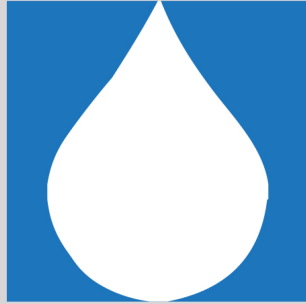


# Mobilizing New England Vascular Plant Specimen Data



**to Track Environmental Changes**

**Dorothy J. Allard**  
University of Vermont  
Pringle Herbarium

**Patrick W. Sweeney**  
Yale University

**Co-PIs:**

**P.W. Sweeney, D.S. Barrington, C.C. Davis,  
M.J. Donoghue, E.J. Edwards, D.R. Foster, P.J. Morris, C.  
Neefus, R.B. Primack, K.B. Searcy, B. Starly, J.R. Sullivan**



# THEMATIC COLLECTIONS NETWORKS



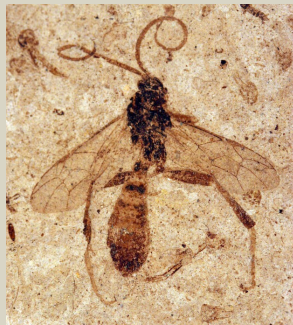
Macroalgae



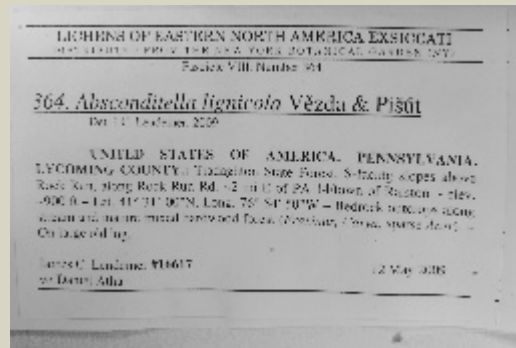
Macrofungi



New England Vascular Plants



Fossil Insects



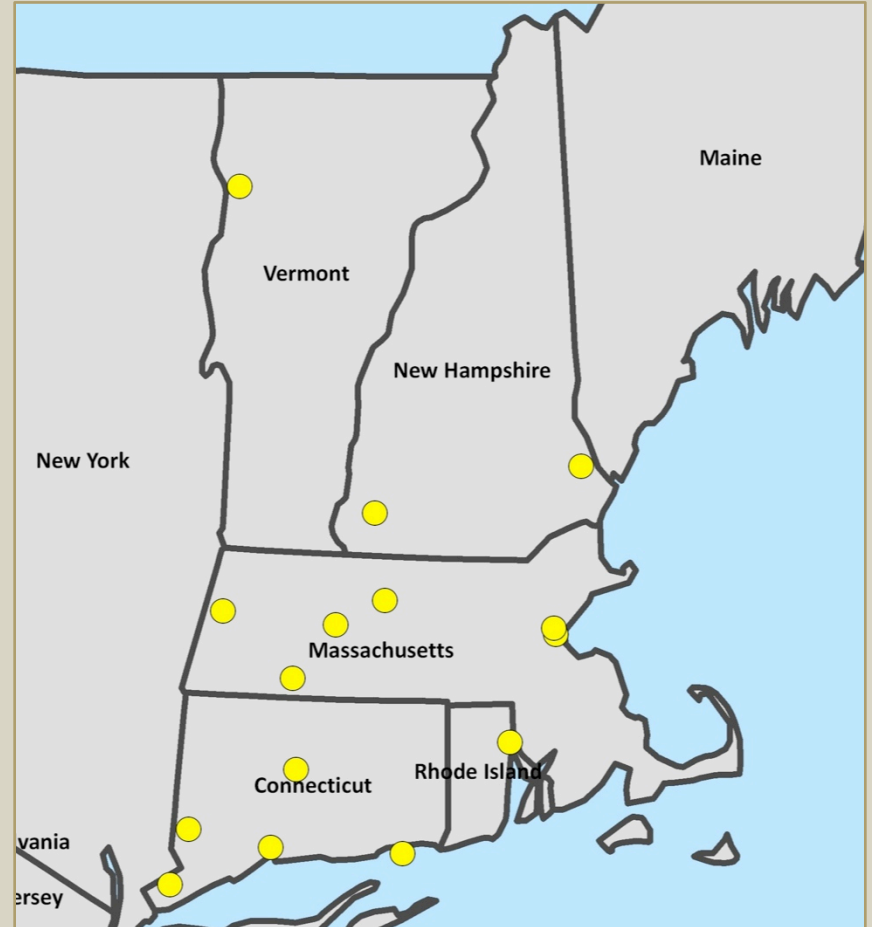
Lichens and Bryophytes



Invertebrates

# NEVP

- 1,300,000 specimens
- 15 regional herbaria



# THEMES

## Climate Change



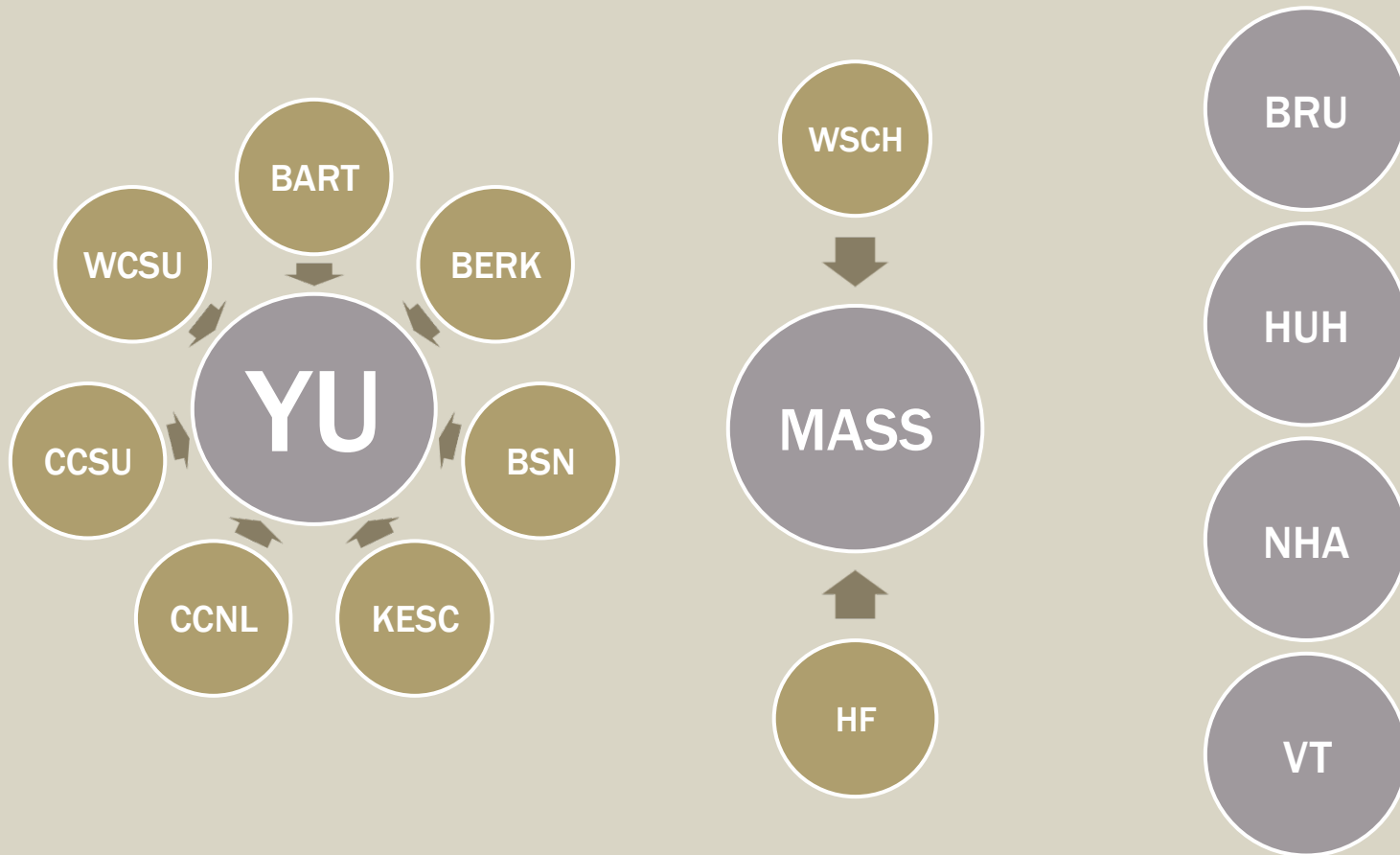
## Land-use History



# PARTNERS

- Brown University (BRU)
  - Harvard University (HUH)
  - U. of New Hampshire (NHA)
  - U. of Massachusetts Amherst (MASS)
  - U. of Vermont (VT)
  - Yale University (YU)
  - Connecticut College (CCNL)
  - Harvard Forest (HF)
  - Keene State (KESC)
  - Western Connecticut State U. (WCSU)
  - Westfield State U. (WSCH)
- Engineering group:
- University of Oklahoma
  - North Carolina State U.
- Boston University (BSN)
  - Bartlett Arboretum (BART)
  - Berkshire Museum (BERK)
  - Central Connecticut State U. (CCSU)

# DIGITIZATION PLAN: ORGANIZATION



# DIGITIZATION PLAN: WORKFLOW

Collection  
Preparation (Pre-  
capture)



Primary  
digitization



Data  
Enhancement  
(Secondary  
Digitization)

# WORKFLOW: PRE-CAPTURE

- Herbarium organization: taxonomy and geography
- First, capture folder-level data





# WORKFLOW: PRE-CAPTURE



*Cardamine maxima* (Nutt.) Alph. Wood  
Massachusetts  
YU



File Window Help

Folders Inventory

Filter Taxa by: Family  Genus

Genus	Specific E...	Infraspecif...	Infraspeci...	Scientific...	Authorsh
Cardamine	concatenata				(Michx.) Sw...
Cardamine	maxima				(Nutt.) Alph. W
Cardamine	diphylla				(Michx.) Alph. 1

Taxon

Genus 1

Specific Epithet 2

Infraspecific Rank 3

Infraspecific Epithet 4

Scientific Name 5

Authorship 6

State 7

County 8

Collector 9

Storage Location 0

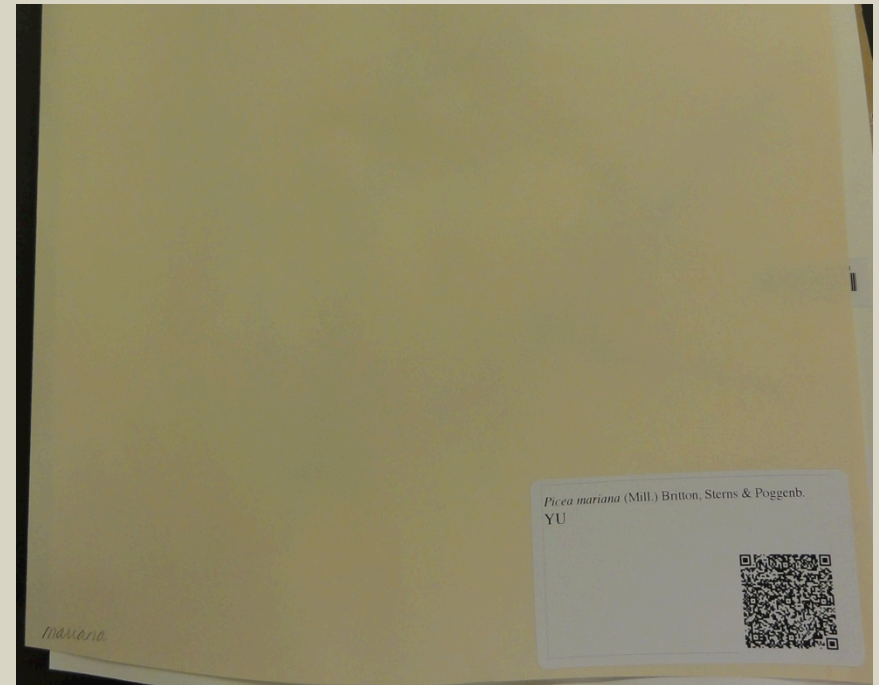
Herbarium Acronym

Number To Print

Print One Add to Print List

Print Clear

# WORKFLOW: PRE-CAPTURE



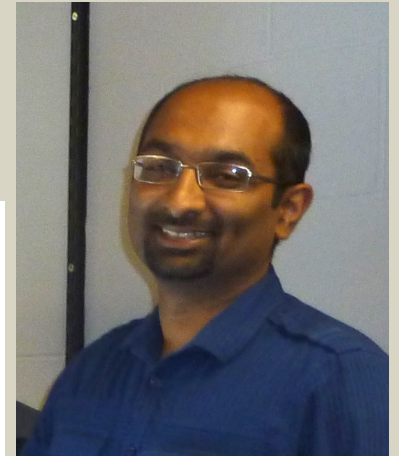
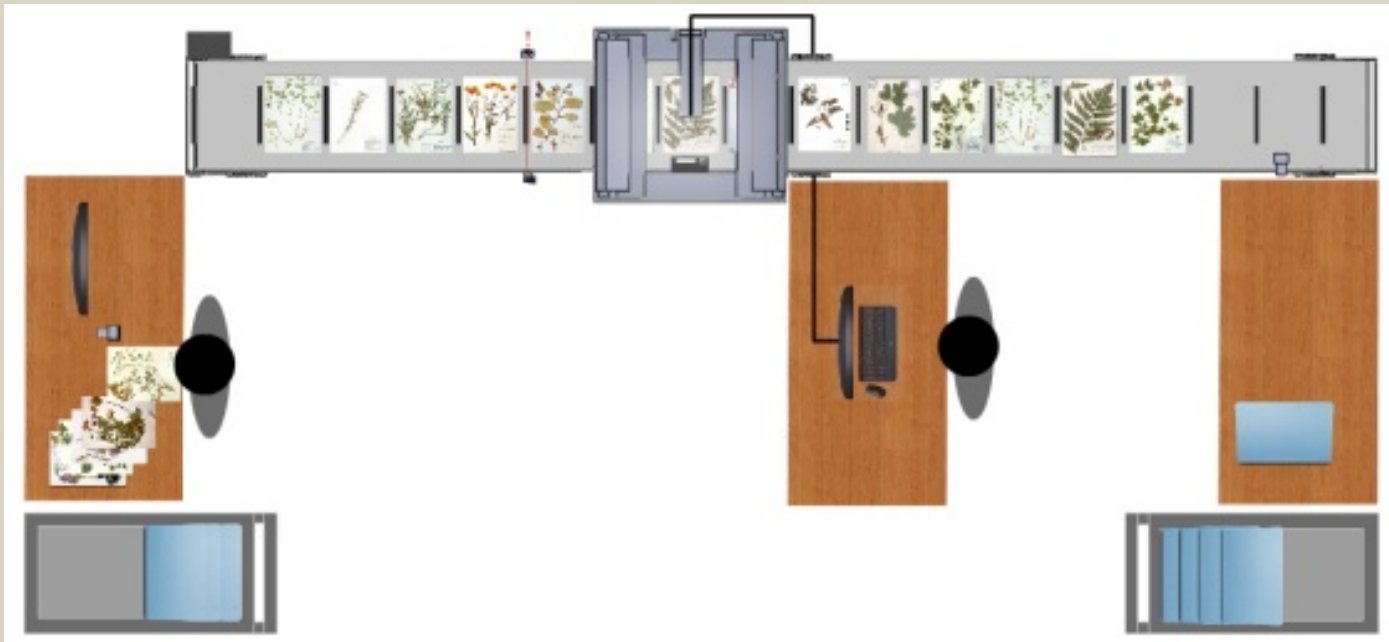
# WORKFLOW: PRIMARY DIGITIZATION

- Image
- Data
  - Barcode Number
  - Scientific Name
  - Collector, Collection number, Collection Date
  - State, County, Town



# WORKFLOW: PRIMARY DIGITIZATION

## Specimen conveyor belt



# WORKFLOW: PRIMARY DIGITIZATION



# WORKFLOW: PRIMARY DIGITIZATION

Herbarium Digitalization by OU

Settings About Help Logout

Off

006107 89

006107 88

Camera Position

Scientific Name

Barcode

Genus

Collector

Species

Collector Number

Infraspecific Rank

Verbatim Collection Date

Infraspecific Epithet

Beginning Date

Scientific Name Author

Ending Date

Collection Code

Town

Identification Qualifier

County

Record Entered By

State

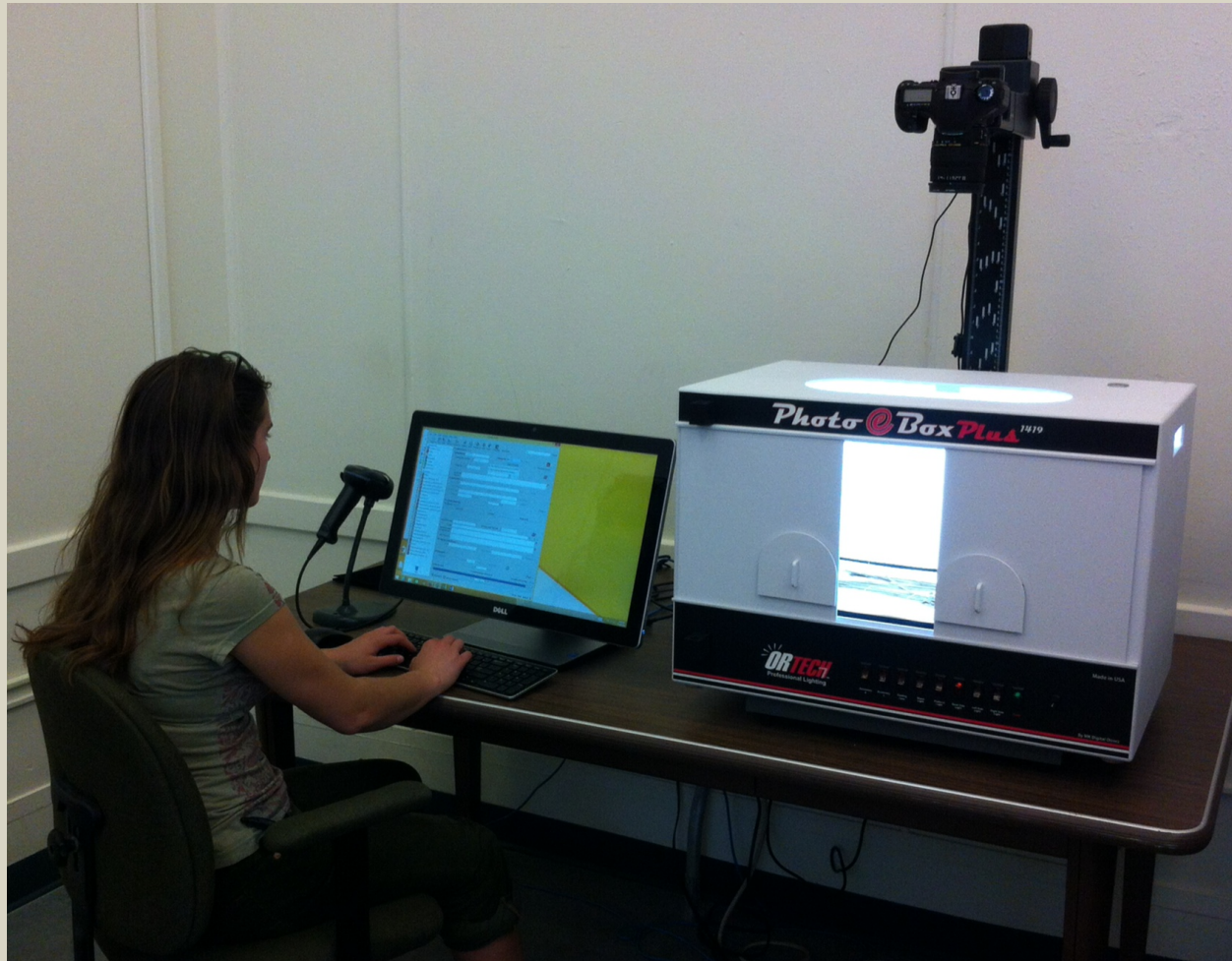
Tags

- Flag Specimen
- Folder

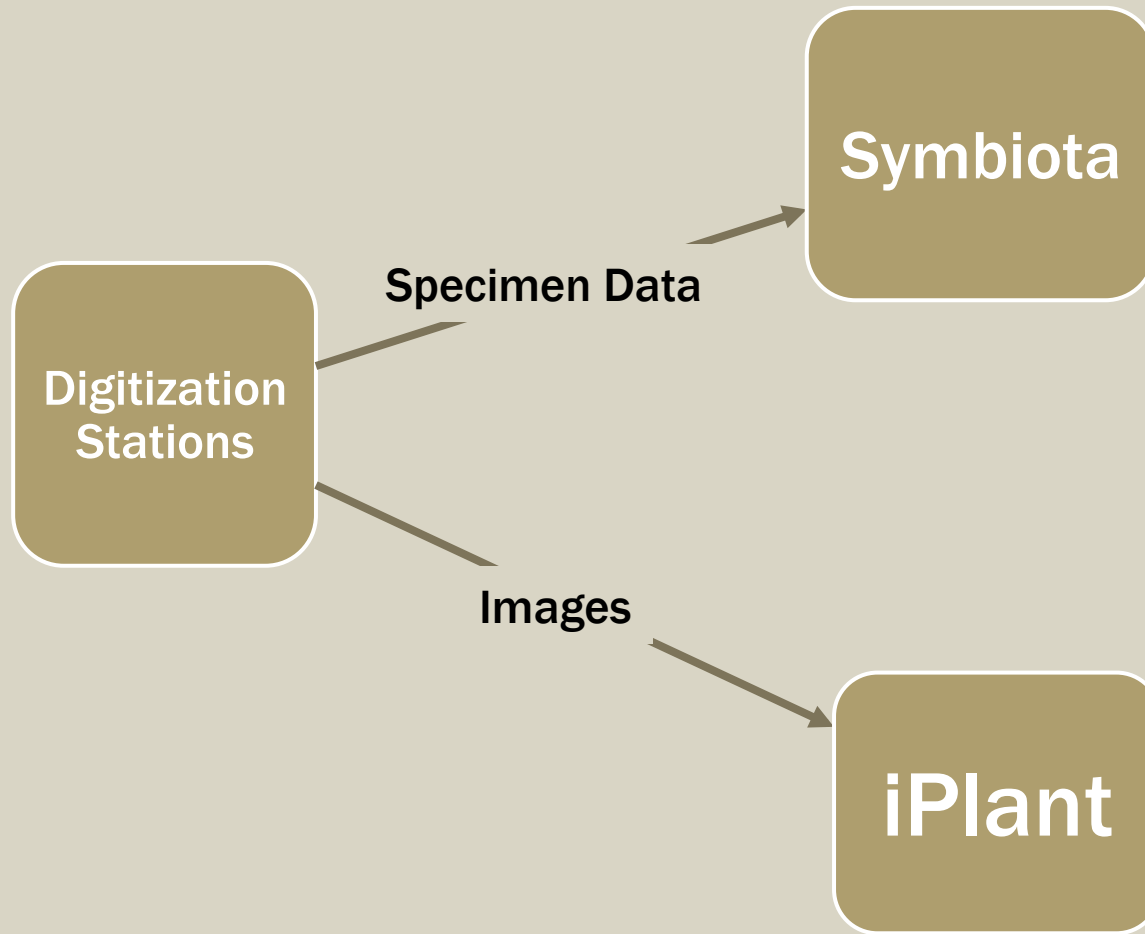
66 Connected

9:22 AM 6/18/2014

# WORKFLOW: PRIMARY DIGITIZATION



# WORKFLOW: PRIMARY DIGITIZATION






# WORKFLOW: SECONDARY DIGITIZATION

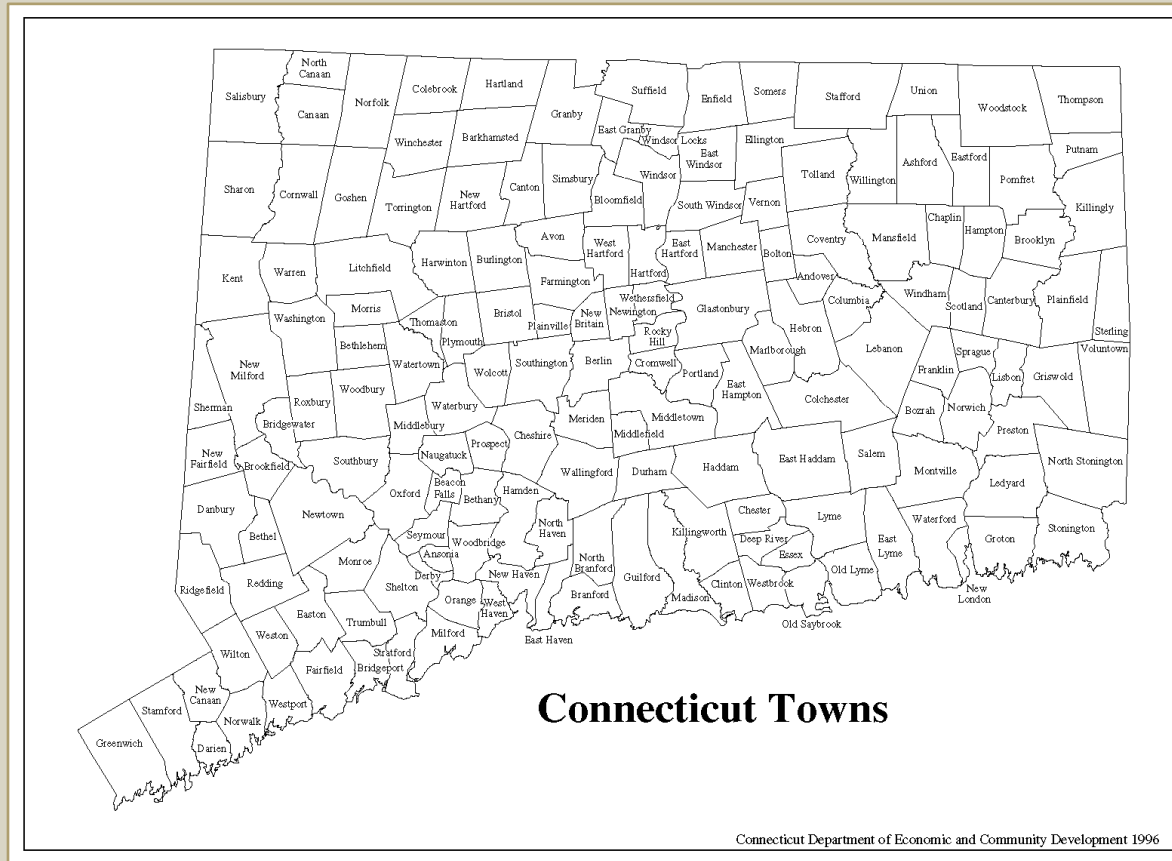
- Habitat data
- Phenology data
- Georeferencing

Occurrence Data	Determination History	Images	Admin
<b>Collector Info</b>			
atalog Number ?	Occurrence ID ?	Collector	Number      Date
.063041		William Russell Dudley	
Associated Collectors		Other Catalog Numbers ?	
<b>Best Identification</b>			
Scientific Name:		Author:	
Syringia divaricata		(L.) G.L. Nesom	
Qualifier: ?		Family: Asteraceae	
Identified By:		Date Identified:	
<b>Locality</b>			
Country	State/Province	County	Municipality
USA	Connecticut	New Haven County	
Locality:			
Locality Security			

### Label Processing



# WORKFLOW: SECONDARY DIGITIZATION



# MOBILIZATION

neherbaria.org/CNH

Membership | Governance | Meetings | Resources

## Herbarium Specimen Data Sharing Portal for CNH

Number of records in database: 409883

### About:

The CNH portal provides access to herbarium specimen data housed in member institutions with an emphasis on specimens collected in the region. The database includes taxa traditionally including plants, fungi, diatoms, algae, and lichens.

Use of any specimen data and related material (e.g., images, species checklists, etc.) on 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 [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 is an NSF funded endeavor based at Arizona State University. We are particularly indebted to the staff at ASU for assisting CNH in implementing this Symbiota instance.

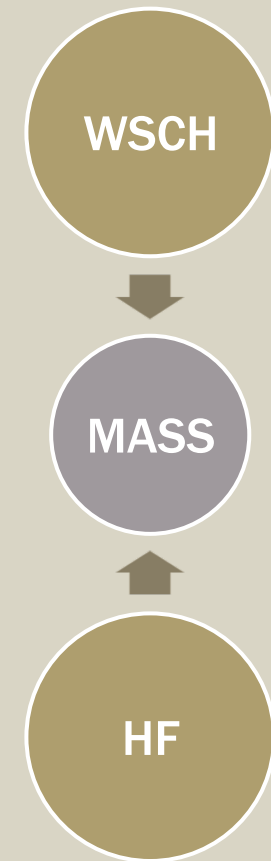
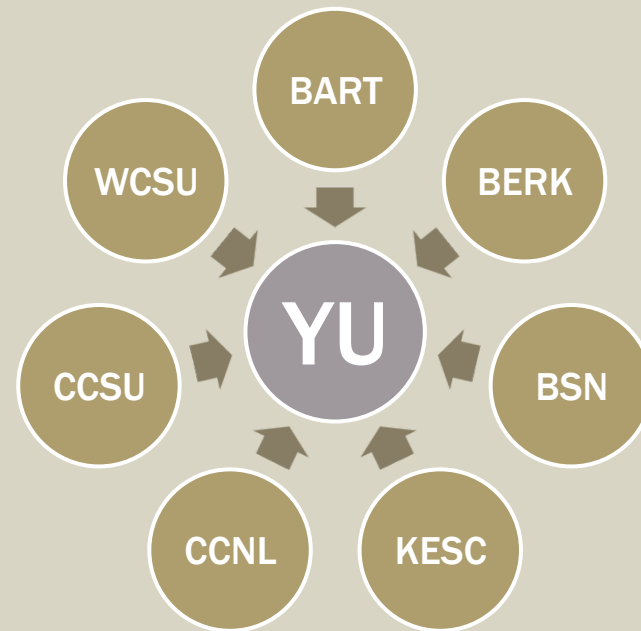


AccessionNumber	Quantity	AccessionNumber	AccessionNumber	AccessionNumber	AccessionNumber	AccessionNumber	
CONN000001	1	CONN000002	1	CONN000003	1	CONN000004	1
CONN000005	1	CONN000006	1	CONN000007	1	CONN000008	1
CONN000009	1	CONN000010	1	CONN000011	1	CONN000012	1
CONN000013	1	CONN000014	1	CONN000015	1	CONN000016	1
CONN000017	1	CONN000018	1	CONN000019	1	CONN000020	1
CONN000021	1	CONN000022	1	CONN000023	1	CONN000024	1
CONN000025	1	CONN000026	1	CONN000027	1	CONN000028	1
CONN000029	1	CONN000030	1	CONN000031	1	CONN000032	1
CONN000033	1	CONN000034	1	CONN000035	1	CONN000036	1
CONN000037	1	CONN000038	1	CONN000039	1	CONN000040	1
CONN000041	1	CONN000042	1	CONN000043	1	CONN000044	1
CONN000045	1	CONN000046	1	CONN000047	1	CONN000048	1
CONN000049	1	CONN000050	1	CONN000051	1	CONN000052	1
CONN000053	1	CONN000054	1	CONN000055	1	CONN000056	1
CONN000057	1	CONN000058	1	CONN000059	1	CONN000060	1
CONN000061	1	CONN000062	1	CONN000063	1	CONN000064	1
CONN000065	1	CONN000066	1	CONN000067	1	CONN000068	1
CONN000069	1	CONN000070	1	CONN000071	1	CONN000072	1
CONN000073	1	CONN000074	1	CONN000075	1	CONN000076	1
CONN000077	1	CONN000078	1	CONN000079	1	CONN000080	1
CONN000081	1	CONN000082	1	CONN000083	1	CONN000084	1
CONN000085	1	CONN000086	1	CONN000087	1	CONN000088	1
CONN000089	1	CONN000090	1	CONN000091	1	CONN000092	1
CONN000093	1	CONN000094	1	CONN000095	1	CONN000096	1
CONN000097	1	CONN000098	1	CONN000099	1	CONN000100	1



# SMALL COLLECTIONS

- Nine small collections
- 75,100 total specimens
- Centralized digitization



# SMALL COLLECTIONS



# SMALL COLLECTIONS

## Centralized digitization of small collections

- Pros
- Cons

# ACKNOWLEDGEMENTS



National Science Foundation (EF1208829, EF1208835, EF1208972, EF1208973, EF1208975, EF1208989, EF1209149).



Symbiota Project

FilteredPush



**iPlant Collaborative™** *Empowering A New Plant Biology*



Biota of North America

**BONAP**