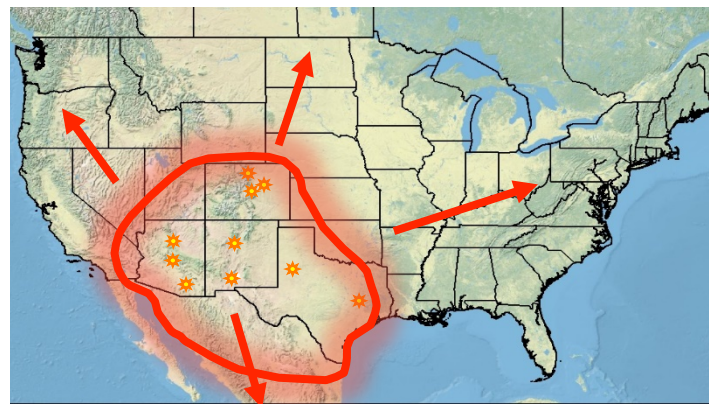


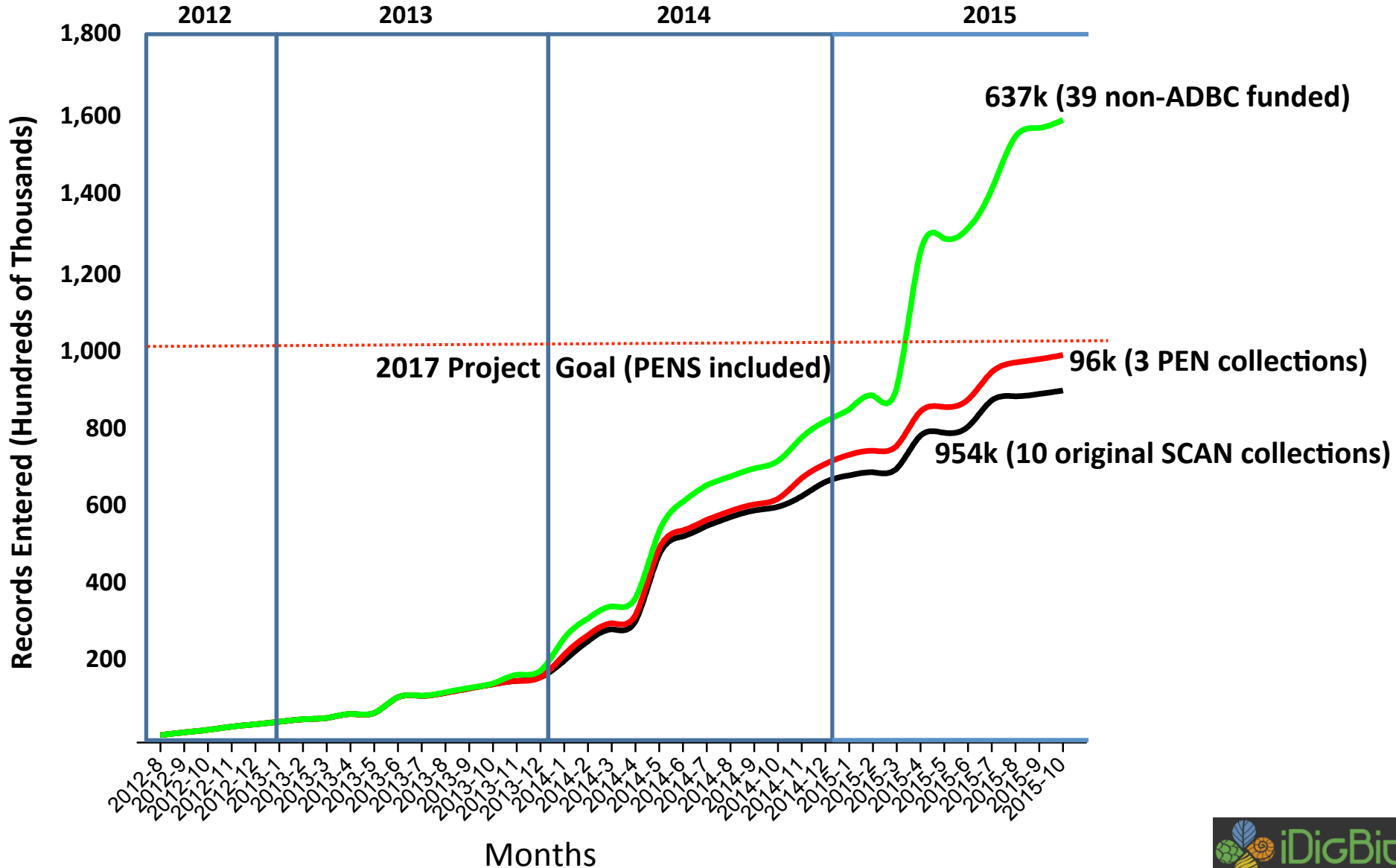


Symbiota Collections of Arthropods Network (SCAN)

A Data Portal Built to Visualize, Manipulate, and Export Species Occurrences

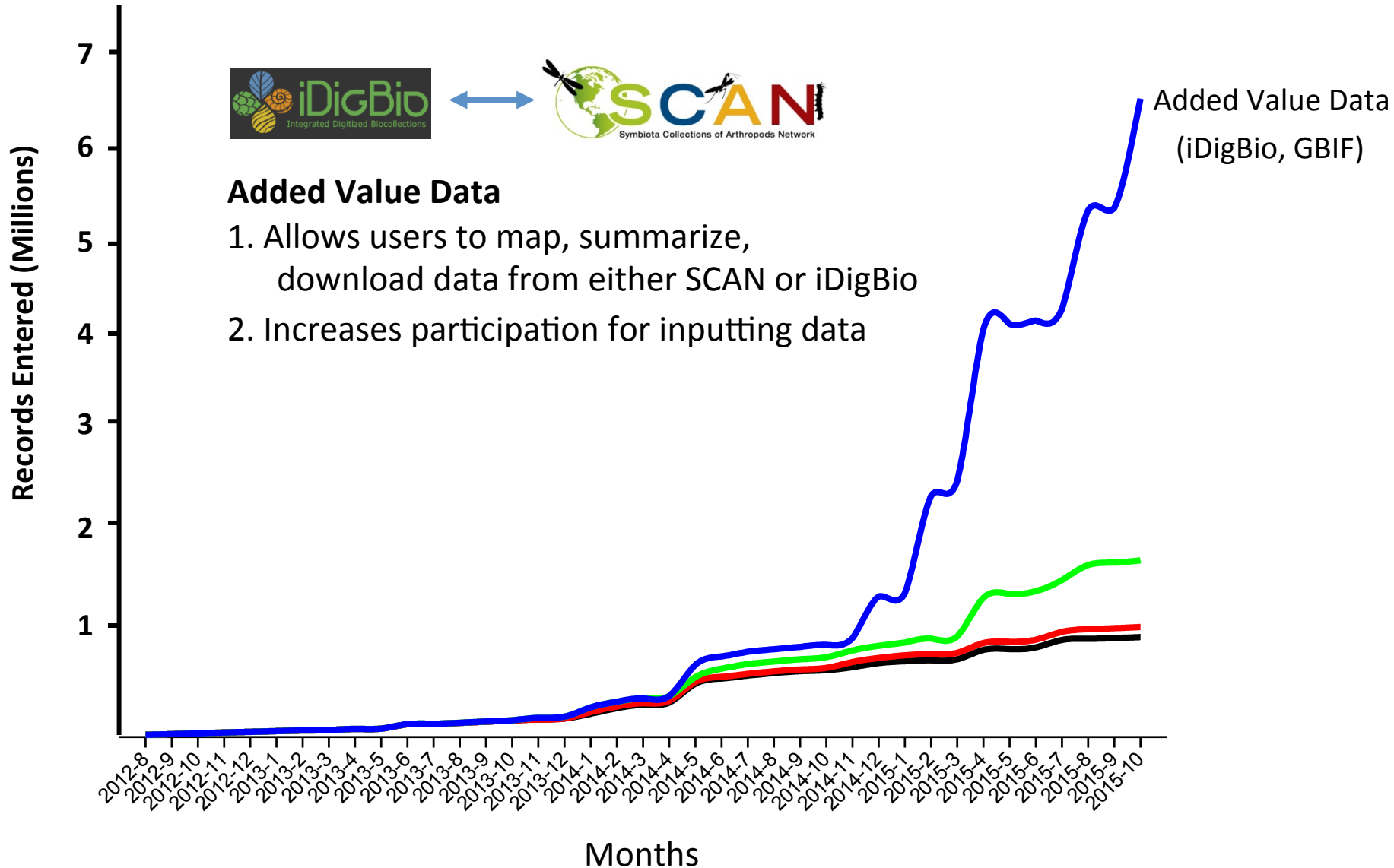


Broader Impact Digitizing: 1.68 million



Towards a Complete Arthropod Portal

6,250,725 specimen records served



Challenges Using Digitized Arthropod Data for Global Change Research

- ✦ Achieving critical mass: 250 million specimens in North American collections, but <10 million digitized (~4%)
- ✦ 62% of specimens in North American collections identified to species
- ✦ 10% of North American arthropod species have “enough” occurrence data (n=30). Arthropods comprise ~65% of described species, only 15% of climate impact studies
- ✦ Most data providers do not actively conduct global change research
- ✦ No collaborative repository extensively used for vetted research-ready data

Strategy to Promote Global Change Research

- ✦ “If you build it they will come”
- ✦ Identify and promote research groups

Digitized Data for Arthropod Research:

- ❖ SCAN Focus on North America – United States > Canada > Mexico
- ❖ 5-25 thousand species can be modeled today! (10 to 30 records per species)
- ❖ Key Ground-Dwelling Groups with data

	North America					
	Estimated NA species	Occurrence Records	Number & Percentage of Species			
			w/ >10 records		w/ >30 records	
Ants (Formicidae)	1,000	134,348	600	60%	412	41%
Ground Beetles (Carabidae)*	2,000	372,311	1,211	61%	861	43%
Darkling Beetles (Tenebrionidae)	850	66,208	425	50%	239	28%
Grasshoppers (Acrididae)	550	109,742	258	47%	196	36%
Spiders (Araneae) *	3,000	99,478	994	33%	566	19%
Other Groups						
Scarab beetles (Scarabaeidae)	1,100	210,000	623	57%	450	41%
Bees (Apoideae)*	4,000	576,000	1,800	45%	1,200	30%
Butterflies & Moths (Lepidoptera)*	15,000	254,000	3,000	20%	1,900	13%
Plant Bugs (Miridae)*	1,600	236,000	1,200	75%	700	44%



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RESOURCES

Here you can find a compilation of resources related to ecology and evolutionary biology, including R code and relevant data sources. This is by no means a comprehensive list of resources or techniques and represents the biases of the BRAIN Lab personnel, but should get you on the right track. Click on any of the headings below to find resources on that topic.

Species Distribution Modeling

Modeling species distributions is a rapidly expanding area of research with applications in ecology, evolution and conservation biology. Operationally, species distribution models (aka climate envelope models) typically seek to estimate the set of environmental conditions that best describe a species' realized niche. A variety of tools exist for extracting species occurrence records, relating them to environmental layers, generating/testing models and projecting them spatially.

[NAU](#) ▶ [Merriam-Powell](#) ▶ [SDM Main](#)

SPECIES DISTRIBUTION MODELING: STEP-BY-STEP

[Step 1: Occurrences & Presence-Absence Data](#)

[Step 2: Spatial Projections](#)

[Step 3: Environmental Data \(Predictor Variables\)](#)

[Step 4: Data Cleaning & Formatting](#)

[Step 5: Extent Selection](#)

[Step 6: Model Algorithms & Other Decisions](#)

[Step 7: Model Evaluation](#)

[Step 8: Geographic Projection](#)

[Step 9: Range Maps](#)

[Step 10: Migration](#)

[Step 11: Niche Overlap Tests](#)

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SOFTWARE - THE BIOMOD PACKAGE

Ensemble forecasting and uncertainty analysis in BIOMOD

Initial conditions
State of the system

Model choice
Different types of models

Model parameters
Range of values for key parameters

Ensemble forecasting and uncertainty analysis in BIOMOD
Ensemble of climate projections

Probability density function

BIOMOD

BIOMOD is a computer platform for ensemble forecasting of species distributions, enabling the treatment of a range of methodological uncertainties in models and the examination of species-environment relationships. BIOMOD includes the ability to model species distributions with several techniques, test models with a wide range of approaches, project species distributions into different environmental conditions (e.g. climate or land use change scenarios) and dispersal functions. It allows assessing species temporal turnover, plot species response curves, and test the strength of species interactions with predictor variables. BIOMOD is implemented in R and is a freeware, open source, package.

R is available here: <http://cran.univ-lyon1.fr/index.html>

Goals: Final Year and Beyond



1. Create “research-ready” data (i.e., >30 records per species) for 1,000s of target taxa
2. Achieve 90% identification of specimens digitized to species within five years of project end (ground-dwelling taxa).
3. Promote research groups.



Symbiota Collections of Arthropods Network (SCAN): A Data Portal Built to Visualize, Manipulate, and Export Species Occurrences

The Symbiota Collections of Arthropods Network (SCAN) grew from the Southwest Collections of Arthropods Network TCN (Thematic Collections Network) funded by the National Science Foundation. The data portal houses arthropod occurrence records from the original Southwest Collections of Arthropods Network as well as an ever-growing number of collections. These additional collections are drawn from a much wider selection of geographic locations and arthropod taxa. We expect that eventually SCAN will include data for all arthropod taxa and from anywhere in North America. SCAN is built on Symbiota, a web-based collections database system that is used for other taxonomic data portals, including (Symbiota Portals).

Important features of all Symbiota databases include:

1. Easy web-based data entry.
2. Download entire datasets in two clicks.
3. Map georeferenced records in two clicks.
4. Upload high-resolution images & create species profile pages.
5. Design custom species lists for any locality at multiple scales.
6. Develop educational games with data.
7. Create taxonomic keys.

The key organizational feature is that each museum or project is listed as a separate collection, so that one database group does not interfere with another. End users can select all "collections", or just a subset. We are incorporating Filtered Push to enhance the capacity of far-flung experts to contribute identifications and annotations of data that may be shared across the network.

This website is the central data portal for SCAN; all other project information can be found at <http://scan1.acs.ufl.edu/>, including How-To-Guides and network updates. Our database is currently focused on ground-dwelling arthropods, but our goal is to expand to any arthropod group. SCAN will promote a North American Arthropod Database and more focused thematic data portals for specific taxa (e.g., weevils) and geographically-delineated portals.

Listronotus vitticollis. Image by: Chelsey Tellez.



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