

NEON Biorepository @ ASU

Updates, Access & Use

Nico Franz, Ed Gilbert, Azhar Husain, Andrew Johnston
Laura Rocha Prado, Laura Steger & Kelsey Yule

ASU Biocollections & BioKIC



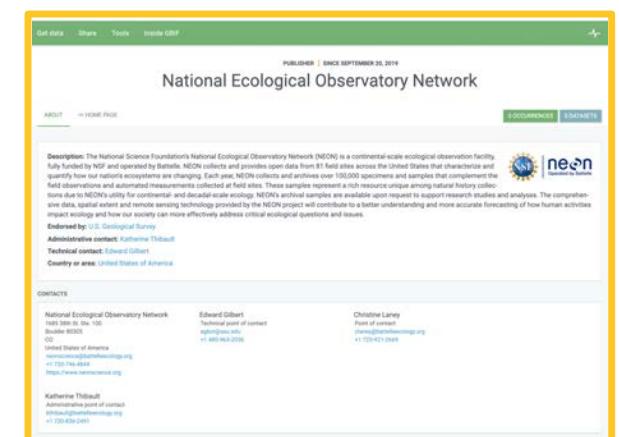
ASU Biodiversity Knowledge
Integration Center
Arizona State University

Biodiversity Next 2019 – Pre-Conference
Workshop W53 –
Using NEON samples and data in biodiversity research

Scheltema, Leiden, The Netherlands
Sunday, October 21, 2019

Brief history of the NEON Biorepository

- Spring 2017 – Call for proposals
- Fall 2017 – Site visit & revised proposal
- Summer 2018 – BMI/NEON subcontract
- Fall 2018 – 1st NEON shipments received
- Spring 2019 – NEON Biorepository team hired & **Loan activity initiated**
- Summer 2019 – **NEON BioRepo portal goes public**
- Fall 2019 – 1st wave of renovations planned (cryo storage), **> 98,500 samples** received and accessioned, **1st NEON collections published with GBIF**



NEON Biorepository Team



Dr. Nico Franz
Principal Investigator



Laura Steger
*Environmental & Zoological
Collections Manager*



Dr. Laura Rocha Prado
Bioinformatician (II)



Ed Gilbert
Bioinformatician (I)



Azhar Husain
Cryo Collections Manager



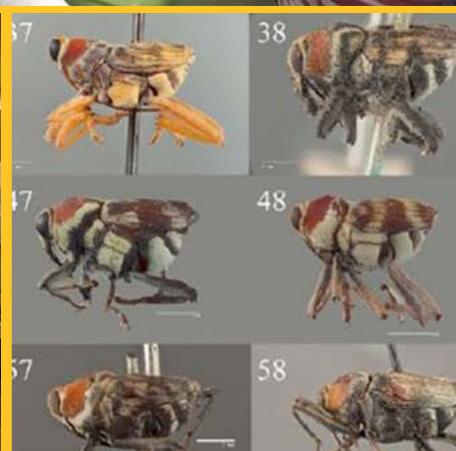
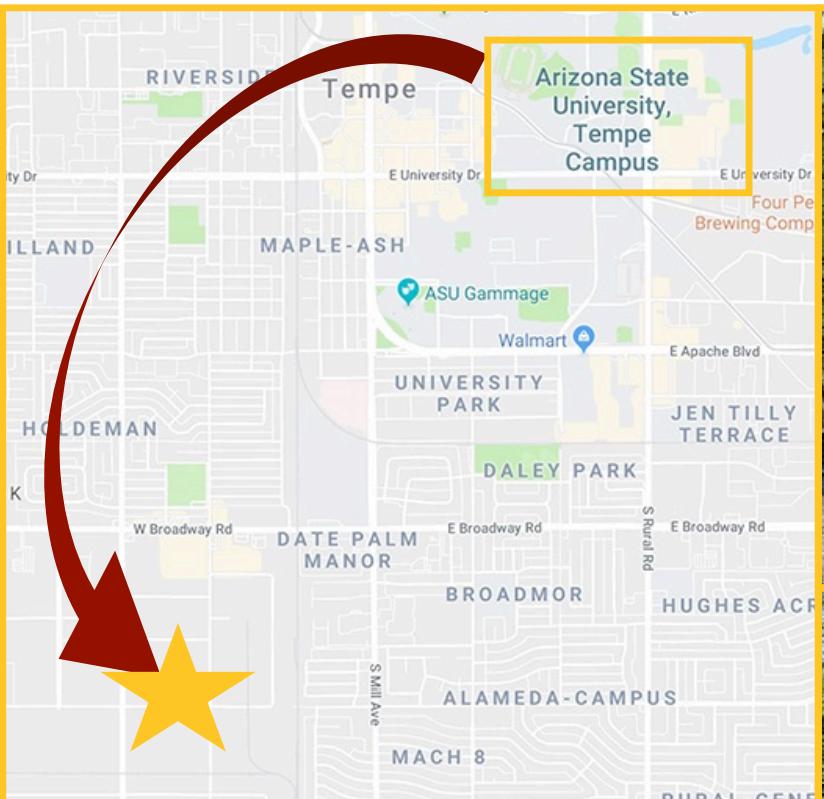
Dr. Andrew Johnston
Invertebrate Collections Manager

ASU
Biodiversity
Knowledge
Integration
Center
Arizona State
University



Dr. Kelsey Yule
Project Manager

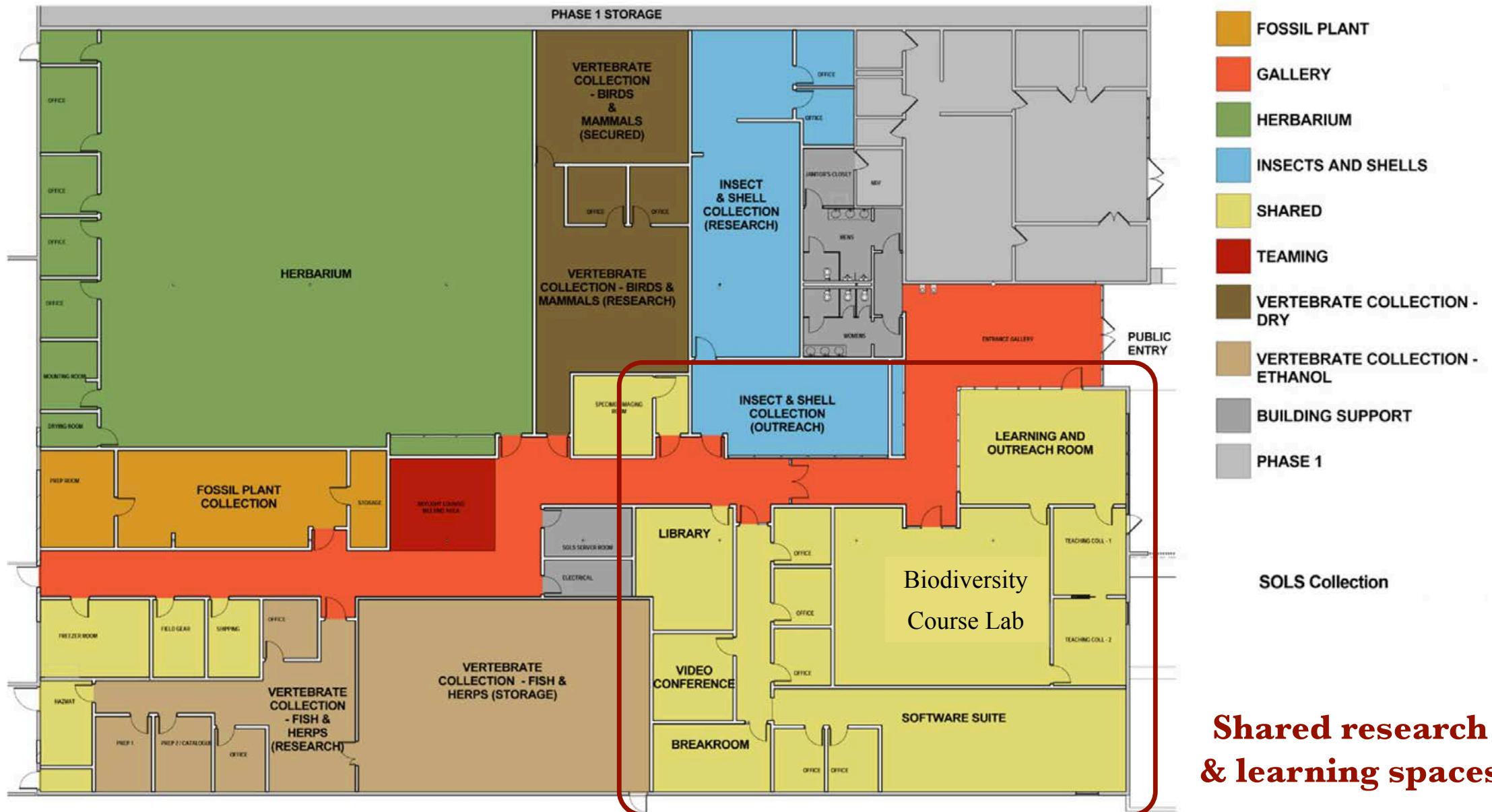
Biocollections facility in Tempe, AZ



Collections-centered activities

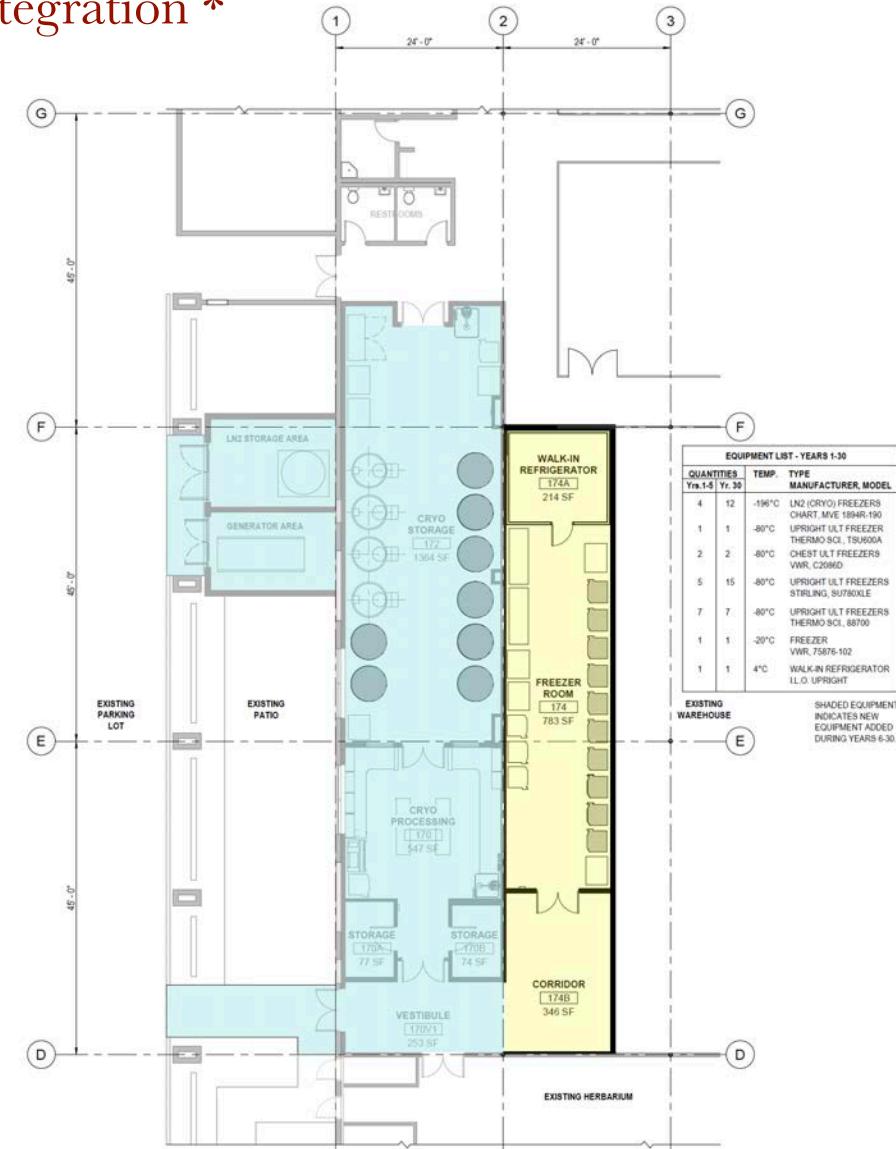
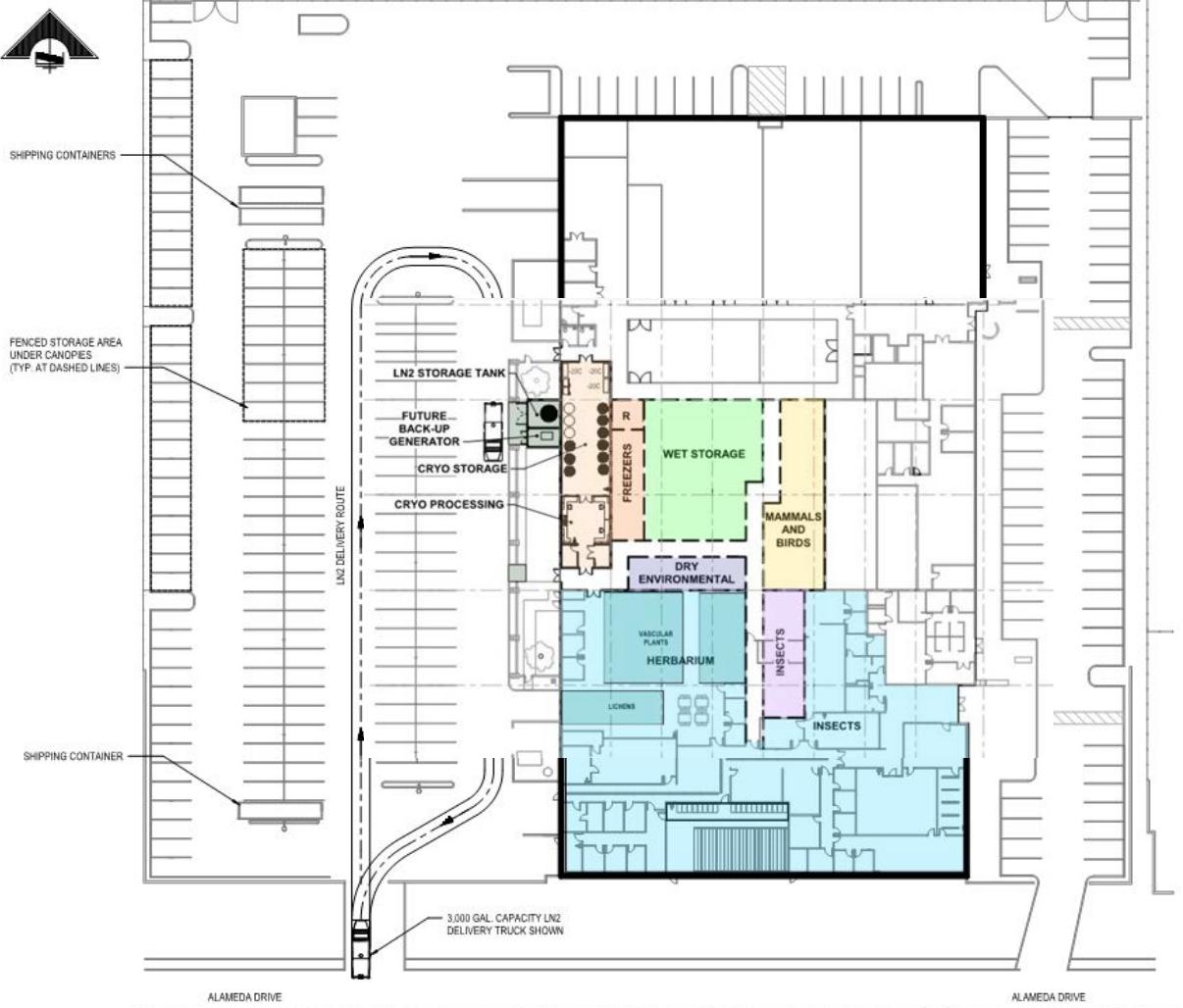


Biocollections floorplan (2014 to present)



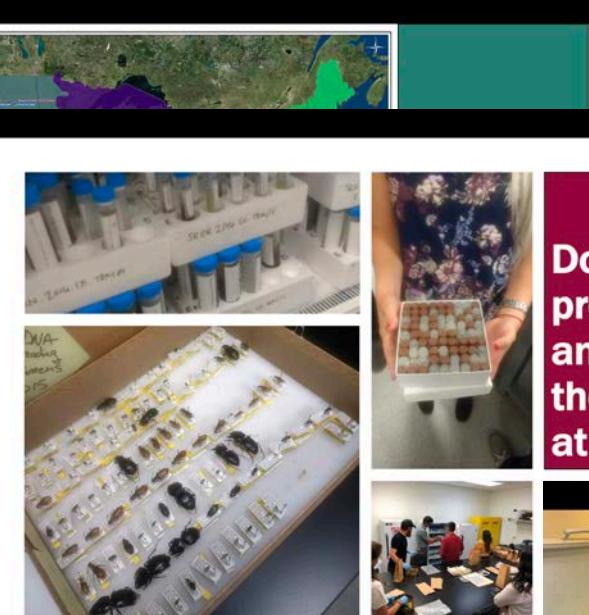
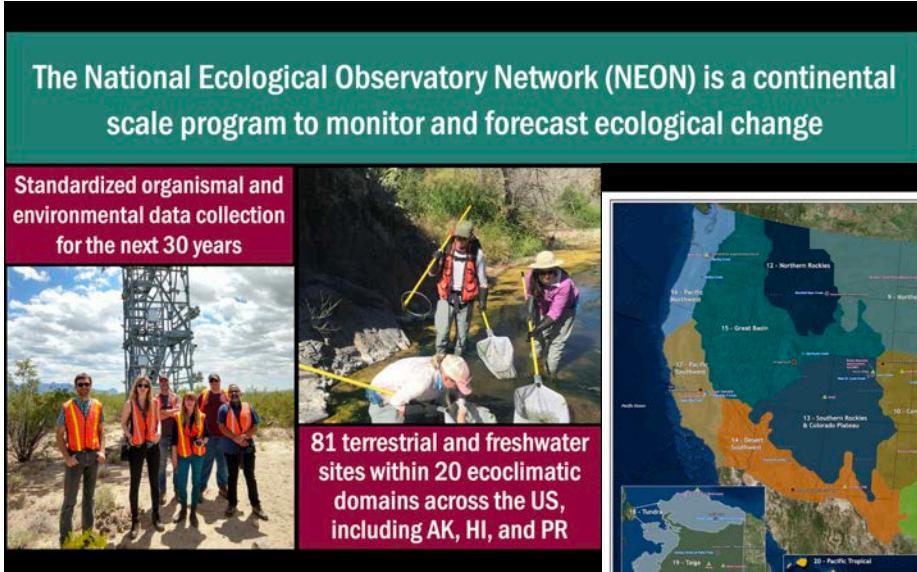
2020: ~3,500 sq.ft. cryo collections expansion

- Location in facility, detail design view, and long-term integration *



YEARS
1-5
SITE PLAN
NEON
BIOREPOSITORY

NEON sample flow to Biorepository



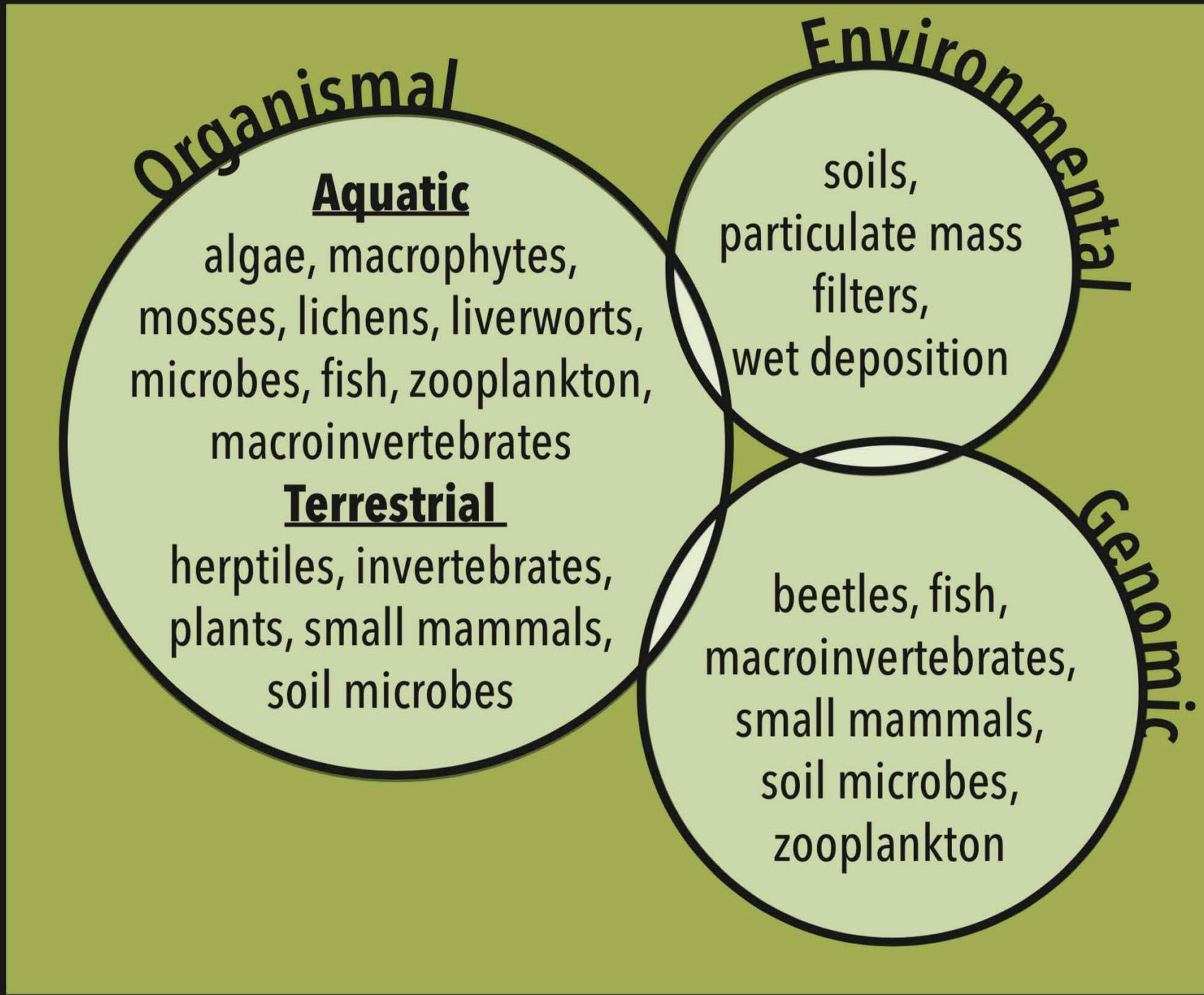
Domain facilities process samples and send them to the Biorepository at ASU



Samples are arriving and being curated daily

> 100k
samples /
year

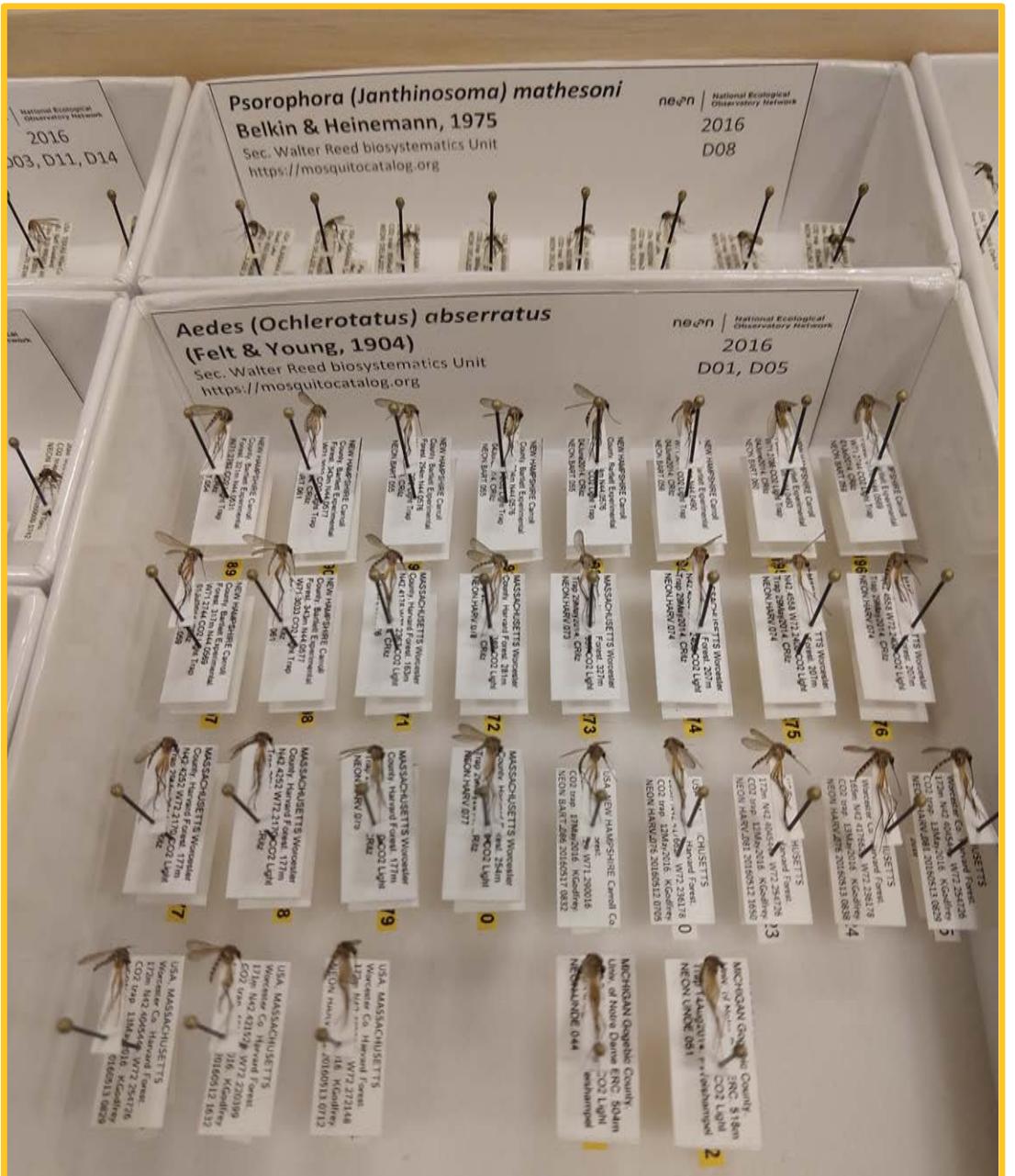
> 45 sample
classes



Sample Type	Volume/Year	Sample Type	Volume/Year
Algae: periphyton, seston, phytoplankton, diatoms		Plant	
DNA extractions (whole) ▲	500	Aquatic macrophytes - vouchers ■	50
Slides ■	700	Belowground biomass ■	900
Whole sample ●	700	Foliage ■	320
Macroalgae - whole sample ●	250	Tissue ▲	250
Aquatic Lichens, Mosses & Liverworts		Voucher ■	900
Vouchers	55	Vertebrate	
Invertebrate		Fish – DNA extractions▲	1,100
Carabids – DNA extractions ▲	4,500	Fish - fin clip ●	275
Carabids – pinned/pointed ■	9,000	Fish – voucher ●	275
Carabids – pooled ●	2,500	Herptiles – pitfall bycatch ●	200
Macroinvertebrates - pooled ●	800	Small mammal - blood▲	2,000
Macroinvertebrates – DNA extractions ▲	300	Small mammal - DNA extractions▲	1,750
Pitfall – pooled ●	3,750	Small mammal – fecal ▲	6,000
Mosquitoes – DNA extractions ▲	1,750	Small mammal – hair/whisker ■	4,000
Mosquitoes – disease pools ▲	21,000	Small mammal – ear punch ▲	4,000
Mosquitoes – pinned/pointed ■	3,000	Small mammal - voucher ● ■	750
Mosquitoes– pooled ▲	3,500	Environmental	
Tick – disease pools ▲	4,500	Litterfall ■	125
Zooplankton – DNA extractions ▲	75	Soil – frozen ▲	21,000
Zooplankton – pooled ●	75	Soil – dry ■	375
Microbial		Particulate mass filters (PM10) ■	150
Aquatic microbes - Sterivex filters ▲	850	Wet deposition ■	1,100
Soil microbes – DNA extractions ▲	2,500	Total >104,000 samples per year	

- Wet
- Dry / 4°C
- ▲ LN₂
- ◆ -80 / -20° C

Pinned mosquito & carabid voucher collections



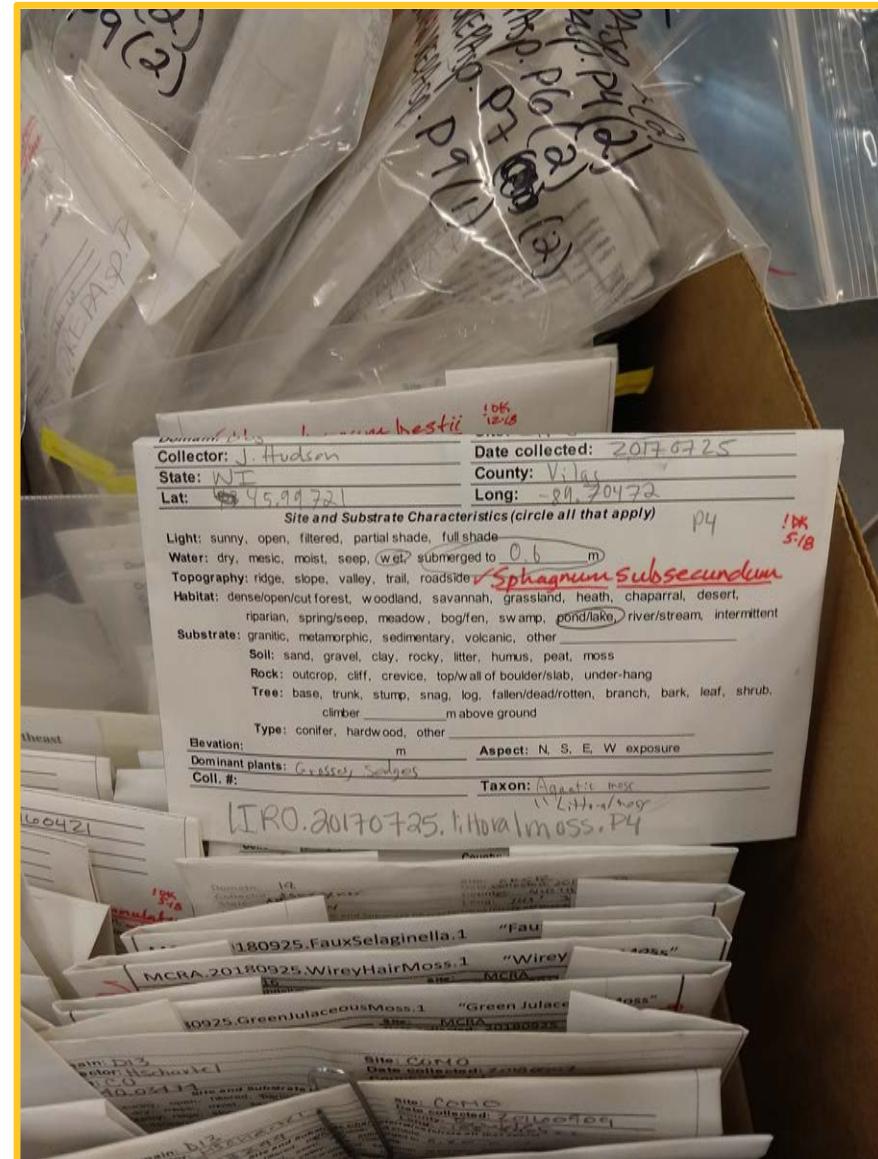
EtOH-preserved pitfall trap (by)catch



Aquatic macroinvertebrate and phytoplankton samples



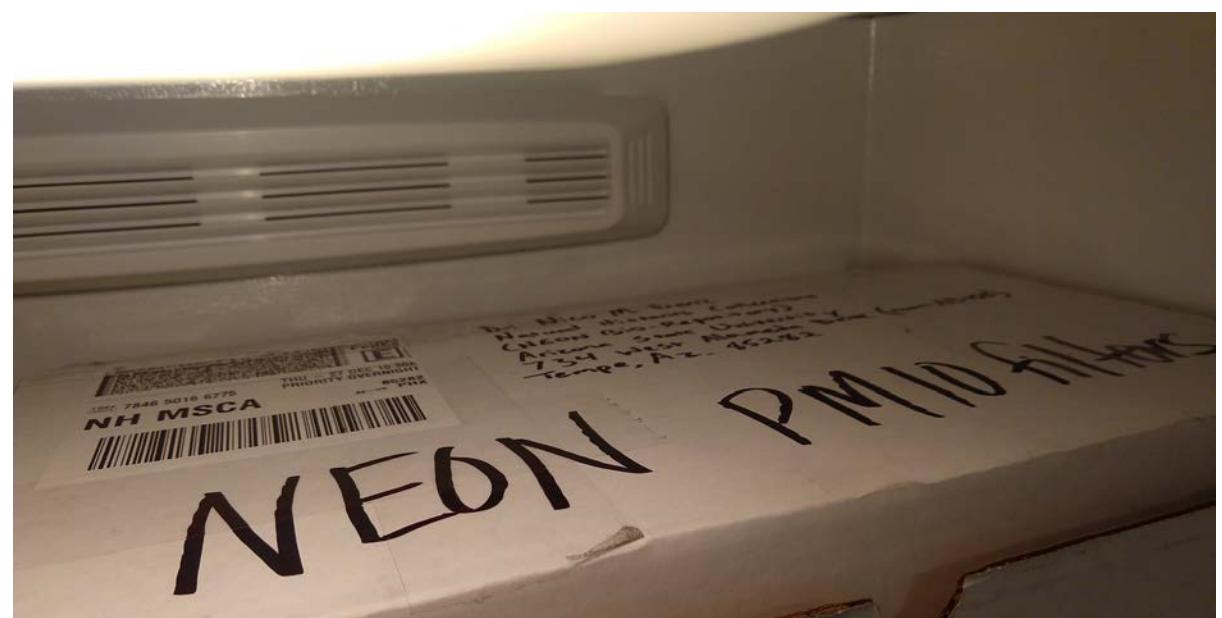
Plant vouchers: lichens, mosses, vascular plants



Whole vertebrate specimens (fish, herps, small mammals)



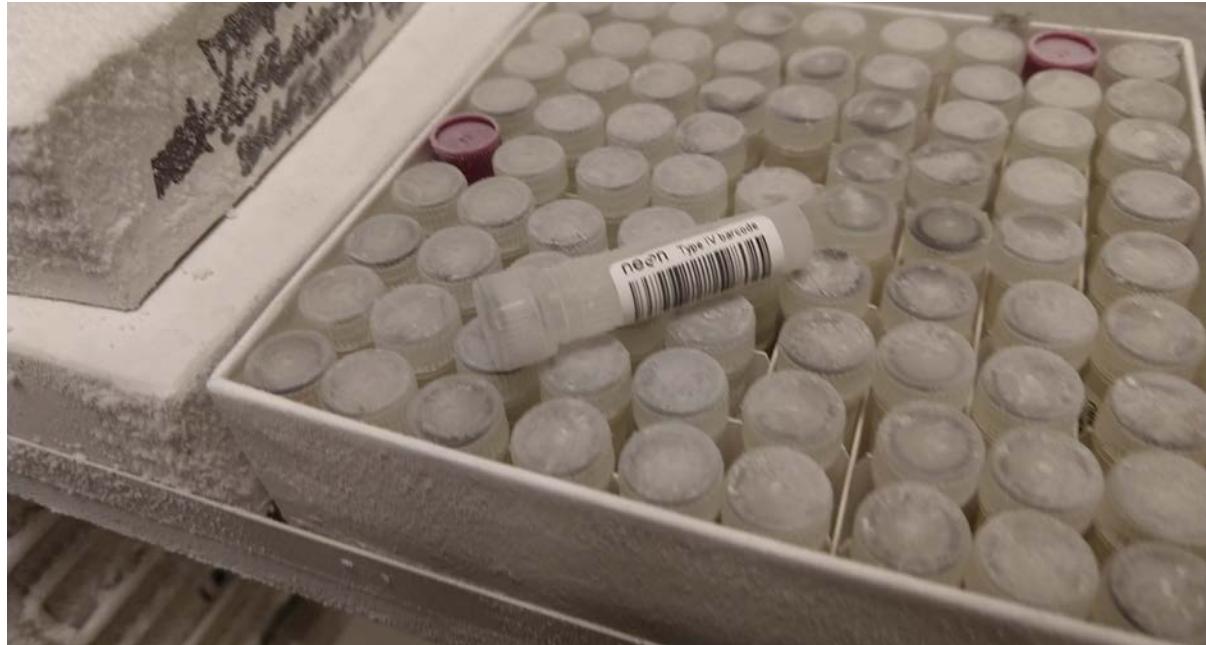
Environmental samples (soil, wet depositions, particles)



Mechanical freezer farm (2020 => LN2 addition)



Cryo-preserved samples (genomics, etc.)



How do I access NEON-collected samples and specimens?

biorepo@asu.edu

Biorepository Data Portal

<https://biorepo.neonscience.org/>



BIOREPOSITORY DATA PORTAL



SEARCH

IMAGES

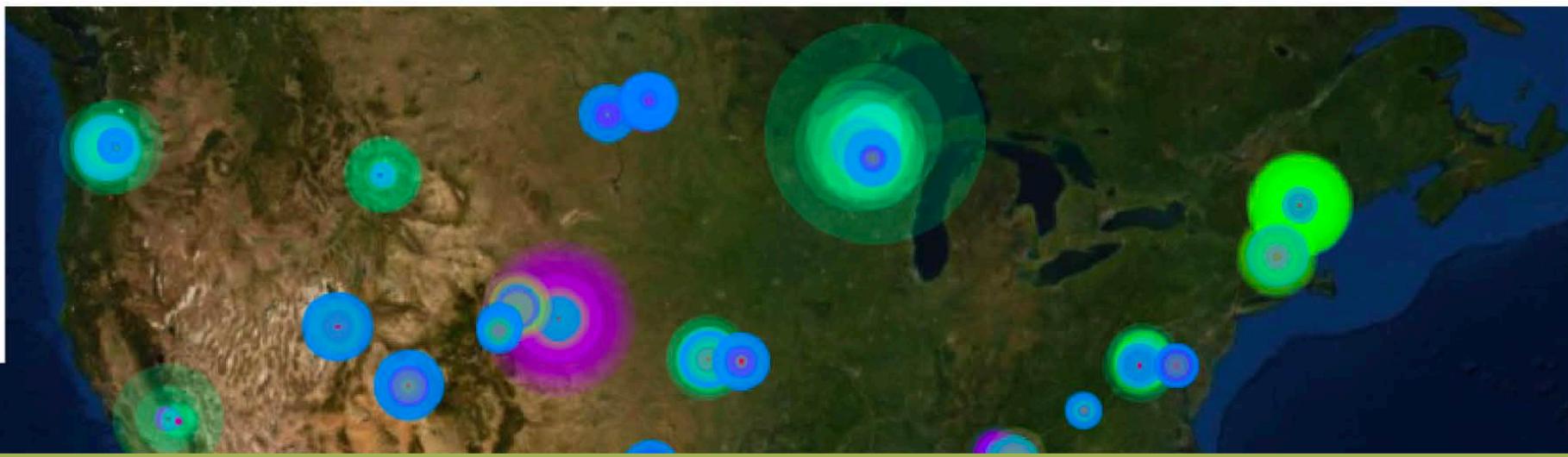
CHECKLISTS

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Discover and access sample-based data





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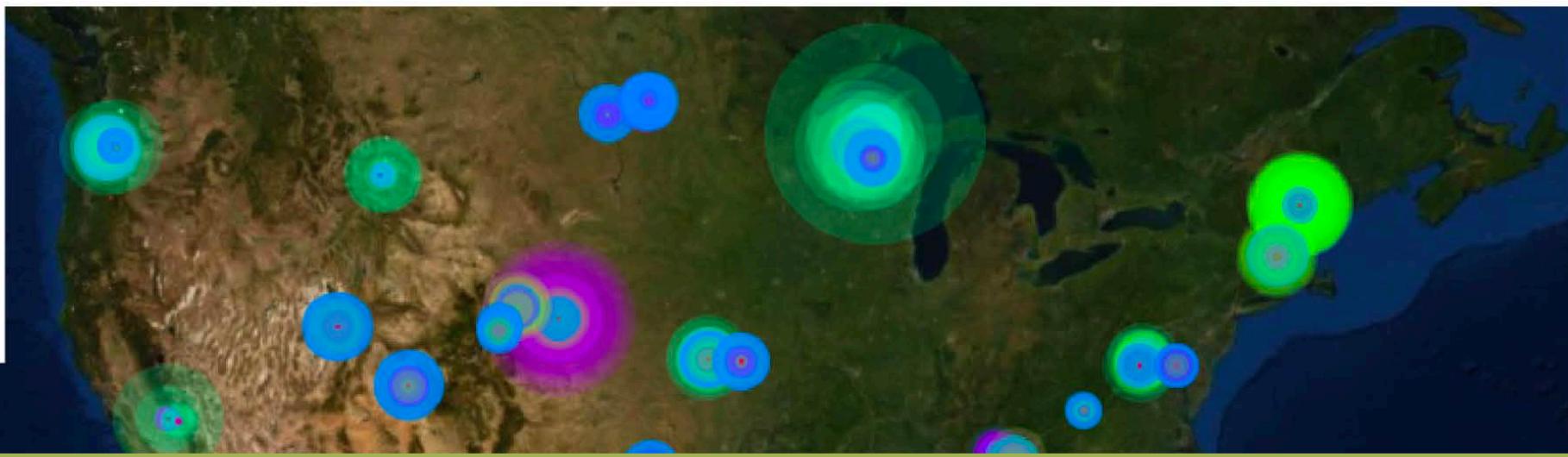
IMAGES

CHECKLISTS

SAMPLE USE

Discover and access sample

**Symbiota portal
like N. America:
SEINet or SCAN**





Biodiversity Data Journal 2: e1114
doi: [10.3897/BDJ.2.e1114](https://doi.org/10.3897/BDJ.2.e1114)



Software description

Symbiota - A virtual platform for creating voucher-based biodiversity information communities

Corinna Gries[†], Edward E. Gilbert[‡], Nico M. Franz[‡]

[†] University of Wisconsin, Madison, Madison, United States of America

[‡] Arizona State University, Tempe, United States of America

Corresponding author: Corinna Gries (cgries@wisc.edu)

Academic editor: Lyubomir Penev

Received: 19 May 2014 | Accepted: 19 Jun 2014 | Published: 24 Jun 2014

Citation: Gries C, Gilbert E, Franz N (2014) Symbiota – A virtual platform for creating voucher-based biodiversity information communities. Biodiversity Data Journal 2: e1114. doi: [10.3897/BDJ.2.e1114](https://doi.org/10.3897/BDJ.2.e1114)

Abstract

We review the Symbiota software platform for creating voucher-based biodiversity information portals and communities. Symbiota was originally conceived to promote small-to medium-sized, regionally and/or taxonomically themed collaborations of natural history

Frequently used software in North America for managing Natural History Collection occurrence records

Based on DwC standard

Mid-level data aggregation platform and user-driven content management system

View and contribute directly to sample data and publish annotations in this portal

Explore available samples



Sample search

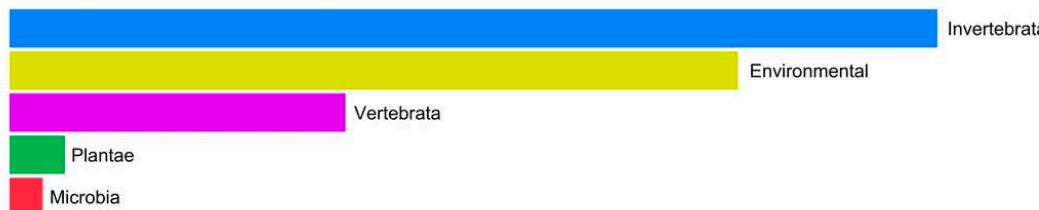


Map search



Checklists

> 62,000 samples *



Distribution of samples by collection type.

> 400 taxa *



Distribution of samples by top 5 determined taxa.

Data

Visit the [Data Usage Policy](#) page for information on how to cite data obtained from the NEON Biorepository Data Portal.

Specimens

Please consult the [Archival Sample Request information page](#) to initiate inquiries about sample accessibility and loans.

Contact

Join the portal as a regular visitor or contributor, and send direct feedback or inquiries to BioRepo@asu.edu.



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Specimens

 Select/Deselect All Environmental (NEON-EN)[SEARCH >](#) [Litter Sample Collection \(NEON-LISC\) more info...](#) [Particulate Mass Filter Collection \(NEON-PMFC\) more info...](#) [Soil Microbe Collection \(NEON-SOMIC\) more info...](#) [Soil Sample Collection \(NEON-SOSC\) more info...](#) External Collections

ENVIRONMENTAL (NEON-EN)

-  **Litter Sample Collection (NEON-LISC)** more info...
-  **Particulate Mass Filter Collection (NEON-PMFC)** more info...
-  **Soil Microbe Collection (NEON-SOMIC)** more info...
-  **Soil Sample Collection (NEON-SOSC)** more info...

[SEARCH >](#) **External Collections**

- SCAN Portal Network Arthropod Specimens (SCAN)** more info...
- SEINet Portal Network Botanical Specimens (SEINet-Plants)** more info...

 Invertebrata (NEON-IV)

-  **Aquatic Invertebrate Collection (NEON-AIVC)** more info...
-  **Carabid Collection - Archive Pooling (NEON-CARC-AP)** more info...
-  **Carabid Collection - Prepared Specimen (NEON-CARC-PS)** more info...
-  **Carabid Collection - Trap Sorting (NEON-CARC-TS)** more info...
-  **Chironomid Collection (NEON-CHIC)** more info...
-  **Invertebrate Bycatch Collection - Archive Pooling (NEON-IVBC-AP)** more info...
-  **Invertebrate Bycatch Collection - Trap Sorting (NEON-IVBC-TS)** more info...
-  **Mosquito Voucher Collection (NEON-MOSC)** more info...
-  **NEON Biorepository Invertebrate Collections at Arizona State University (ASU-NEON-IV)** more info...



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[Home](#) >> [Collections](#) >> **Search Criteria**[Login](#) [New Account](#) [Sitemap](#)

Enter Search Parameters

Fill in one or more of the following query criteria and click "Search" to view your results.

Taxonomic Criteria:

 Include SynonymsScientific Name **LIST DISPLAY****TABLE DISPLAY****RESET FORM**

Locality Criteria

Country:

Elevation (in meters): to

Latitude and Longitude

Bounding box 

Northern Latitude: N

Southern Latitude: N

Western Longitude: W

Eastern Longitude: W

Polygon (WKT footprint) 

Point-Radius 

Latitude: N

Longitude: W

Radius: Kilometers

Collector Criteria

Collector's Last Name:

Collector's Number:

Collection Date: -

Specimen Criteria

Catalog Number: Include other catalog numbers and GUIDs

Limit to Type Specimens

Limit to Specimens with Images

Limit to Specimens with Genetic Data

Include cultivated/captive occurrences

LIST DISPLAY

TABLE DISPLAY



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SAMPLE USE

ADDITIONAL INFORMATION

[Home](#) >> [Collections](#) >> **Search Criteria**[Login](#) [New Account](#) [Sitemap](#)

Enter Search Parameters

Fill in one or more of the following query criteria and click "Search" to view your results.

Taxonomic Criteria:

 Include Synonyms

Scientific Name



Aedes

LIST DISPLAY

TABLE DISPLAY

RESET FORM

Locality Criteria

Country:

State/Province:



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Species List

Occurrence Records

Maps

**Dataset:** NEON-MOSC**Taxa:** Aedes**Search Criteria:** excluding cultivated/captive occurrences

1 2 3 4 5 6 7 8 9 10 11 >> Last

Page 1, records 1-100 of 2781

Mosquito Voucher Collection

*Aedes communis* (De Geer, 1776)

2016-05-13

United States, Massachusetts, Worcester, Harvard Forest Site, CORE, Plot HARV_082 (plot dimensions: 0m), 42.482279 -72.272148, 172m

[Full Record Details](#)*Aedes fulvus pallens*

2017-07-18

United States, Alabama, Greene, Dead Lake Site, Plot DELA_032 (plot dimensions: 0m), 32.530107 -87.815715, 27m

[Full Record Details](#)*Aedes punctor* (Kirby, 1837)

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Map samples



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Species List

Occurrence Records

Maps



Google Map

[DISPLAY COORDINATES IN GOOGLE MAP](#)

Google Maps is a web mapping service provided by Google that features a map that users can pan (by dragging the mouse) and zoom (by using the mouse wheel). Collection points are displayed as colored markers that when clicked on, displays the full information for that collection. When multiple species are queried (separated by semi-colons), different colored markers denote each individual species.

Google Earth (KML)

This creates an KML file that can be opened in the Google Earth mapping application. Note that you must have Google Earth installed on your computer to make use of this option.

[CREATE KML](#)[Add Extra Fields](#)[Microsoft PowerPoint](#)



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Google Map

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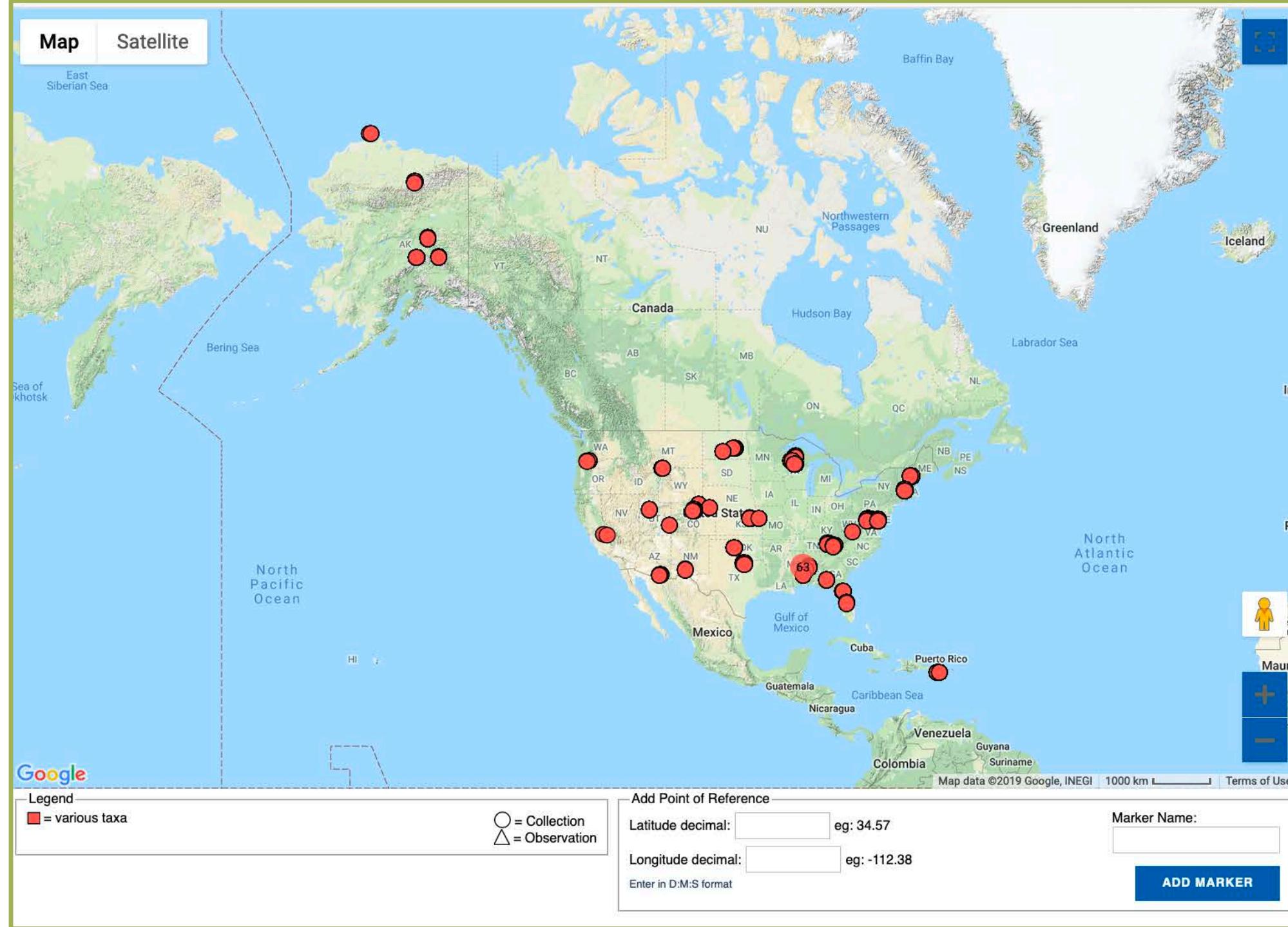
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[CREATE KML](#)[Add Extra Fields](#)

Microsoft PowerPoint

[Map](#)[Satellite](#)

View sample record details



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Species List

Occurrence Records

Maps

**Dataset:** NEON-MOSC**Taxa:** Aedes**Search Criteria:** excluding cultivated/captive occurrences

1 2 3 4 5 6 7 8 9 10 11 >> Last

Page 1, records 1-100 of 2781

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[Full Record Details](#)*Aedes fulvus pallens*

2017-07-18

United States, Alabama, Greene, Dead Lake Site, Plot DELA_032 (plot dimensions: 0m), 32.530107 -87.815715, 27m

[Full Record Details](#)*Aedes punctor* (Kirby, 1837)

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[Details](#)[Map](#)[Comments](#)[Linked Resources](#) [Share 0](#) [Tweet](#)

Mosquito Voucher Collection

Secondary Catalog #: MOS.D01.000432

Taxon: *Aedes communis* (De Geer, 1776)

Family: Culicidae

Collector:

Date: 2016-05-13

Locality: United States, Massachusetts, Worcester, Harvard Forest Site, CORE, Plot HARV_082 (plot dimensions: 0m)

42.482279 -72.272148 +-10m. WGS84

Elevation: 172 meters (564ft)

Habitat: woodyWetlands; slope aspect: 159.51; slope gradient: 4.3; soil type order: Inceptisols

Description: List of individual mosquitoes preserved as vouchers

Usage Rights: CC0 1.0 (Public-domain)

Record Id: 7015c1d0-8ea8-49bf-801a-7e794752a8db

For additional information on this specimen, please contact: NEON Biorepository (biorepo@asu.edu)

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Researchers are encouraged to become portal managers to link all sample-associated data

Download sample data



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Species List

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1 2 3 4 5 6 7 8 9 10 11 >> Last

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[Full Record Details](#)*Aedes punctor* (Kirby, 1837)

Firefox

Data Usage Guidelines

By downloading data, the user confirms that he/she has read and agrees with the general data usage terms. Note that additional terms of use specific to the individual collections may be distributed with the data download. When present, the terms supplied by the owning institution should take precedence over the general terms posted on the website.

Download Georeference Data

File Format: Comma Delimited (CSV)
 Tab Delimited

Character Set: ISO-8859-1 (western)
 UTF-8 (unicode)

Compression: Compressed ZIP file

DOWNLOAD DATA

**Download:
Darwin Core Archive**

Map search



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I access sample-based data



Search Criteria and Options

Collections Criteria Map Options

Select/Deselect All

Environmental (NEON-EN)

- Litter Sample Collection (NEON-LISC) more info...
- Particulate Mass Filter Collection (NEON-PMFC) more info...
- Soil Microbe Collection (NEON-SOMIC) more info...
- Soil Sample Collection (NEON-SOSC) more info...

External Collections

- SCAN Portal Network Arthropod Specimens more info... (SCAN)
- SEINet Portal Network Botanical Specimens more info... (SEINet-Plants)

Invertebrata (NEON-IV)

- Aquatic Invertebrate Collection (NEON-AIVC) more info...
- Carabid Collection - Archive Pooling more info... (NEON-CARC-AP)
- Carabid Collection - Prepared Specimen more info... (NEON-CARC-PS)
- Carabid Collection - Trap Sorting (NEON-CARC-TS) more info...
- Chironomid Collection (NEON-CHIC) more info...
- Invertebrate Bycatch Collection - Archive Pooling (NEON-IVBC-AP) more info...
- Invertebrate Bycatch Collection - Trap Sorting more info... (NEON-IVRC-TS)
- Mosquito Voucher Collection (NEON-MOSC) more info...

NEON Biorepository Invertebrate Collections at Arizona State University (ASU-NEON-IV) more info...

Microbia (NEON-MI)

- Benthic Microbe Collection (NEON-BEMC) more info...
- Surface Water Microbe Collection (NEON-SWMC) more info...

Plantae (NEON-PL)

- Aquatic Plant Point Count Taxonomy Collection (NEON-APPCTC) more info...

The map displays the eastern coast of North America from the Great Lakes to the Gulf of Mexico and the Atlantic Ocean. It highlights several states: Illinois, Indiana, Ohio, Kentucky, Tennessee, Mississippi, Alabama, Georgia, South Carolina, North Carolina, Virginia, and Florida. Major cities like Springfield, Indianapolis, Columbus, Cincinnati, Louisville, Lexington, Nashville, Memphis, Huntsville, Chattanooga, Birmingham, Tuscaloosa, Jackson, Montgomery, Columbus, Atlanta, Savannah, Jacksonville, Mobile, Pensacola, Panama City Beach, Tallahassee, Daytona Beach, Orlando, Tampa, and New Orleans are marked. A green shaded area labeled "Mark Twain National Forest" is visible in western Missouri and eastern Kansas. The "Mosquito Voucher Collection (NEON-MOSC)" is indicated by a red rectangular box around the collection name in the search criteria, which corresponds to the green shaded area on the map.

Map

Satellite

Microsoft Word

Map data ©2019 Google, INEGI | 100 km | Terms of Use

Search Criteria and Options

Collections Criteria Map Options

RESET SEARCH

Include Synonyms
 Scientific Name
Taxa: Aedes

Country:

State/Province:

County:

Locality:

Use the shape tools on the map to select occurrences within a given shape.

Collector's Last Name:

Collector's Number:

Collection Date: -

Catalog Number:

Include other catalog numbers and GUIDs
 Limit to Type Specimens Only
 Limit to Specimens with Images Only
 Limit to Specimens with Genetic Data Only
 Include cultivated/captive occurrences

The map displays the southeastern region of the United States, including parts of Illinois, Indiana, Ohio, Kentucky, Tennessee, Mississippi, Alabama, Georgia, South Carolina, North Carolina, Virginia, Maryland, Delaware, and Florida. Numerous green dots represent the locations of Aedes species occurrences. Major cities labeled include Springfield, Indianapolis, Columbus, Cincinnati, Louisville, Lexington, Roanoke, Richmond, Norfolk, Virginia Beach, Greensboro, Durham, Asheville, Charlotte, Winston-Salem, Memphis, Huntsville, Chattanooga, Birmingham, Tuscaloosa, Jackson, Montgomery, Atlanta, Columbia, Savannah, Charleston, Myrtle Beach, Jacksonville, Tallahassee, Mobile, Pensacola, Panama City Beach, Daytona Beach, Orlando, Tampa, and West Palm Beach. The state boundaries and major rivers are also visible.

Map Satellite

Map data ©2019 Google, INEGI 100 km Terms of Use



Records and Taxa

Records

Collections

Taxa List

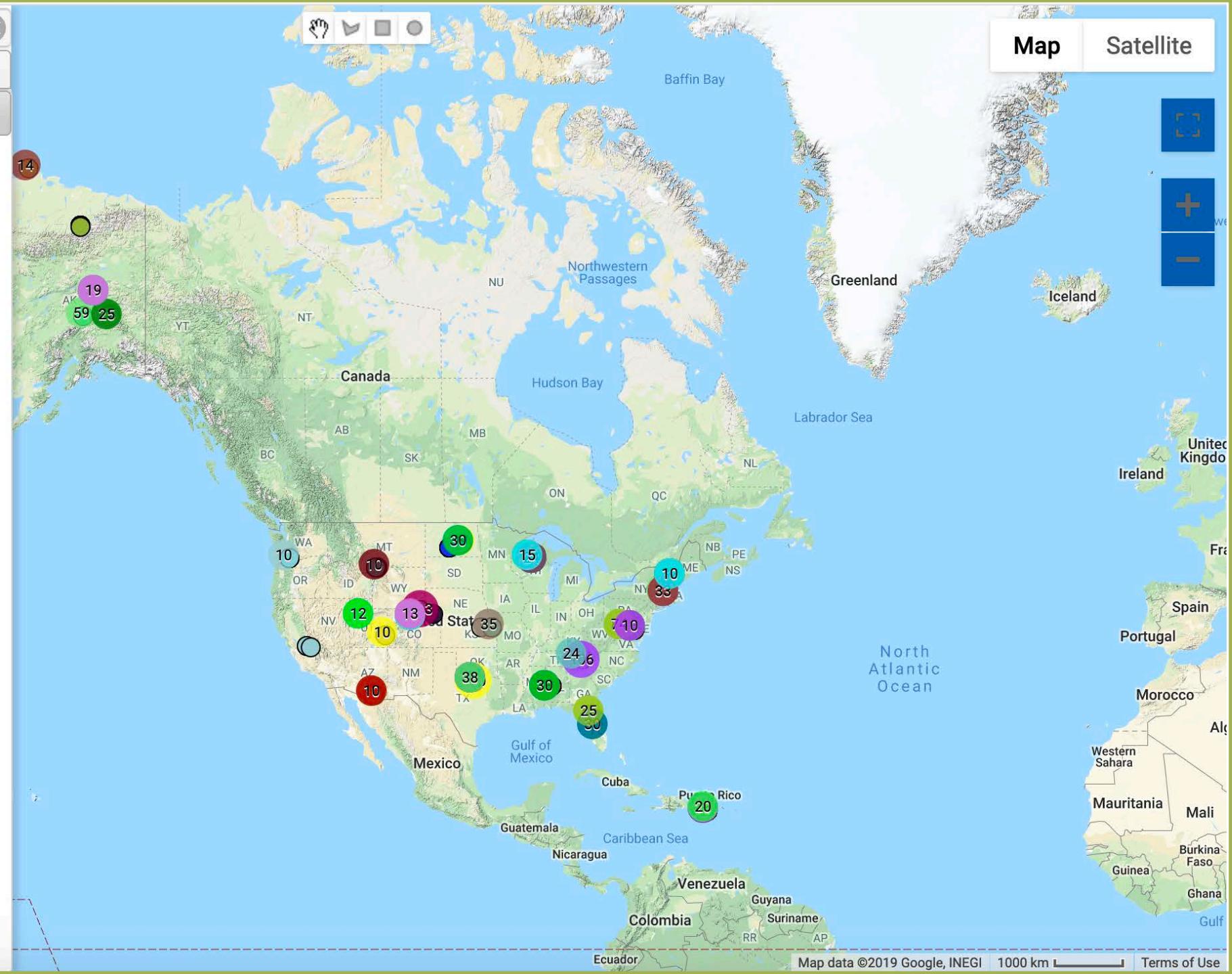
RESET SYMBOLOGY

AUTO COLOR

Taxa Count: 53

CULICIDAE

- █ = *Aedes aboriginis*
- █ = *Aedes aegypti*
- █ = *Aedes albopictus*
- █ = *Aedes atlanticus*
- █ = *Aedes aurifer*
- █ = *Aedes canadensis*
- █ = *Aedes canadensis canadensis*
- █ = *Aedes cantator*
- █ = *Aedes cataphylla*
- █ = *Aedes cinereus*
- █ = *Aedes communis*
- █ = *Aedes diantaeus*
- █ = *Aedes dorsalis*
- █ = *Aedes dupreei*
- █ = *Aedes excrucians*
- █ = *Aedes fitchii*
- █ = *Aedes flavescens*
- █ = *Aedes fulvus pallens*
- █ = *Aedes grossbecki*
- █ = *Aedes hendersoni*
- █ = *Aedes hexodontus*
- █ = *Aedes impiger*
- █ = *Aedes implicatus*
- █ = *Aedes increpitus*
- █ = *Aedes infirmatus*
- █ = *Aedes intrudens*
- █ = *Aedes mediovittatus*
- █ = *Aedes mitchellae*
- █ = *Aedes monticola*
- █ = *Aedes nigripes*
- █ = *Aedes piaromaculalis*



Map

Satellite



Search Criteria and Options

Collections Criteria Map Options

RESET SEARCH

Include Synonyms

Scientific Name

Taxa: Aedes

Country:

State/Province:

County:

Locality:

Within the selected rectangle.

DELETE SELECTED SHAPE

Collector's Last Name:

Collector's Number:

Collection Date:

Catalog Number:

Include other catalog numbers and GUIDs

Limit to Type Specimens Only

Limit to Specimens with Images Only

Limit to Specimens with Genetic Data Only

Include cultivated/captive occurrences

TERRITORIES

Map Satellite

Records and Taxa

Map data ©2019 Google, INEGI 500 km Terms of Use

A map of North America showing occurrence points for the genus Aedes. The map includes Canada, the United States, and parts of Mexico and Greenland. Occurrence points are represented by numbered circles of various colors (e.g., orange, green, blue, red) scattered across the continent. A red arrow points from the 'SEARCH' button in the search criteria panel to the top center of the map, indicating where the search results are displayed.

▶ Search Criteria and Options



Map

Satellite

▼ Records and Taxa

Records

Collections

Taxa List

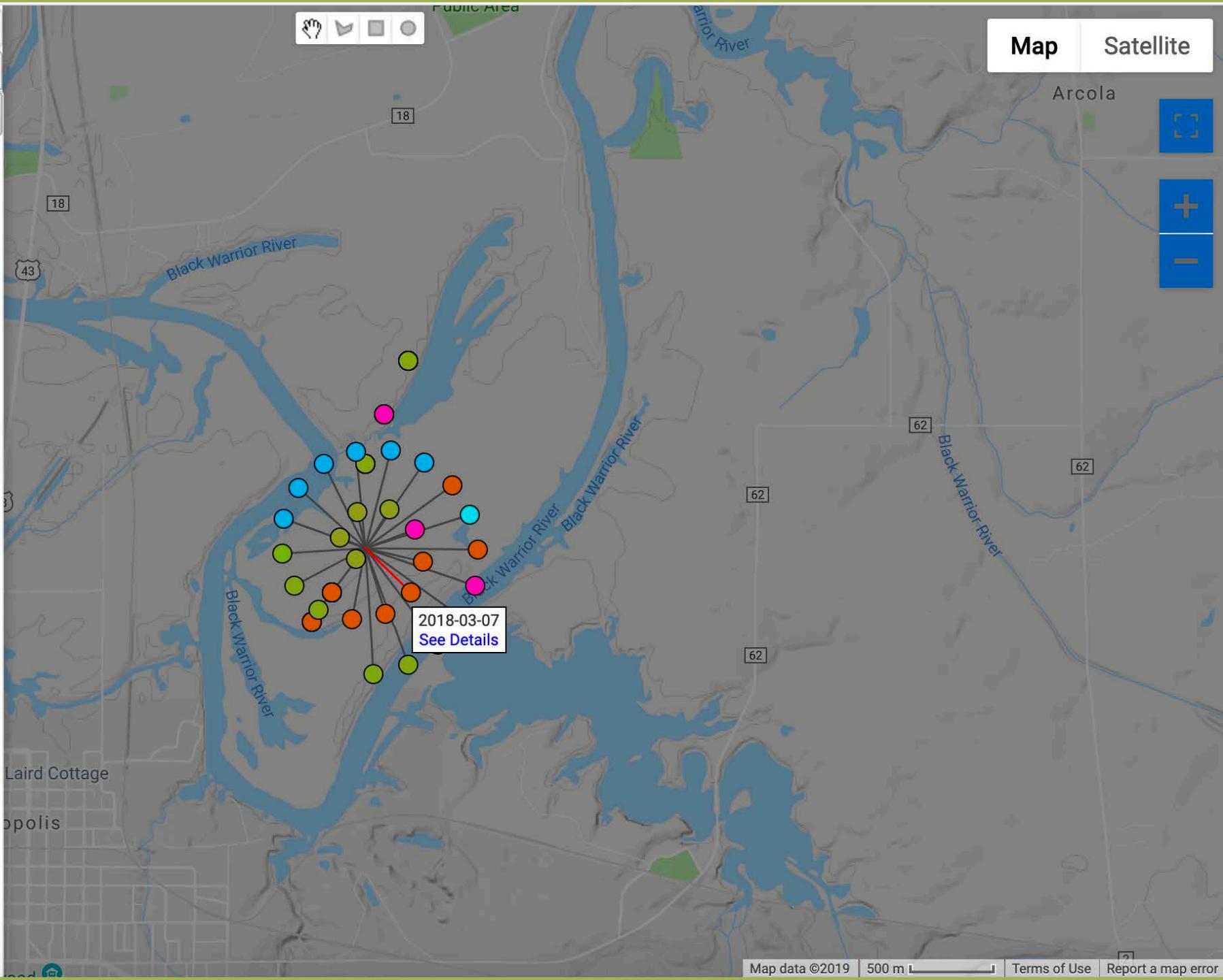
RESET SYMBOLOGY

AUTO COLOR

Taxa Count: 12

CULICIDAE

- [Green square] = *Aedes albopictus*
- [Blue square] = *Aedes atlanticus*
- [Yellow square] = *Aedes canadensis*
- [Brown square] = *Aedes canadensis canadensis*
- [Dark Green square] = *Aedes dupreei*
- [Dark Green square] = *Aedes fulvus pallens*
- [Cyan square] = *Aedes hendersoni*
- [Light Blue square] = *Aedes infirmatus*
- [Orange square] = *Aedes sticticus*
- [Dark Green square] = *Aedes triseriatus*
- [Light Blue square] = *Aedes trivittatus*
- [Pink square] = *Aedes vexans*



National Forests

Search Criteria and Options

Records and Taxa

Records Collections Taxa List

1 2 3 4
Page 1, records 1-100 of 302

Catalog #	Collector	Date	Scientific Name
	Not available	2016-07-08	Aedes albopictus
	Not available	2016-07-28	Aedes albopictus
	Not available	2016-08-04	Aedes albopictus
	Not available	2016-08-04	Aedes albopictus
	Not available	2016-08-17	Aedes albopictus
	Not available	2016-08-17	Aedes albopictus
	Not available	2016-08-18	Aedes albopictus
	Not available	2016-08-18	Aedes albopictus
	Not available	2016-08-18	Aedes albopictus
	Not available	2016-08-24	Aedes albopictus
	Not available	2016-08-30	Aedes albopictus
	Not available	2017-06-13	Aedes albopictus
	Not available	2017-06-13	Aedes albopictus
	Not available	2017-06-14	Aedes albopictus
	Not available	2017-06-20	Aedes albopictus

Pickensville Memphis Aliceville Tuscaloosa Vance Calera Jemison Rockford Ecle Wetumpka Pike Rd Catherine Hayneville Ramer Highland Home Chapman Georgiana Luverne Goshen Brantley

Map Satellite

Download: Darwin Core Archive

Map data ©2019 Google, INEGI 20 km Terms of Use Report a map error

Request samples

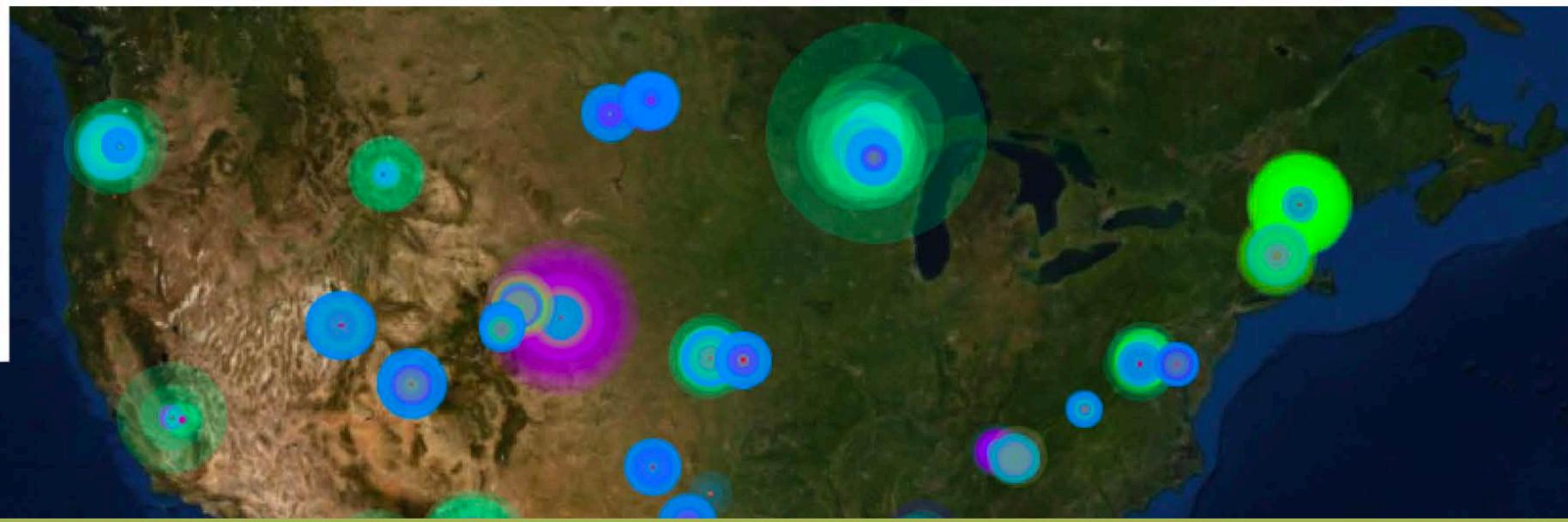


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BIOREPOSITORY DATA PORTAL

[SEARCH](#)[IMAGES](#)[CHECKLISTS](#)[SAMPLE USE](#)[ADDITIONAL INFORMATION](#)[SAMPLE USE POLICY](#)[SAMPLE REQUEST](#)[Login](#) [New Account](#) [Sitemap](#)

Discover and access sample-based data



Sample Use Policy

NEON, the National Ecological Observatory Network, aims to provide "open data to understand how our aquatic and terrestrial ecosystems are changing". Therefore, the [NEON Sample Use Policy](#) reflects the need to provide researchers with access to NEON samples for a wide-variety of purposes while preserving the future research potential of those samples.

- [Contact us](#) well in advance of any grant proposal deadlines in order to optimally integrate sample uses into project narratives, data management plans, and budgets.
- The NEON Biorepository data portal is capable of hosting or linking to many forms of sample-associated data. Researchers using samples are strongly encouraged to become portal managers in order to disseminate their data to the public.
- The NEON Biorepository Advisory Committee, consisting of Biorepository and NEON staff as well as the external Biorepository Technical Working Group, may be consulted prior to approval of any sample use request.
- Sample uses can be non-invasive, invasive, consumptive, or destructive. Uses that reduce the future research potential of a sample will likely require stronger justification and a plan to disseminate all sample-associated data.
- Researchers are responsible for proper handling of all samples, adhering to all aspects of the sample use agreement, and following all NEON and National Science Foundation data reporting and citation policies.

Please read the [full policy](#) for more details and [contact us](#) for more information.

Acceptable sample uses, sample use approval process

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SEARCH

IMAGES

CHECKLISTS

SAMPLE USE

ADDITIONAL INFORMATION

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Sample Use Policy

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Sample Use Request

NEON Biorepository at Arizona State University - Sample Use Request Form

Version 01.2 - August 8, 2019

NEON, the National Ecological Observatory Network, aims to provide "open data to understand how our aquatic and terrestrial ecosystems are changing". NEON samples are meant to be used very frequently; however, immediate usage must be balanced against the potential future research value of those same samples. Additionally, data associated with these samples should be openly available. In keeping with these needs, the NEON Biorepository at Arizona State University (ASU) requires information in order to process sample use requests.

Visit the NEON Biorepository Data Portal (<https://biorepo.neonscience.org>) to explore sample availability. Samples are being added to the portal as they arrive at ASU. Some sample classes and legacy samples may be located at other facilities. Contact us (BioRepo@asu.edu) if you are interested in samples not listed on the portal.

Please consult the latest version of the NEON Sample Use Policy for guidelines. Send an e-mail request to BioRepo@asu.edu for more information.

* Required

Email address *

Your email

NEXT

Page 1 of 4

Submit this form for Letters of Support or to receive samples for research

Contact us at biorepo@asu.edu with inquiries

Sample Use Request

In the future:
Full integration
of NEON sample
requests into
BioRepo portal

NEON Biorepository at Arizona State University - Sample Use Request Form

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* Required

Email address *

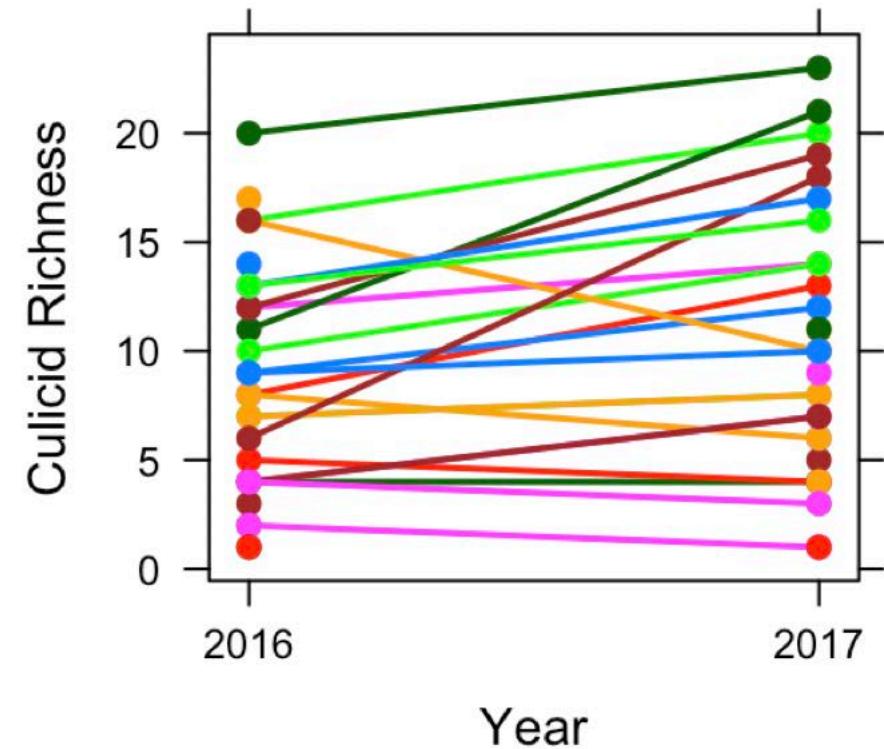
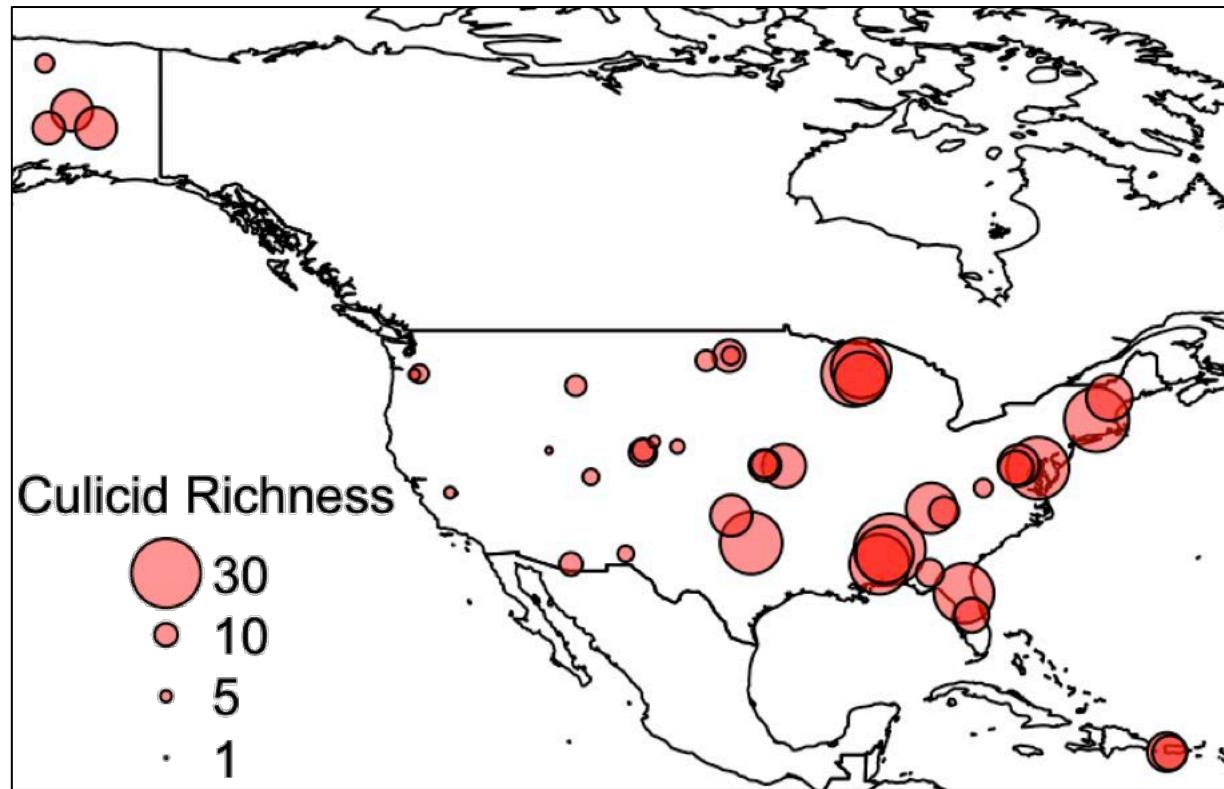
Your email

Load sample records into R

```
##### Set Your Working Directory #####
setwd("~/MyFilePath/")

##### Read in Your Data #####
my.data<-read.csv("MyBiorepositoryData.csv")
```

Explore records in R



Relevant R packages for analyses of Biorepository occurrence record data

vegan (BiodiversityR) – descriptive community ecology

maxent – species distribution modeling

picante – phylogenetic community ecology

phenology – describe species' phenologies

bdvis – visualize biodiversity data coverage, gaps, biases

spocc – download occurrence records from other biodiversity
portals

neonUtilities – download and format NEON data



**Samples are
already being
used for
research**

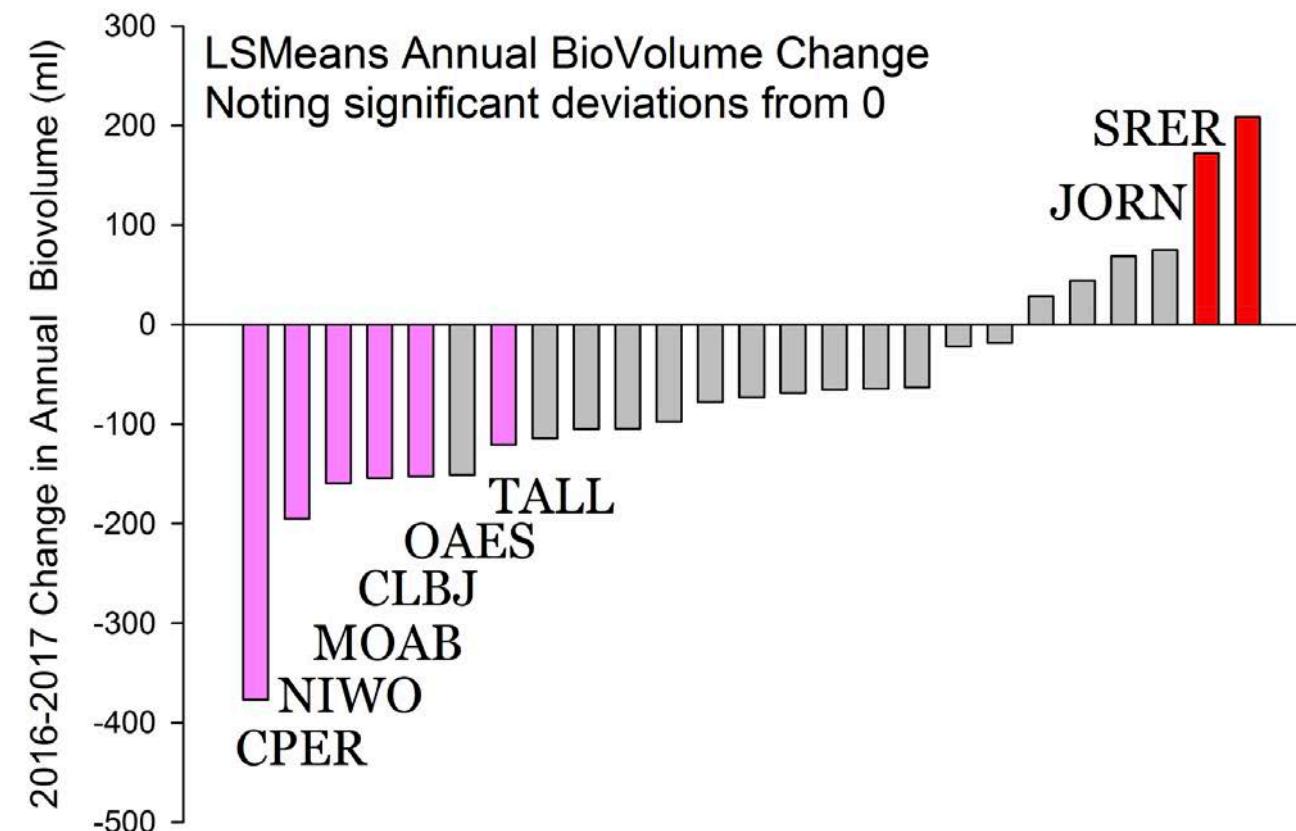
Early research:

Annual *localized* change (increase vs. decrease) in invertebrate biovolume per NEON site.

*Unpublished, preliminary data
provided by Kaspari, Weiser, &
co-authors, University of
Oklahoma.*

Two-year trend, 2016-2017, geographic scale, by site

If we break this down across the 29 sites, the trend is stronger. Below is the adjusted mean change in activity density by biovolume, taking from a GL Mixed Model that includes site, habitat type, and the annual biovolume in 2016 (as it varies 100-fold from 18 to 2558 ml/year across the sites). Note, even with incomplete sampling, 6 of the sites show a significant decrease in annual biovolume, and two show an increase. You can detect a regional signature (the southwest deserts are increasing, the Basin and Range/Rocky mountains are decreasing). Using our productivity, air temperature, cloud cover data, we have the opportunity to test geographic models for this variation for the first time. If these models are robust then they provide the hope for a mechanistic model of biotic response to climate change.





Bulk invertebrates –
Macroecology, species
discovery, community
dynamics

Identified mosquitos –
Phylogenomics

DNA extracts from soil –
Microbial ecology
etc.

Weiser & Kaspari request / loan

Project description (< 1 page; length will vary with scope of project)

A key aim of **MacroSystems** ecology is to **quantify and predict how Earth's great abiotic drivers**--temperature, precipitation, and biogeochemistry--**govern how ecological communities of individuals and species vary from place to place**. Community data at continental extents are sparse and restricted to a few taxa. They vastly underrepresent the **terrestrial arthropods**--perhaps the most diverse and abundant animal group--in part due to the immense effort required to count, size, and identify taxa ranging from mites to ants to beetles to spiders. Yet the few existing arthropod datasets suggest that as one travels from deserts to rainforests, terrestrial arthropod communities vary by orders of magnitudes in abundance (the number of individuals), size (mass per individual), activity (the rate at which individuals do work on the system), and diversity (the number of species/forms). Combined, these four variables help predict how arthropods regulate ecosystem processes like decomposition, herbivory, and seed dispersal.

This knowledge gap will be filled, and **MacroSystems** ecology transformed, by the analysis of samples from the NEON pitfall network (arrays of traps, sunk in the soil, that capture and store biweekly samples of arthropods in ethanol). It will develop two complementary methods to do so. Environmental Bar Coding samples and identifies pitfall taxa from extracts of ethanol. Image Analysis uses machine learning to count, size, and classify arthropods in a sample. Pitfall samples containing key orders of Earth's arthropods will be analyzed from NEON's 47 sites, and Environmental Bar Coding and Image Analysis

Reiskind & Wiegmann request / loan

Project description (< 1 page; length will vary with scope of project)

This study focuses on **phylogenomic sampling and analysis to address evolutionary questions at the species-level and above in mosquitoes (Insecta: Diptera: Culicidae)**. Phylogenetic understanding of mosquitoes lags well behind most other major economically or biomedically important insects. Four primary objectives guide our efforts to reconstruct the evolutionary history of mosquito species and associated aetiological agents through phylogenomics: 1) To generate DNA sequences from field collected mosquitoes and museum holdings using anchored enrichment (AHE) processes to identify monophyletic lineages and establish relationships within and among all higher Culicid taxa, from specific to family level; 2) **Use comprehensively sampled phylogenetic estimates for Aedine clades that contain taxa that have crossed ecological boundaries to address evolutionary questions about domestication, and accompanying habitat- and host-shifts that appear to drive the evolution of major disease vectors;** 3) To anchor these changes within the biogeographic and temporal context of mosquito diversification, and test the effects of ecological change on diversification rates in multiple areas of the Culicid tree, and 4) To further expand the development of an existing species and pathogen biodiversity database (www.VectorMap.si.edu), to include a data-enabled, interactive phylogeny of World mosquitoes that provides a contextualized interface for evolutionary studies of mosquito ecology, evolution, species interactions and taxonomic identification. Intellectual Merit: Phylogeny estimates will be used as a comparative and temporal framework **to test hypotheses involving ecological specialization, microorganism interactions, and host use in mosquitoes.** Phylogenetic

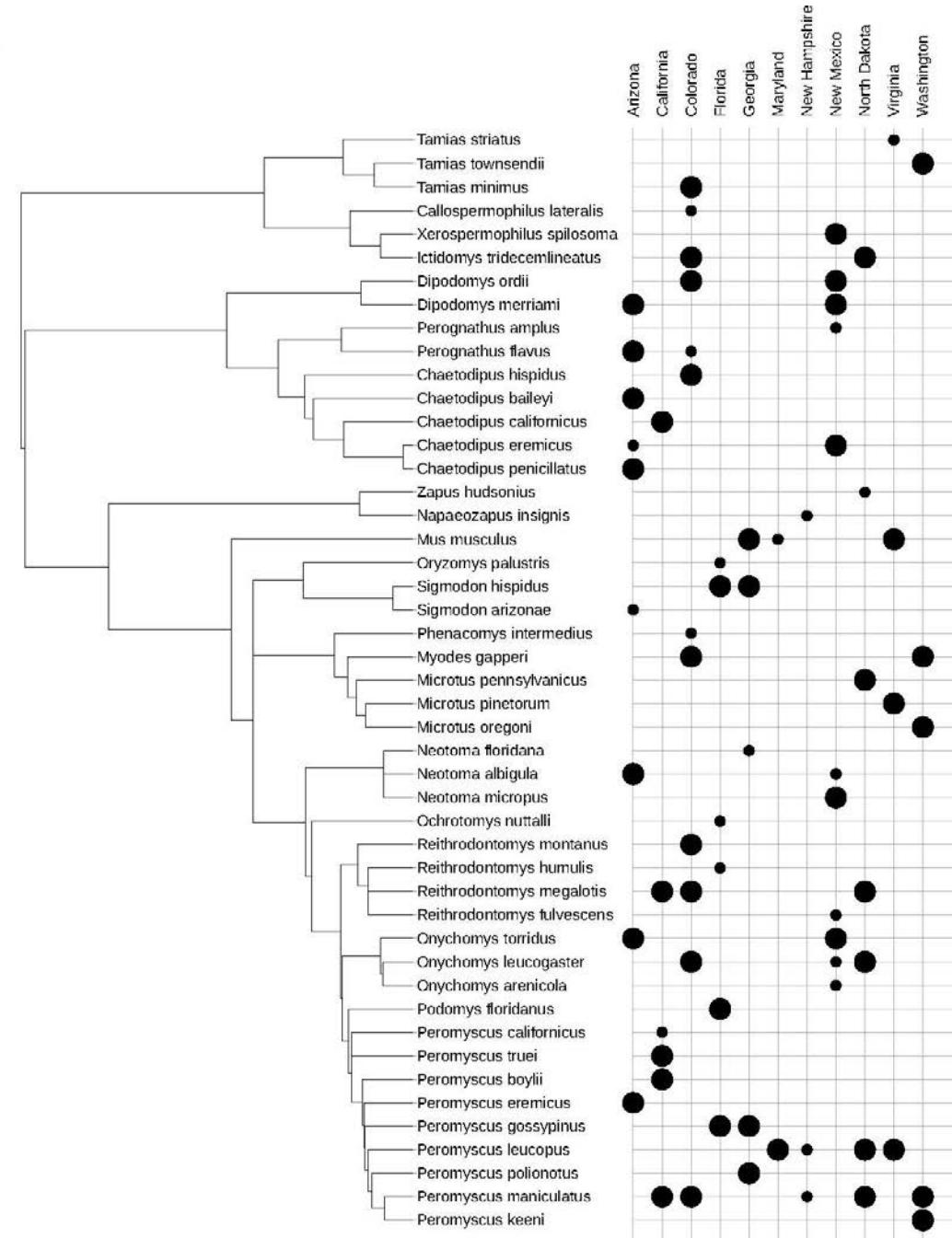
Allen request for aquatic macroinvertebrates

Project description (< 1 page; length will vary with scope of project)

As our climate changes, natural disturbance regimes are being disrupted and magnified. Floods and droughts in particular are increasing in frequency and severity. Understanding how ecosystems will respond to these changes is critical and pressing scientific need. Although ecologists have studied ecosystem stability for decades, we have done so without consistency in the way we have measure stability. Instead, we have typically used different measures in different studies, measures that may or may not be related. Further, we have typically only used a single measure of stability at a time. **A new framework, “*the dimensionality of ecological stability*”** has been developed to address these problems. It uses a multivariate approach to measure “dimensional stability,” and can be used in theoretical and empirical approaches. But this theory is still in its infancy, and key questions about what ecological properties contribute to dimensional stability are still unknown. Here I propose to advance this theory by investigating how disturbance regimes, species traits, and dimensional stability are related. I will do so using an integrated research and educational approach by **developing new theoretical models and a new high-frequency long-term data NEON dataset using DNA metabarcoding**. These models and datasets will be the foundation for open access ecology curriculum modules that I will develop and use in my courses. Students in these courses will be recruited for summer REU positions to develop research projects that will contribute to the proposed research.

Moeller request for small mammal fecal sample microbiomes

Tree scale: 10



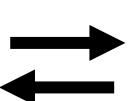


Least Chipmunk
Tamias minimus

Extending the reach of NEON data with natural history collections and citizen science

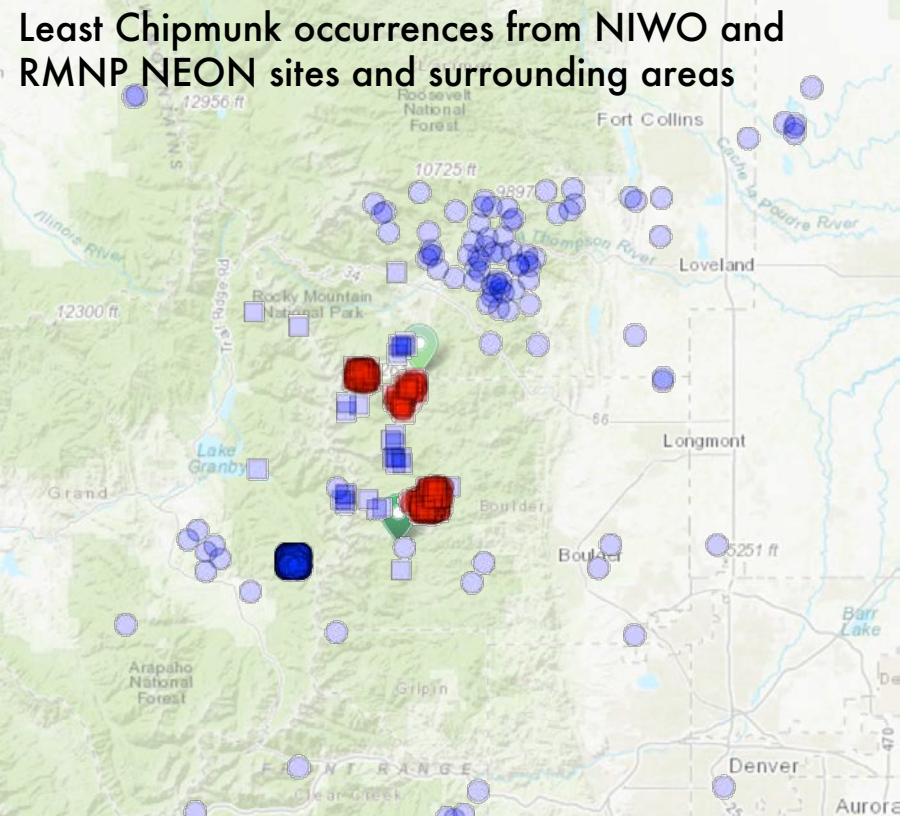
NEON sampling data

Highly structured,
self-referential,
change-focused



Other biodiversity data

Expansive taxonomic,
geographic, and
temporal extent



iNaturalist (citizen science),
iDigBio (collections),
National Phenology
Network
&
NEON

962 non-NEON observations
32 non-NEON specimens

222 NEON captures with
associated specimens/samples

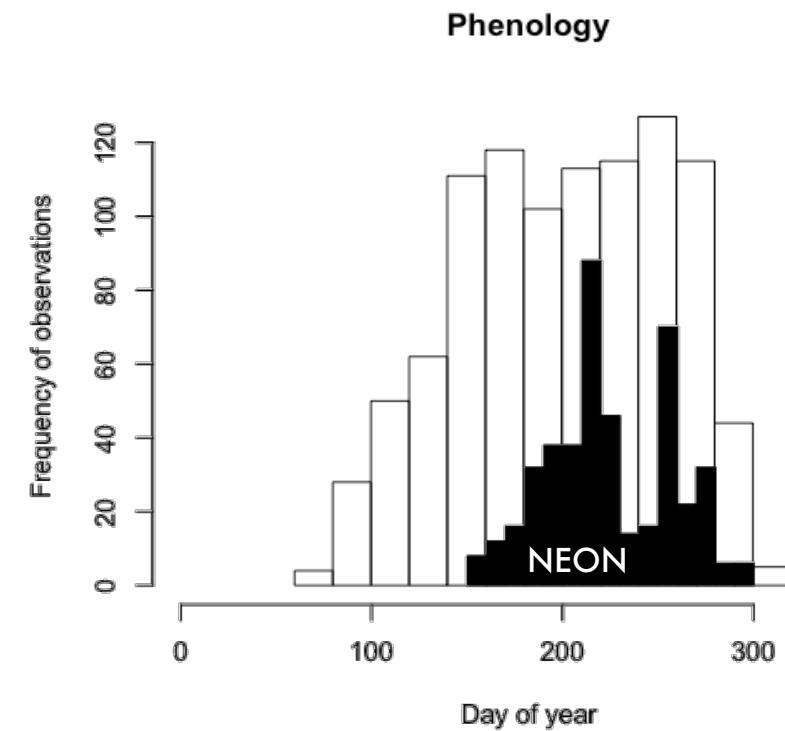
NEON: 2015 - 2019
Other specimens: 1952 - 2014
Other observations: 2001 - 2019

How can we meaningfully integrate
NEON and other biodiversity data
sets?

In doing so, will we improve our
ability to forecast ecological change?

What drives differences in signal
between these data sets?

How can we use NEON
Biorepository samples to move
beyond the insights provided by
presence data alone?



What is new here?

- Data from the NEON Biorepository can play a privileged role in **connecting, contrasting, and reciprocally strengthening the ecological monitoring / forecasting and natural history collections communities.**
- For instance:
 - New insights into the connection between **sampling strategy and sample suitability for specific research questions**. How strong does it need to be, for what purpose? Do we need more biorepositories?
 - How can each complementary data body **mitigate weaknesses** inherent in the other? Can NEON be amplified through natural history collections data, and new sampling be driven "from the outside?"
 - Developing magnitude-of-**change-focused software/query layers**. **"Tell me where to look! Where are things changing the most?"**

NEON Biorepository:

How to promote uptake, use,
impact most effectively?

Contact us...

biorepo@asu.edu



NEON Biorepository samples – October 19, 2019

Number	Count of sampleClass Row Labels	Column Labels			(blank) Grand Total
		N	Y	(blank)	
1	amb_fieldParent_in.archiveID	687	15	702	
2	amb_fieldParent_in.sampleID	37		37	
3	amc_fieldCellCounts_in.archiveID	835	12	847	
4	apc_perTaxon_in.sampleIDmacroalgae	104		104	
5	apc_perTaxon_in.sampleIDplant	51		51	
6	apc_voucher_in.sampleID	22		22	
7	apl_domainLab_in.sampleIDmacroalgae	99		99	
8	apl_domainLab_in.sampleIDplant	41		41	
9	bbc_chemistryPooling_in.bgcArchiveID	1261		1261	
10	bet_archivepooling_in.subsampleID.bet	2917		2917	
11	bet_archivepooling_in.subsampleID.herp	140		140	
12	bet_archivepooling_in.subsampleID.ib	12984	93	13077	
13	bet_IDandpinning_in.individualID	5887		5887	
14	bet_sorting_in.subsampleID.bet	3469		3469	
15	bet_sorting_in.subsampleID.herp	1112		1112	
16	bet_sorting_in.subsampleID.ib	2060		2060	
17	bet_sorting_in.subsampleID.mam	71		71	
18	cfc_chemistrySubsampling_in.archiveSampleID	906	44	950	
19	div_voucher_in.voucherSampleID.herp	1		1	
20	dpm_fieldData_in.sampleID	55		55	
21	fsh_perFish_in.voucherSampleID	224		224	
22	inv_fielddata_in.sampleID	485		485	
23	inv_persample_in.chironomidVialID	20		20	
24	inv_pertaxon_in.slideID	43		43	
25	inv_pervial_in.referenceID	41		41	

26	ltr_chemistrySubsampling_in.archiveSampleID	252	252
27	mam_pertrapnight_in.bloodSampleID	1530	1530
28	mam_pertrapnight_in.earSampleID	3083	1
29	mam_pertrapnight_in.fecalSampleID	5145	5145
30	mam_pertrapnight_in.hairSampleID	3885	3885
31	mam_pertrapnight_in.voucherSampleID	876	876
32	mam_voucher_in.voucherSampleID.herp	1	1
33	mam_voucher_in.voucherSampleID.mam	14	14
34	mos_archivepooling_in.archiveVialIDList	1981	1981
35	mos_identification_in.individualIDList	6830	6830
36	ptx_taxonomy_in.freezeDried	300	300
37	ptx_taxonomy_in.preserved	1541	1541
38	ptx_taxonomy_in.slideID	2051	2051
39	ptx.taxonomy_in.freezeDried	341	341
40	sls_bgcSubsampling_in.bgcArchiveID	941	962
41	sls_soilCoreCollection_in.geneticArchiveSample1ID	5063	2583
42	sls_soilCoreCollection_in.geneticArchiveSample2ID	5063	2583
43	sls_soilCoreCollection_in.geneticArchiveSample3ID	5062	2553
44	sls_soilCoreCollection_in.geneticArchiveSample4ID	3775	2136
45	sls_soilCoreCollection_in.geneticArchiveSample5ID	3756	2135
46	wdp_collection_in.chemSubsampleID	141	1
47	zoo_fieldData_in.sampleID	207	207
	(blank)		
	Grand Total	85390	13118
			98508