



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

**July 2012 to 2016 and onward to 2020**



*Symbiota* Promoting  
Bio-Collaboration



This project made possible by National Science Foundation Award EF 1207371





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

**July 2012 to 2016 and onward to 2020**



*Symbiota* Promoting  
Bio-Collaboration



This project made possible by National Science Foundation Award EF 1207371





## SCAN Digitization Goals

- 10 museums digitize **750,000 records** for Southwest ground-dwelling arthropods
- Produce **16,000 high-resolution images** of species

## SCAN Progress

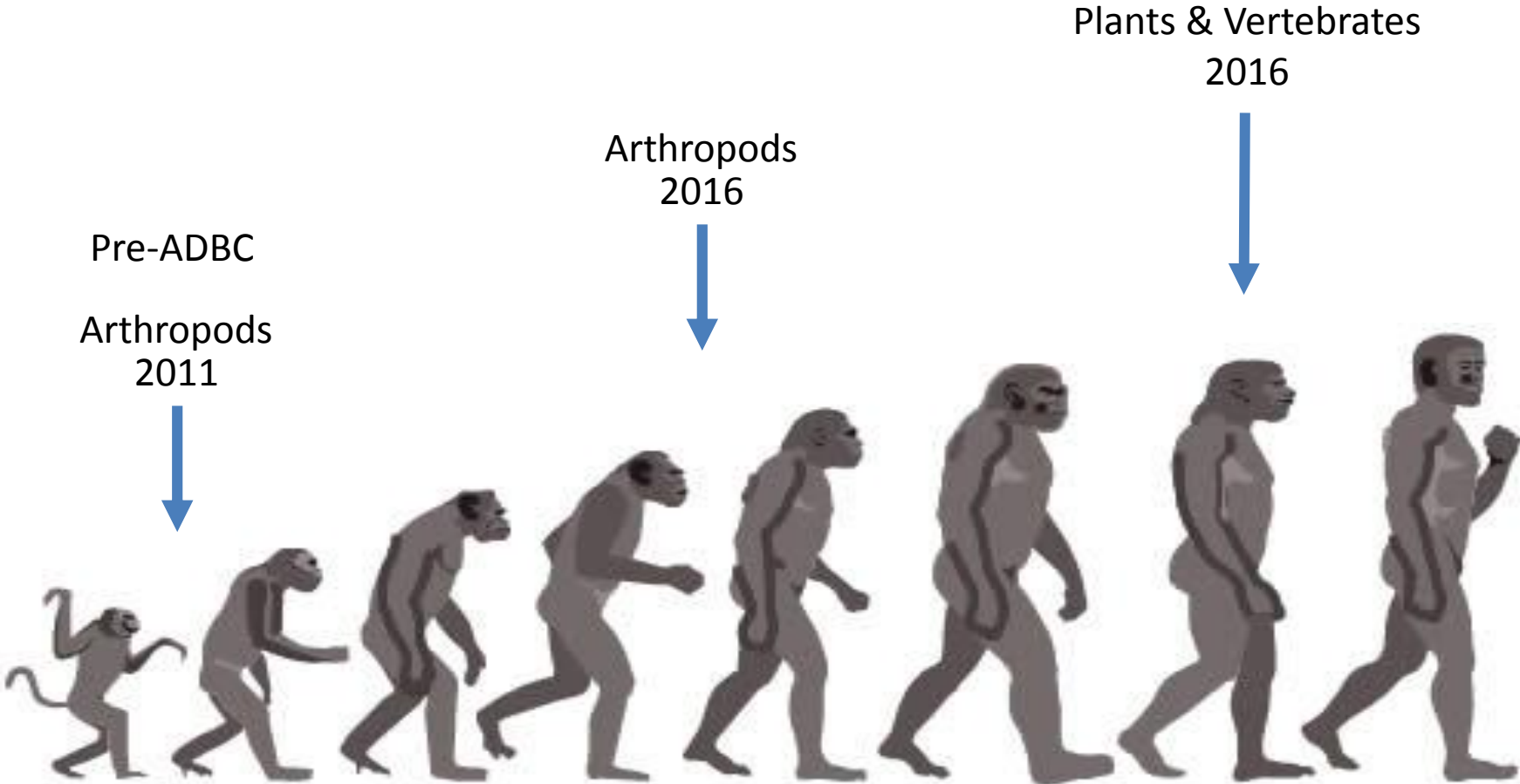
1. Exceeded target (**1,118,546** digitized records) 84% georeferenced, 53% identified to species
2. **43** non-ADBC funded collections, **1,640,293** digitized records
3. 252,600 images ~**40,000** high-res images, 212,000 specimen/label low-res images
4. **4** PEN grants funded, one PEN proposal in review.
5. Lepidoptera of North America Network TCN formed (29+ museums)
6. Education-outreach program
7. Peer-reviewed publications (12) book chapters (2)



# US Arthropod Digitization: Launched by ADBC

Tri-Trophic TCN, InvertEBase TCN, SCAN TCN

- 1. Data doubling (<4 to >9 million)
- 2. Digitization sophistication (What's your GUID?)
- 3. Collaborations fostered (among entomologists and beyond)



# Symbiota: Biodiversity Management Platform

37 Symbiota Portals Coalescing

Data Provider  
Software

Data Portal  
(Data input, cleaning, annotation, packaging, and visualization)

Global  
Aggregators

Symbiota

FileMaker Pro

Excel / Access

Specify\*

Institutional\*

Emu\*

Arctos\*



iDigBio

Share  
Technology &  
Best Practices

GBIF



## Opportunities to Use Digitized Data for Arthropod Research:

- ❖ Focus on North America – United States > Canada > Mexico
- ❖ 8,000 species can be modeled today! (10 to 30 records per species)
- ❖ Five Target Groups

Formicidae (Ants)- 9,072 taxa and 811,999 records

Acrididae (Grasshoppers) – 727 taxa 134,121 records

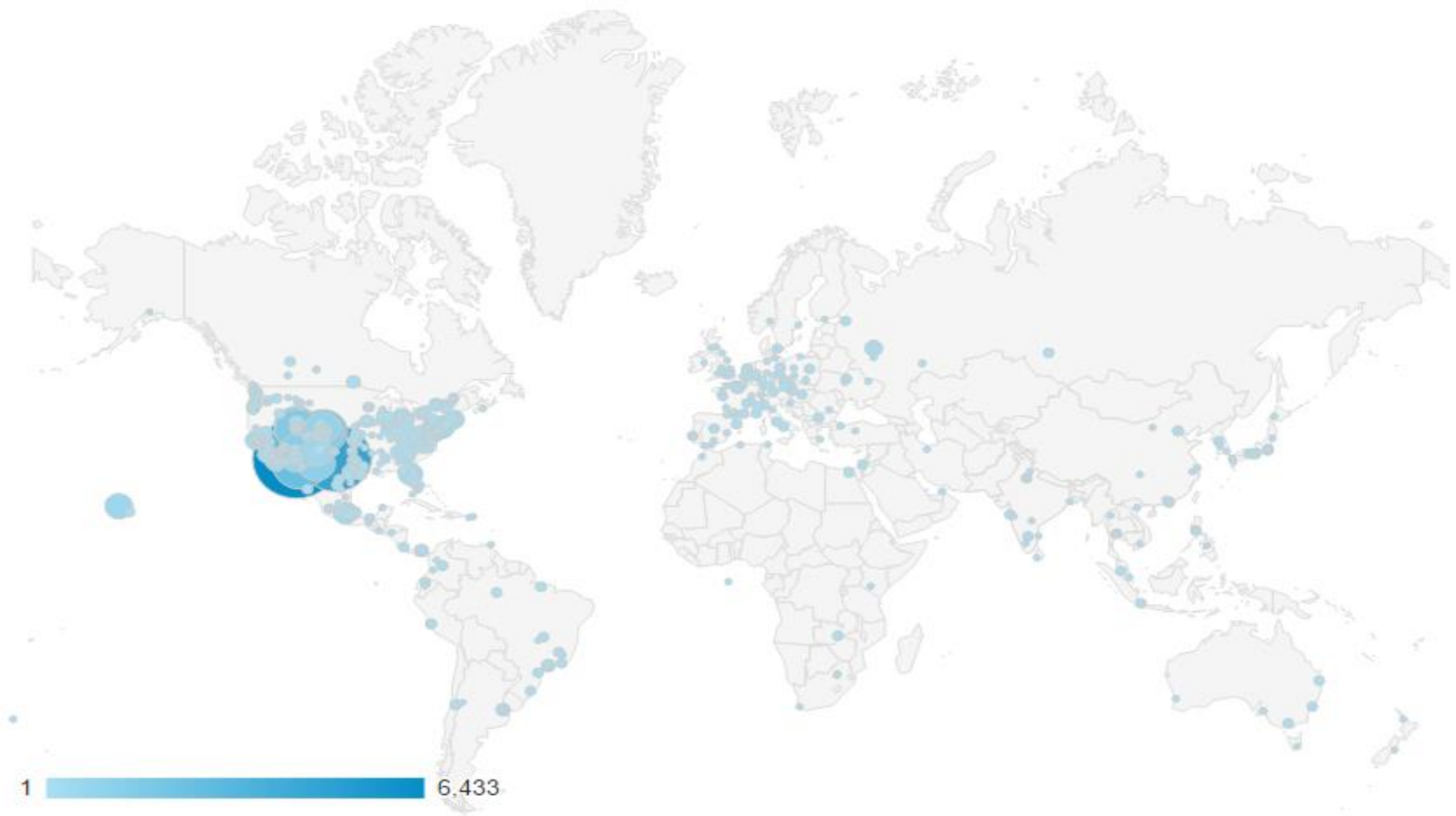
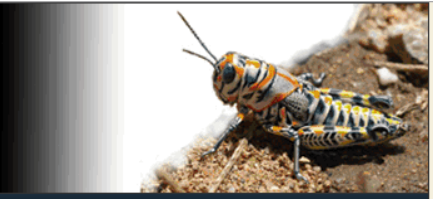
Tenebrionidae (Darkling beetles) 1,236 taxa 123,063 records

Carabidae (Ground beetles)- 3,135 taxa 468,036 records

Araneae (Spiders) – 11,521 taxa, 259,580 records

**25,691 taxa    1,796,799 records**







# Opportunities to Use Digitized Data for Arthropod Research:

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

Ants- 9,000 taxa and 811,999 records

Acrididae (grasshoppers) 727species 134,121 records

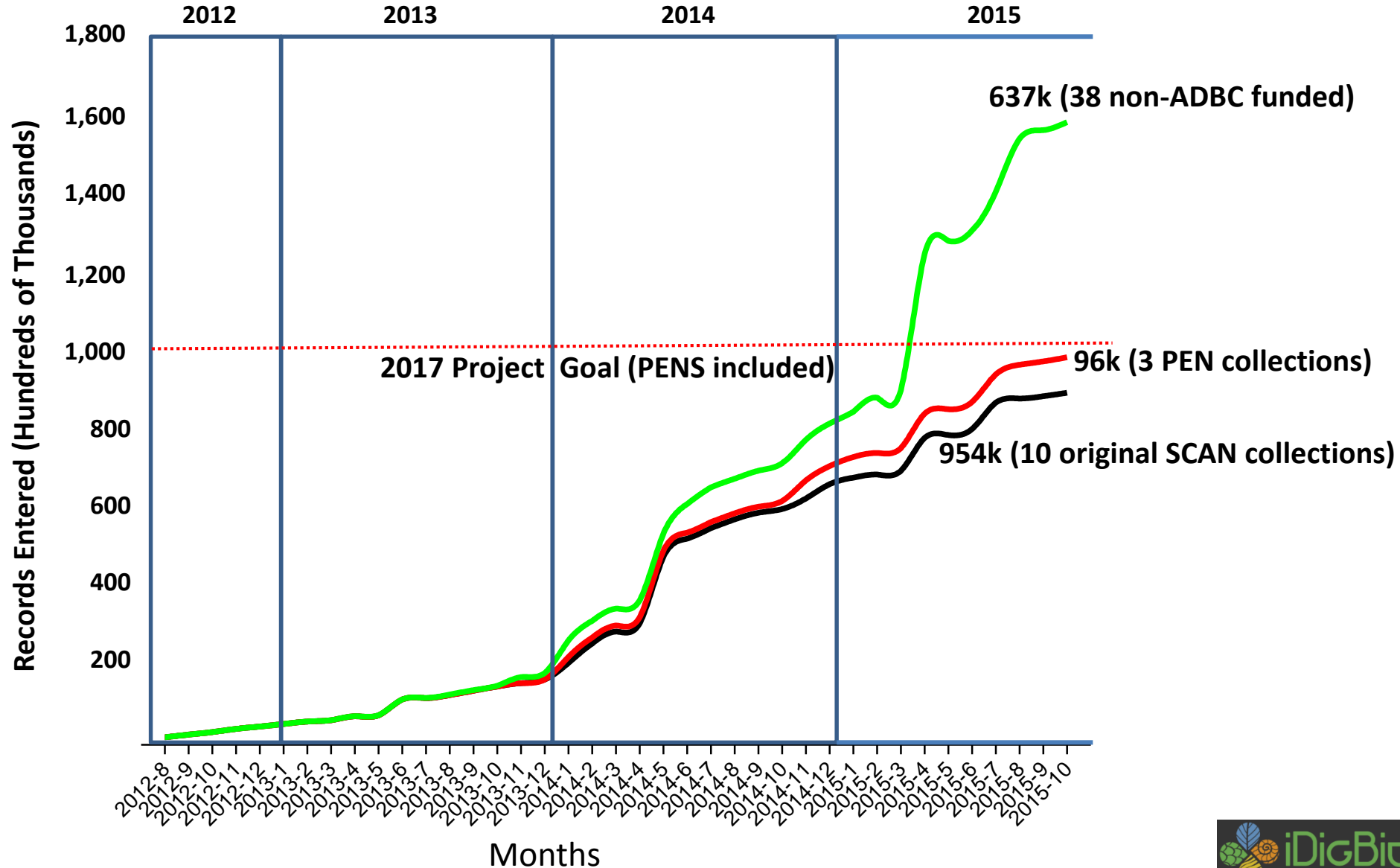
Tenebrionidae (darkling beetles) 727species 134,121 records

Carabidae (ground beetles)- 3,135 taxa 468,036 records

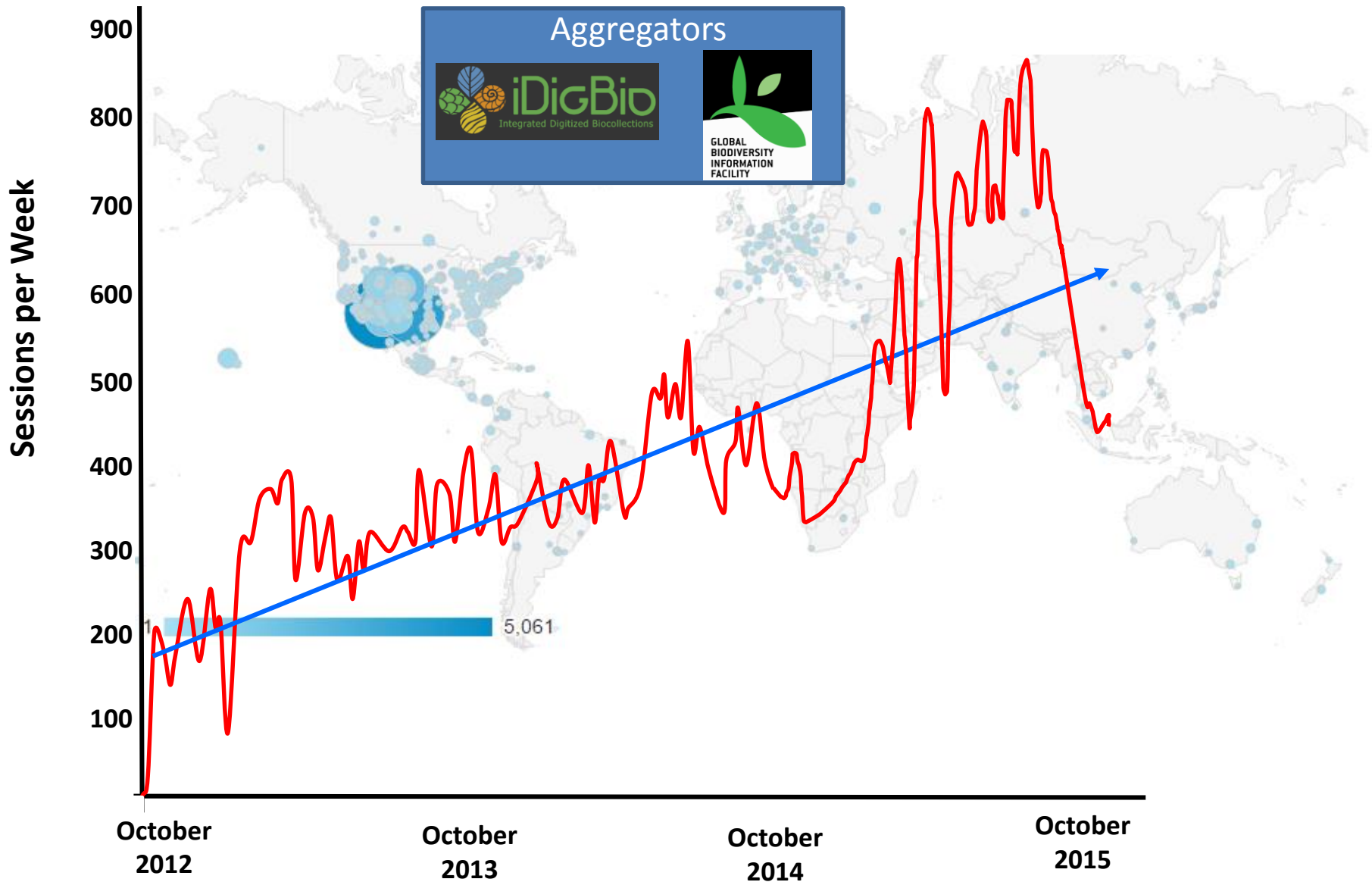
Spiders – 11,521 species, 259,580 records



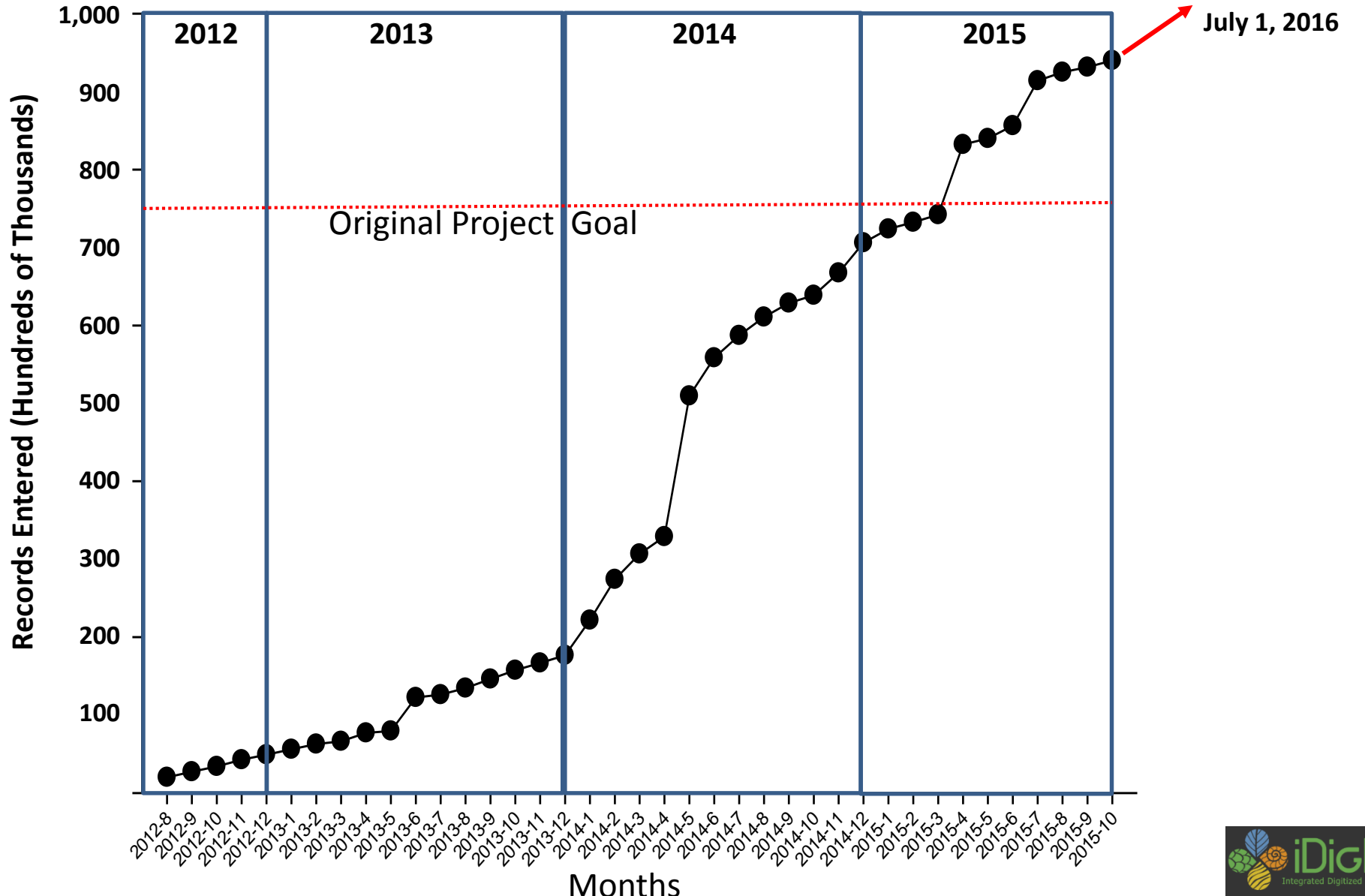
# Broader Impact Digitizing: 1.68 million



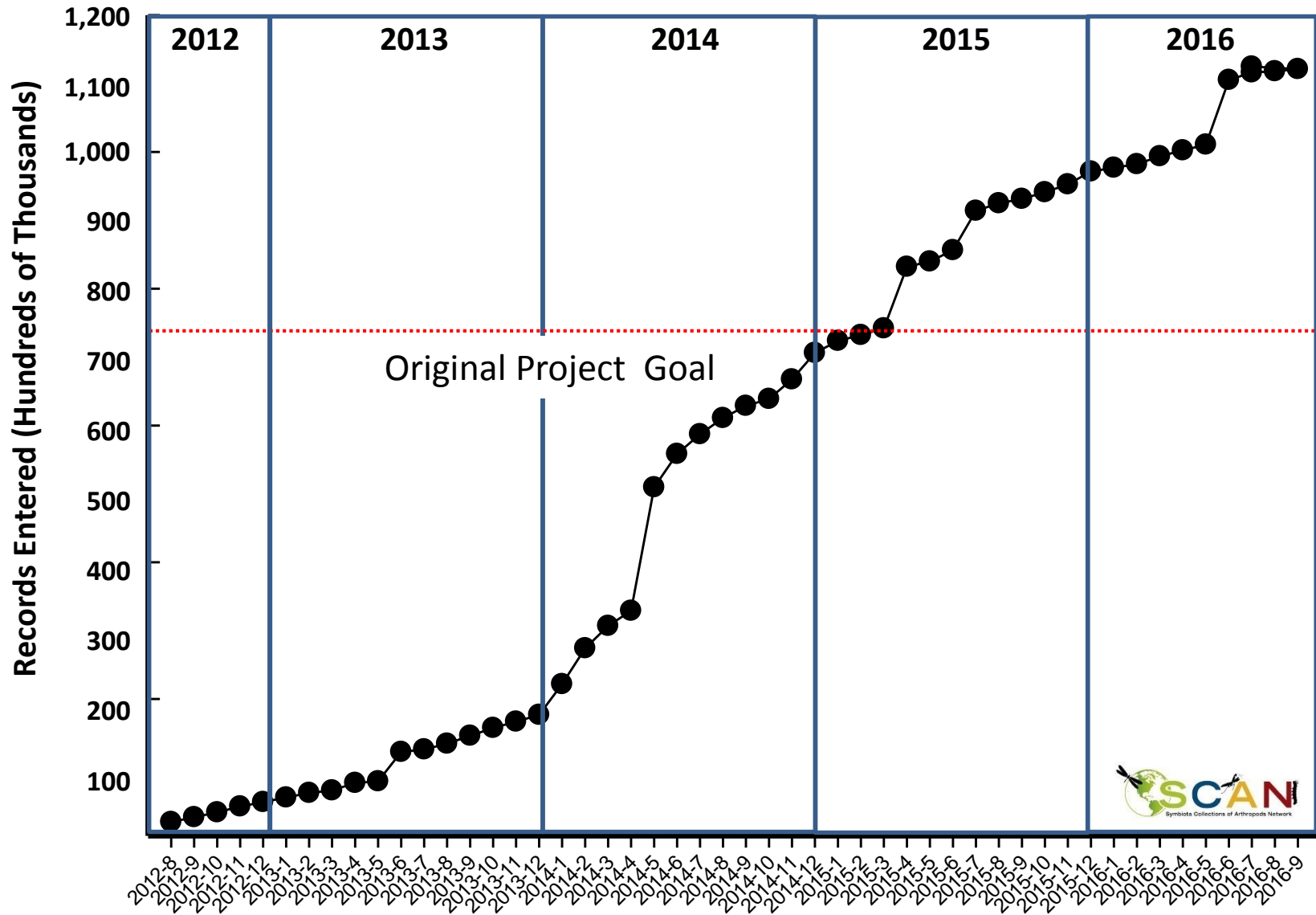
# Consistent Growth of SCAN Portal (Google Analytics)



## Digitization Rate of 10 Original SCAN Members

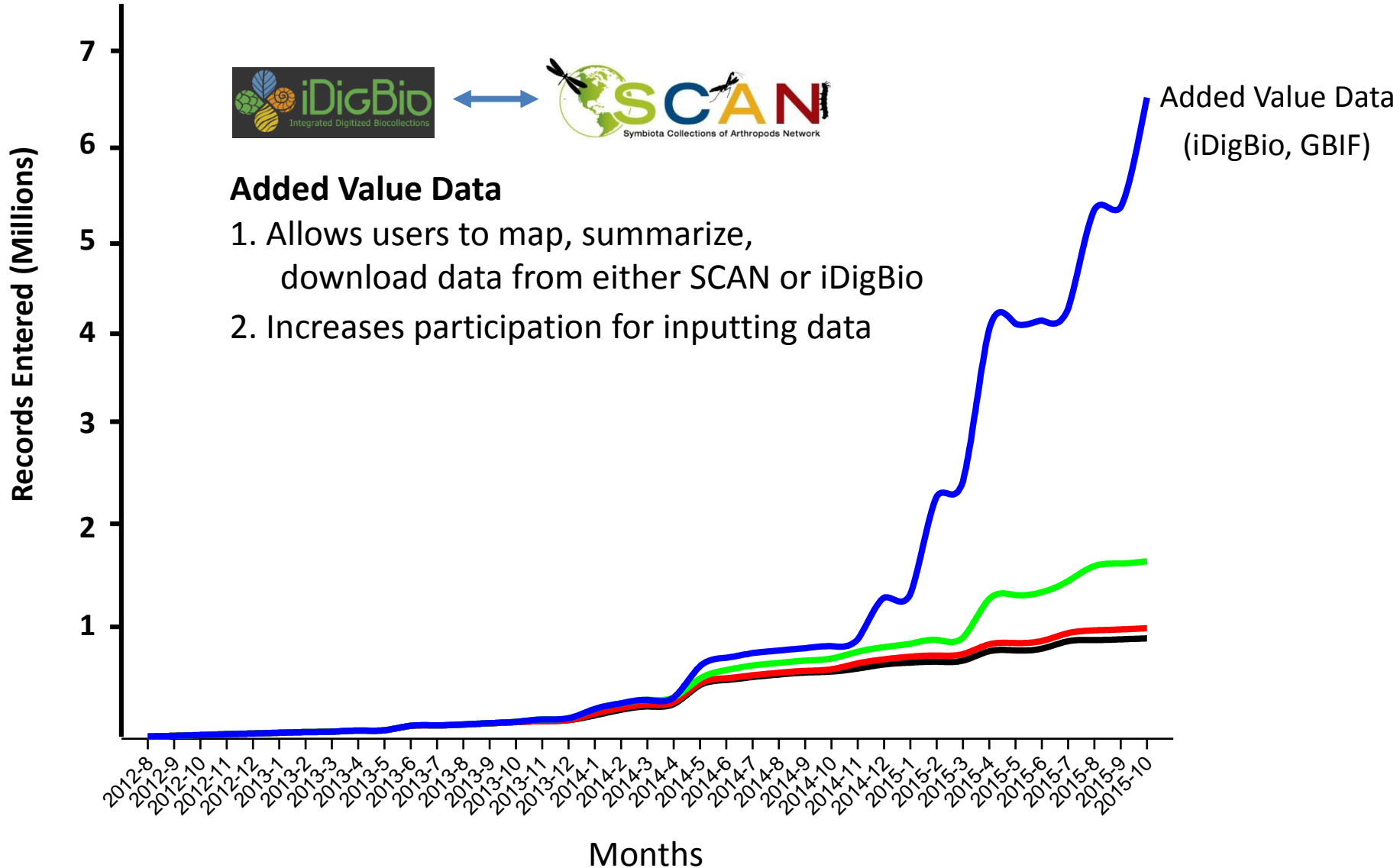


# Digitization Rate of 10 Original SCAN Members



# Towards a Complete Arthropod Portal

6,148,133 specimen records served



# Challenges in Using Digitized Data for Arthropod Research

## **Taxonomy**

- ✦ Working towards critical mass: 250 million specimens in North American collections , <10 million digitized (~4%)
- ✦ Need better linkages with publications & publishing data sets (e.g., Arctos)

## **Ecology (Ecological Niche Modeling)**

- ✦ Arthropod occurrence data resides primarily in museum collections
- ✦ 51% 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



# Using Digitized Data for Arthropod Research:

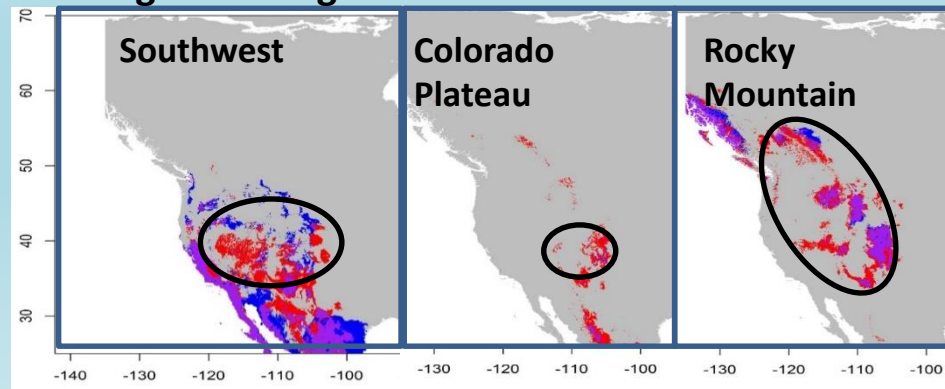
## Taxonomy

- ★ Promoting all taxonomically based publications.
  1. Digitized records increases awareness of specimen availability and will aid in the incorporation of data into manuscripts.

## Ecology (Ecological Niche Modeling)

- ★ Understand ecological constraints on past, present and future distributions of arthropods and ecological associations.

Climate Change Impacts on Wolf Spiders (*Pardosa*)  
Does region of origin matter?

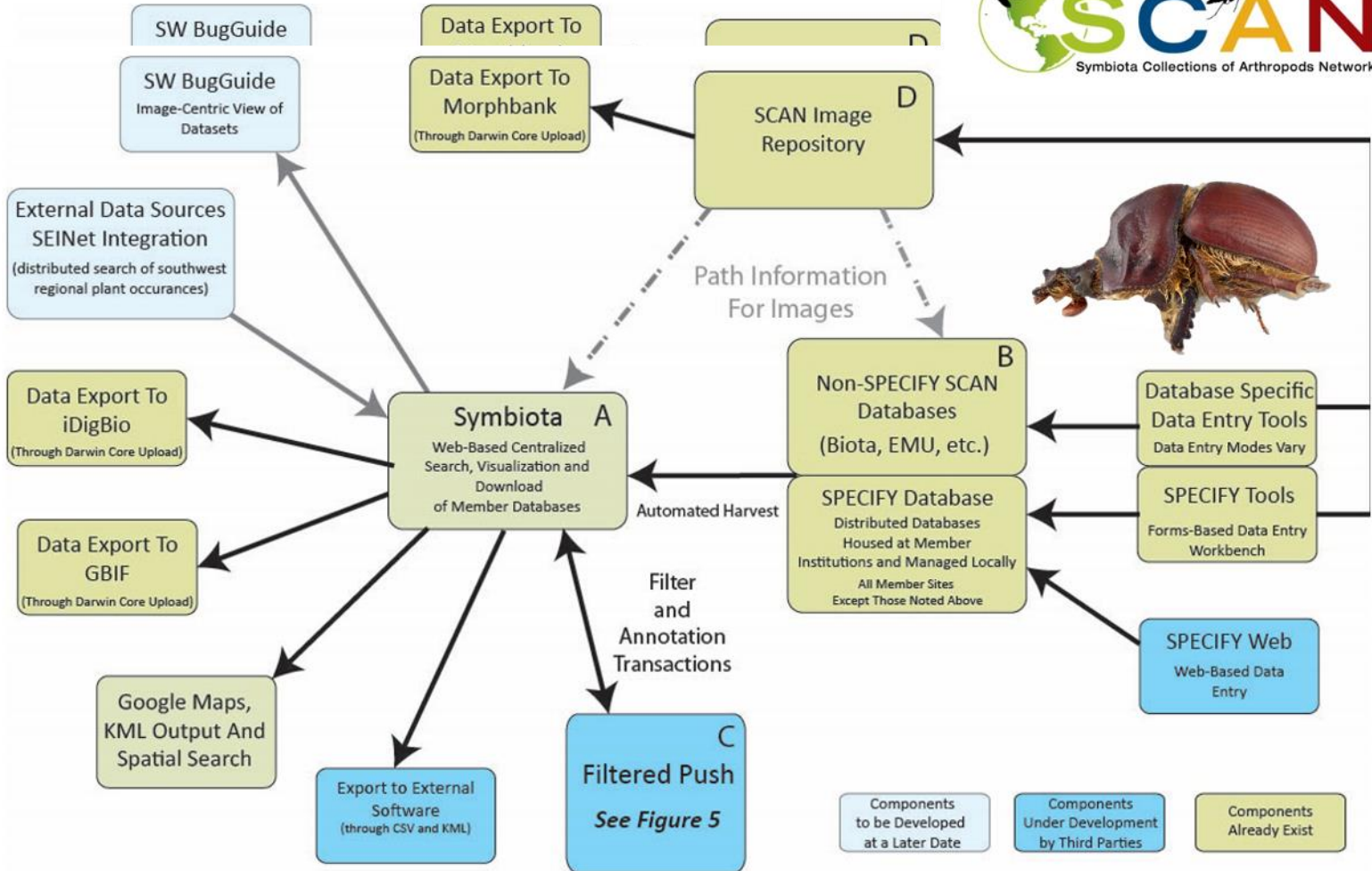


# Goals: Final Year and Beyond



1. Promote “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.
3. Continue inclusion of Broader Impact collections (e.g., DOD, BLM, LTER).
4. Implement 9 more sustainability plans for original collaborators.

A screenshot of the SCAN website interface. The header features the SCAN logo and navigation links: Home, Search, Images, Fauna Projects, Statistics, Other Networks, Work with SCAN, Symbiota, and Contact. A welcome message for 'Neil' is visible. The main content area is titled 'Symbiota Collections of Arthropods Network (SCAN): A Data Portal Built to Visualize, Manipulate, and Export Species Occurrences'. It includes a paragraph about the network's origin, a list of important features, and a key organizational feature. A sidebar on the right shows a specimen image of *Listronotus vitticollis* with a 'HIDE CAPTION' button and a progress indicator. The footer contains the NSF logo and the text 'This project made possible by National Science Foundation Award EF 1207371', along with the iDigBio logo and 'Integrated Digitized Biocollections'.





Home



## Navigation

- ▶ [Add content](#)
- ▶ [Forums](#)

## Participate



Any arthropod collection can become a member of SCAN by following a few simple steps..

1. Contact [Neil Cobb](#) to let us know you are interested.

Symbiota Collections of Arthropods Network

[Home](#)
[Search](#)
[Images](#)
[Fauna Projects](#)
[Statistics](#)
[Other Networks](#)
[Work with SCAN](#)
[Symbiota](#)
[Contact](#)

## Symbiota Collections of Arthropods Network (SCAN): A Data Portal

The Symbiota Collections of Arthropods Network (SCAN) grew from the Southwest Collections of Arthropods Network T arthropods. SCAN will continue to add data for **all** arthropod taxa with a focus on North America. SCAN is built on Sym taxonomic data portals, including (Symbiota Portals). SCAN is the primary repository for occurrence data produced by th arthropod data produced by InvertEBase TCN and encourage museums to serve mollusk records on their data portal.

**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 g or just a subset. This website is the central data portal for SCAN; all other project information can be found here, inclu

SCAN currently serves over 8.8 million records and 380,000 images.

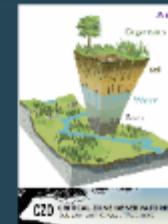
*(Exemplars limited by space constraint; omission does not imply irrelevance!)*



Tri-Trophic Thematic  
Collection Network



**Examples of potential conceptual affinities at  
the collections - NEON interface**



**NSF Environmental Observatories  
that share conceptual affinities**

**Questions at the nexus of land-use, climate change, and invasive species**