Portal Menu
Text-based Search
Map-guided Search
Collections
Species Lists
Sitemap
Crowdsourcing
Welcome General!
My Profile
Logout
Herbarium Specimen Data Sharing Portal for CNH
Number of records in database: 945473
About:
The CNH portal provides access to herbarium specimen data housed in member institutions, with particular emphasis on specimens collected in the region. The database includes taxa traditionally found in herbaria, including plants, fungi, diatoms, algae, and lichens.
Use of any specimen data and related material (e.g., images, species checklists, etc.) accessed through this portal requires agreement to the terms and conditions in the CNH data usage policy.
If your institution is interested in sharing data and is willing to abide by the terms of our data sharing and data usage policies, email Patrick Sweeney for further instructions about how to make this happen.
Acknowledgements:
The CNH specimen portal utilizes the Symbiota framework. The Symbiota Software Project (www.symbiota.org) is an NSF funded endeavor based at Arizona State University. We are particularly indebted to Edward Gilbert for assiting CNH in implementing this Symbiota instance.

DATA


Number of Specimens by Decade (1800 - present)
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
1800-1809
1810-1819
1820-1829
1830-1839
1840-1849
1850-1859
1860-1869
1870-1879
1880-1889
1890-1899
1900-1909
1910-1919
1920-1929
1930-1939
1940-1949
1950-1959
1960-1969
1970-1979
1980-1969
1990-1999
2000-2009
2010-2019

DATA


GREATER SUDBURY
QUÉBEC
TROIS-RIVIÈRES
OTTAWA
MONTRÉAL
BARRIE
TORONTO
KITCHENER
HAMILTON
LONDON
BUFFALO
BRIDGEPORT
PHILADELPHIA
34.00
26193.00
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Symbiota Project

FilteredPush

iPlant Collaborative™ *Empowering A New Plant Biology*

Biota of North America