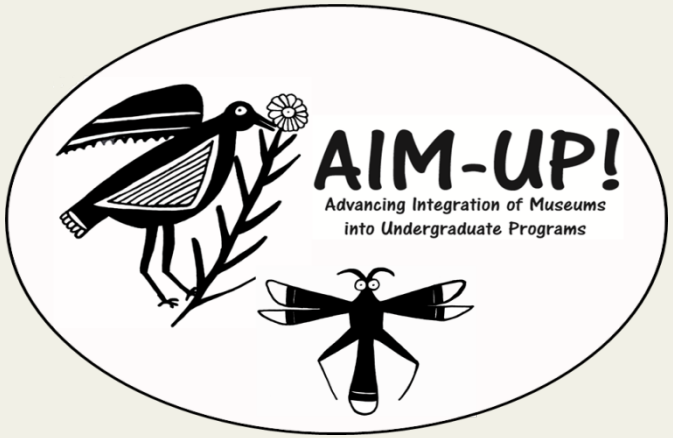
Engaging Students Through Digital Data

Kayce Bell
Museum of Southwestern Biology
University of New Mexico



Students and Natural History

Not all students can experience natural history collections and research physically.

Digital and on-line resources offer a virtual way to experience and explore the natural world.

Big Data and Digitization Initiatives

OBAMA ADMINISTRATION UNVEILS "BIG DATA" INITIATIVE: ANNOUNCES $200 MILLION IN NEW R&D INVESTMENTS

Aiming to make the most of the fast-growing volume of digital data, the Obama Administration today announced a "Big Data Research and Development Initiativ improving our ability to extract knowledge and insights from large and complex collections of digital data, the initiative promises to help solve some the Nation's pressing challenges.

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National Science Foundation
Directorate for Computer & Information Science & Engineering (CISE)

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Computer & Information Sciences & Engineering

Big Data Research Initiative

At a White House event on March 29, NSF Director, Dr. Subra Suresh, joined other federal science agency leaders to discuss cross-agency plans and announce new research efforts to extract knowledge and insights from large and complex collections of digital data. NSF will direct its current efforts to develop new methods to derive knowledge from data; construct new infrastructure to manage, curate and serve data to communities; and forge new approaches for associated education and training. Specific announcements relevant to the CISE community include:

iDigBio
Integrated Digitized Biocollections

About iDigBio | Portal | Technical Information | Education

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15,324,063
Specimen Records
2,342,880
Media Records
255
Recordsets

Search the Portal

Digitization
Learn, share and develop best practices

Sharing Collections
Documentation on data ingestion

Working Groups
Join in, contribute, be part of the community

Proposals
New tool and workshop ideas

Researchers
Learn about research directions

Collections Staff
Learn how your collection can

Teache
Downlo

iDigBio
Integrated Digitized Biocollections

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Welcome to Integrated Digitized Biocollections (iDigBio), the National Resource for Advancing Digitization of Biodiversity Collections (ADBC) funded by the National Science Foundation. Through ADBC, data and images for millions of biological specimens are being made available in electronic format for the research community, government agencies, students, educators, and the general public.

Project Scope
Read more about the vision and mission for iDigBio

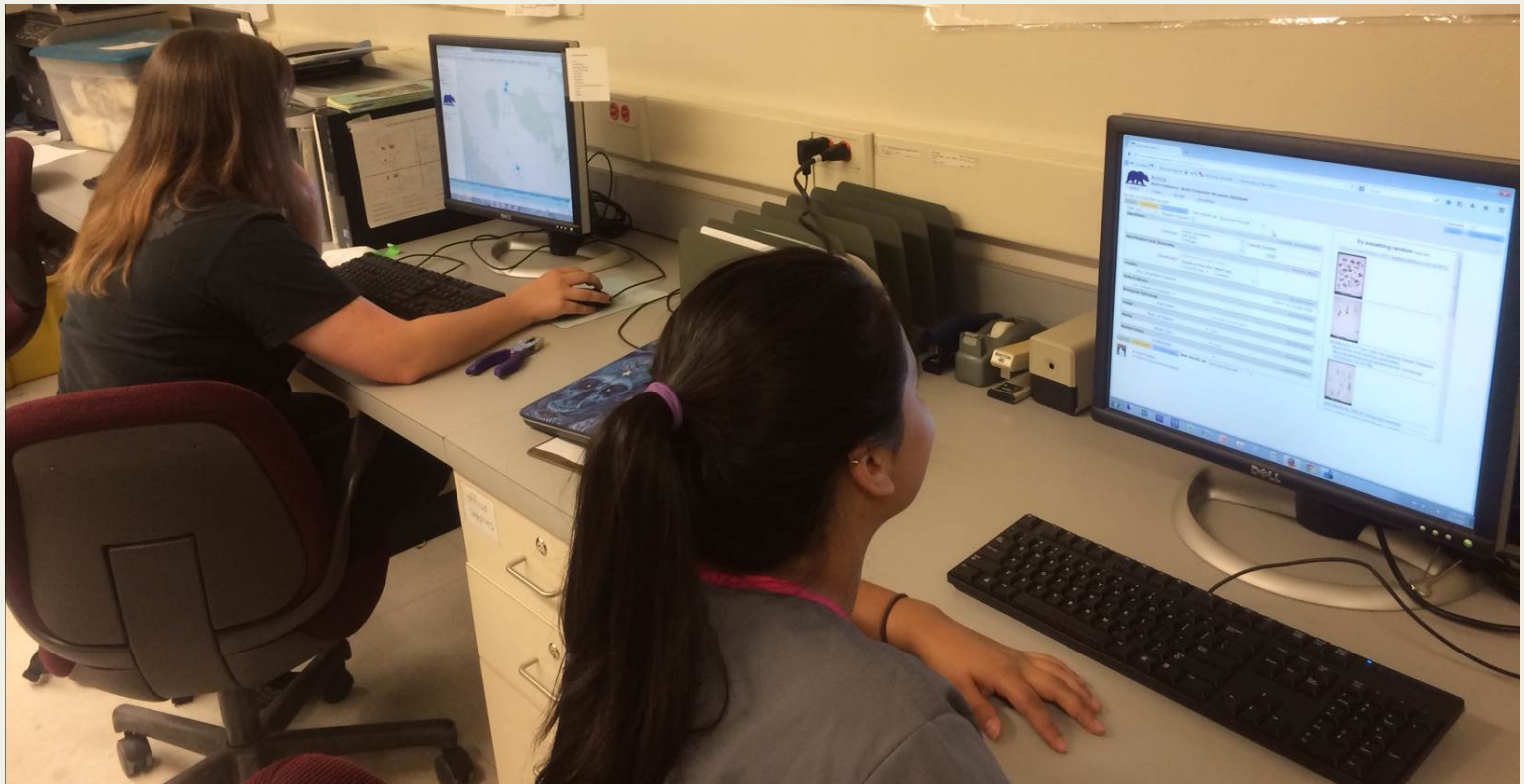
TCN Resources
Collaborator information at a glance

Project News
Announcements and updates about our activities

On-line Data

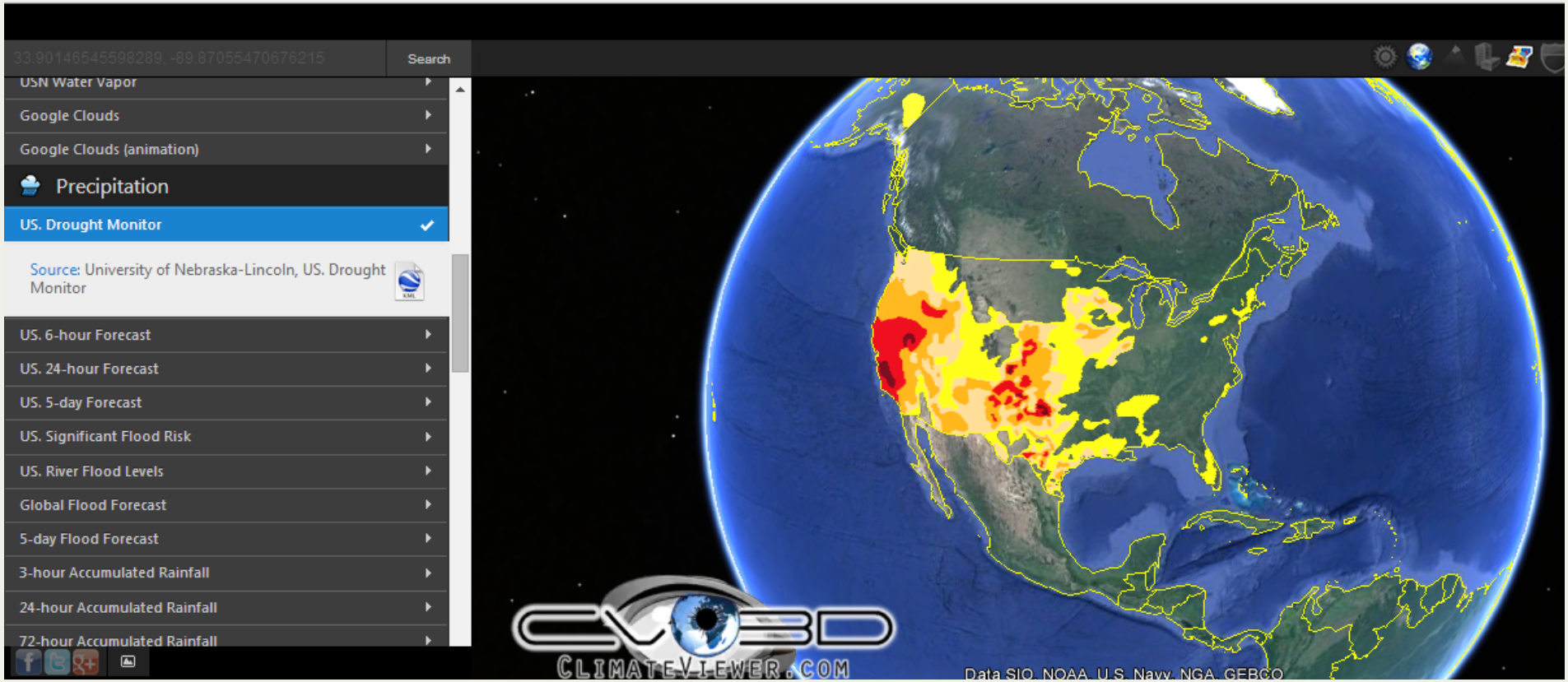
Data available on-line are unreliable and often unverifiable.

Natural history collections provide one of the few verifiable sources of biological data on the internet.



Types of digital data available:

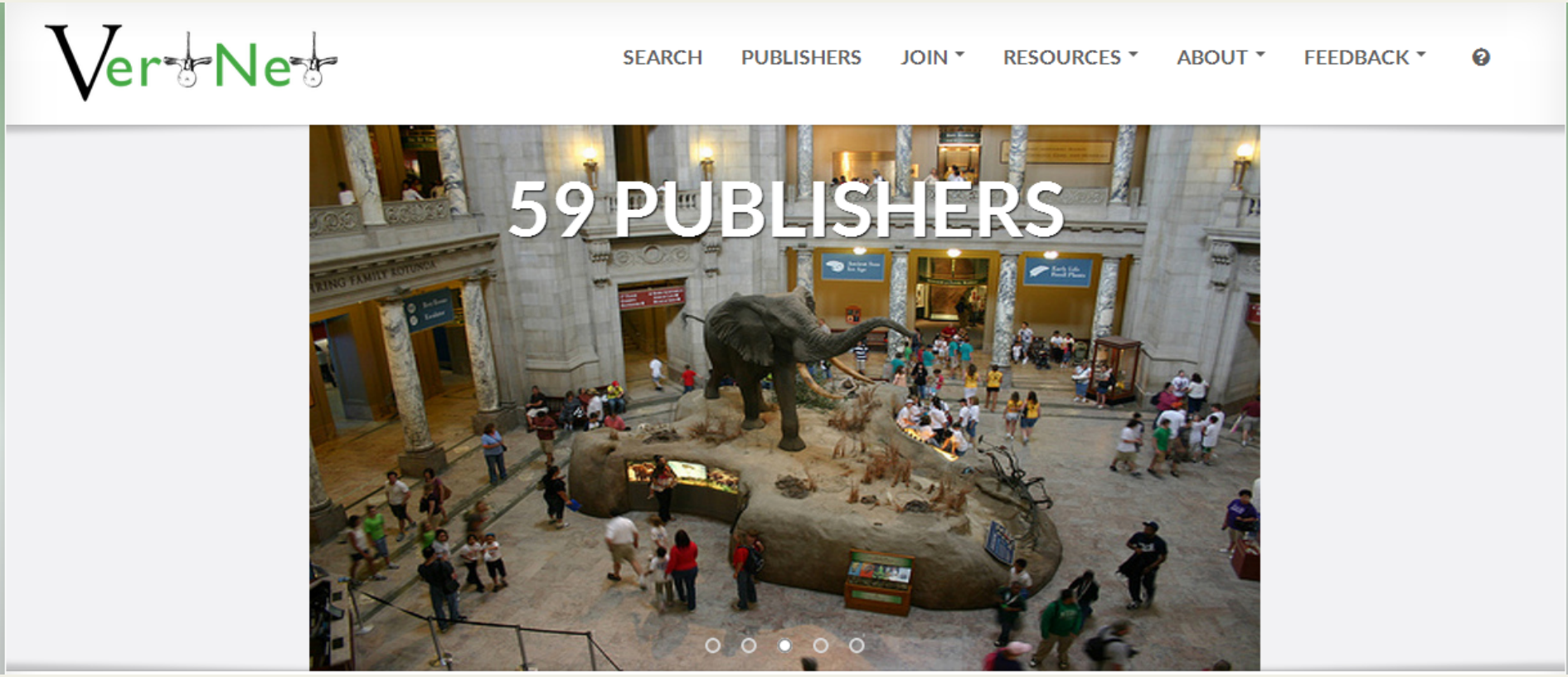
1.Abiotic – Google Earth-based, climate layers



climateviewer.com

Types of digital data available:

1. Abiotic – Google Earth-based, climate layers
2. Specimen databases & portals – VertNet, GBIF, Arctos



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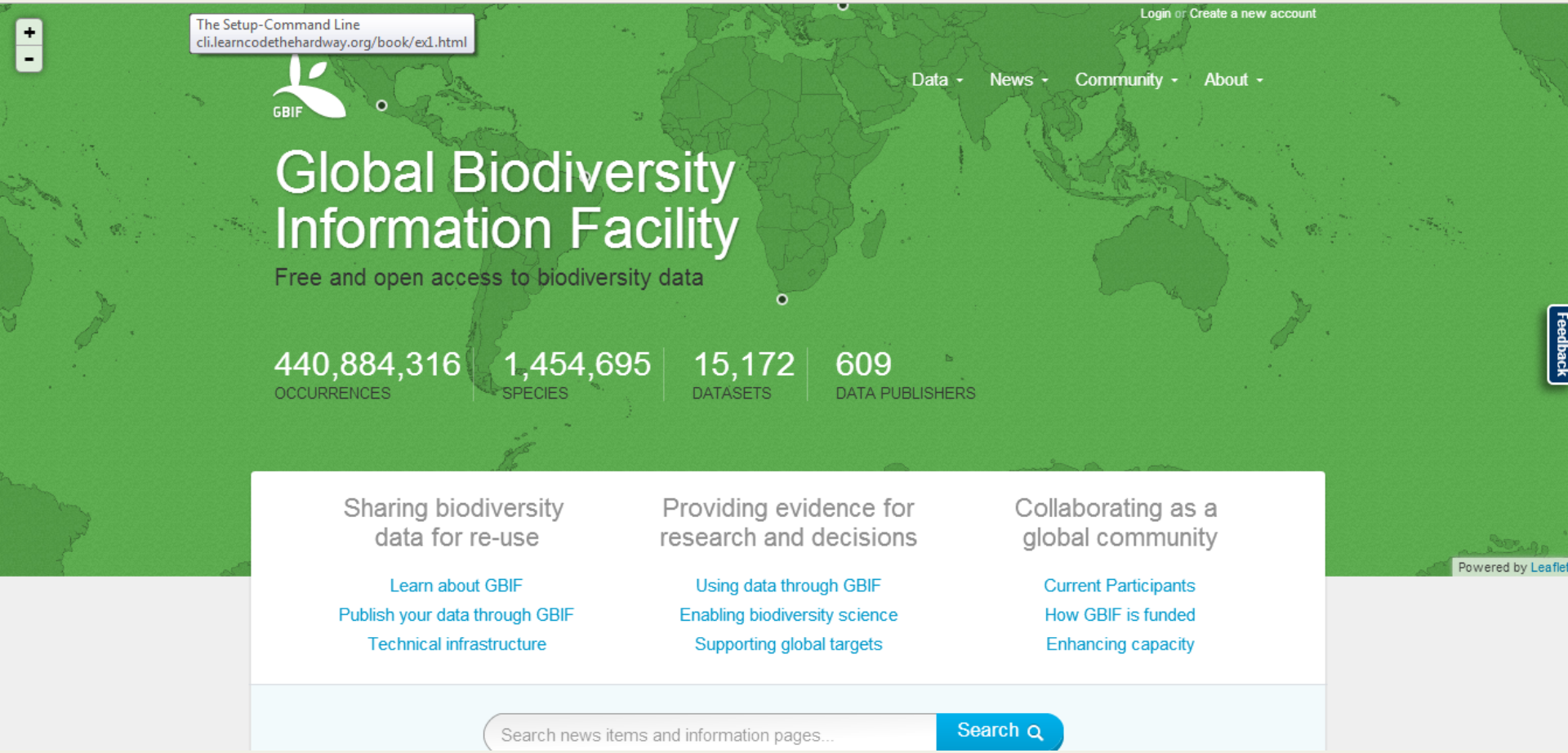

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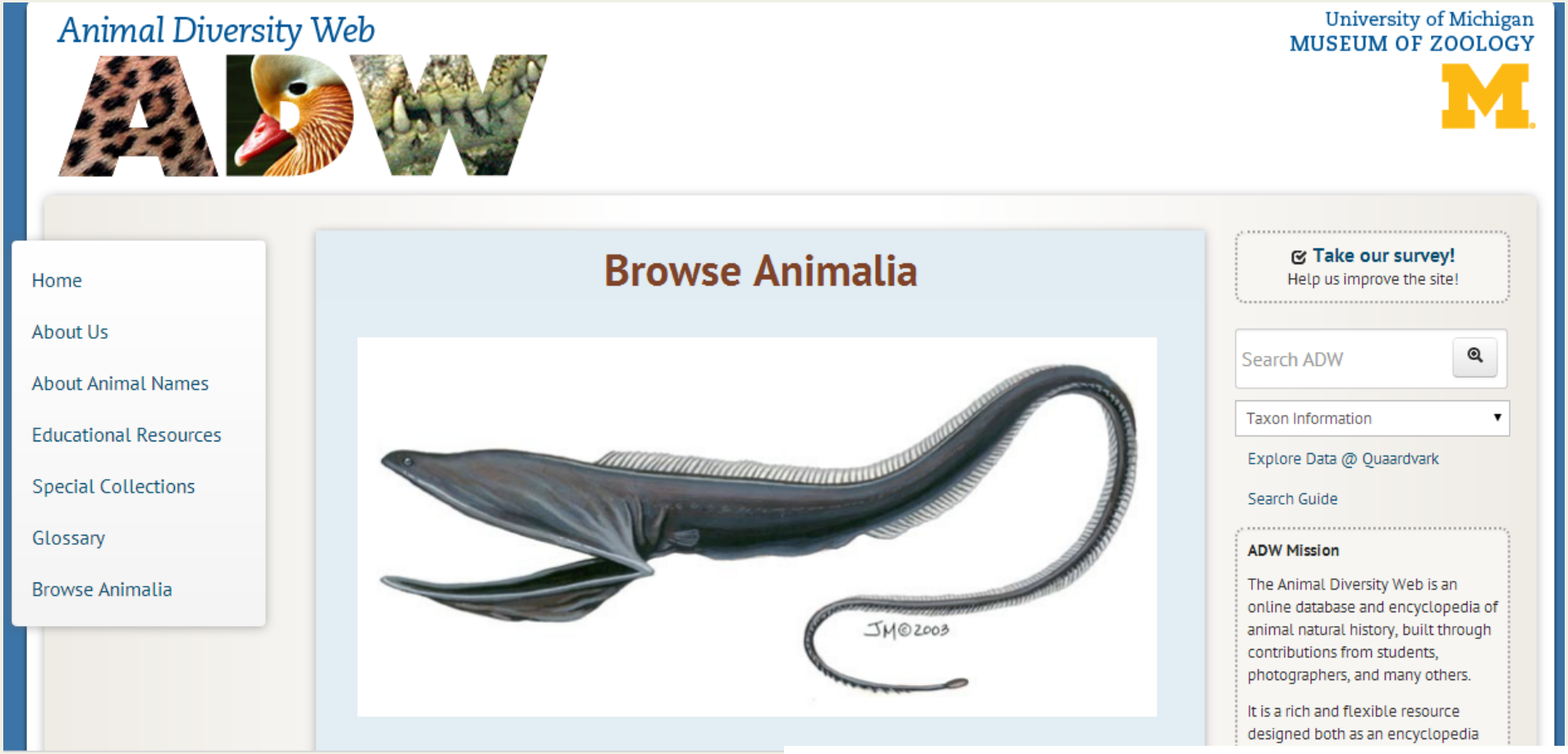
3. Specimens + more – Map of Life, Animal Diversity Web



animaldiversity.ummz.umich.edu

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eol.org

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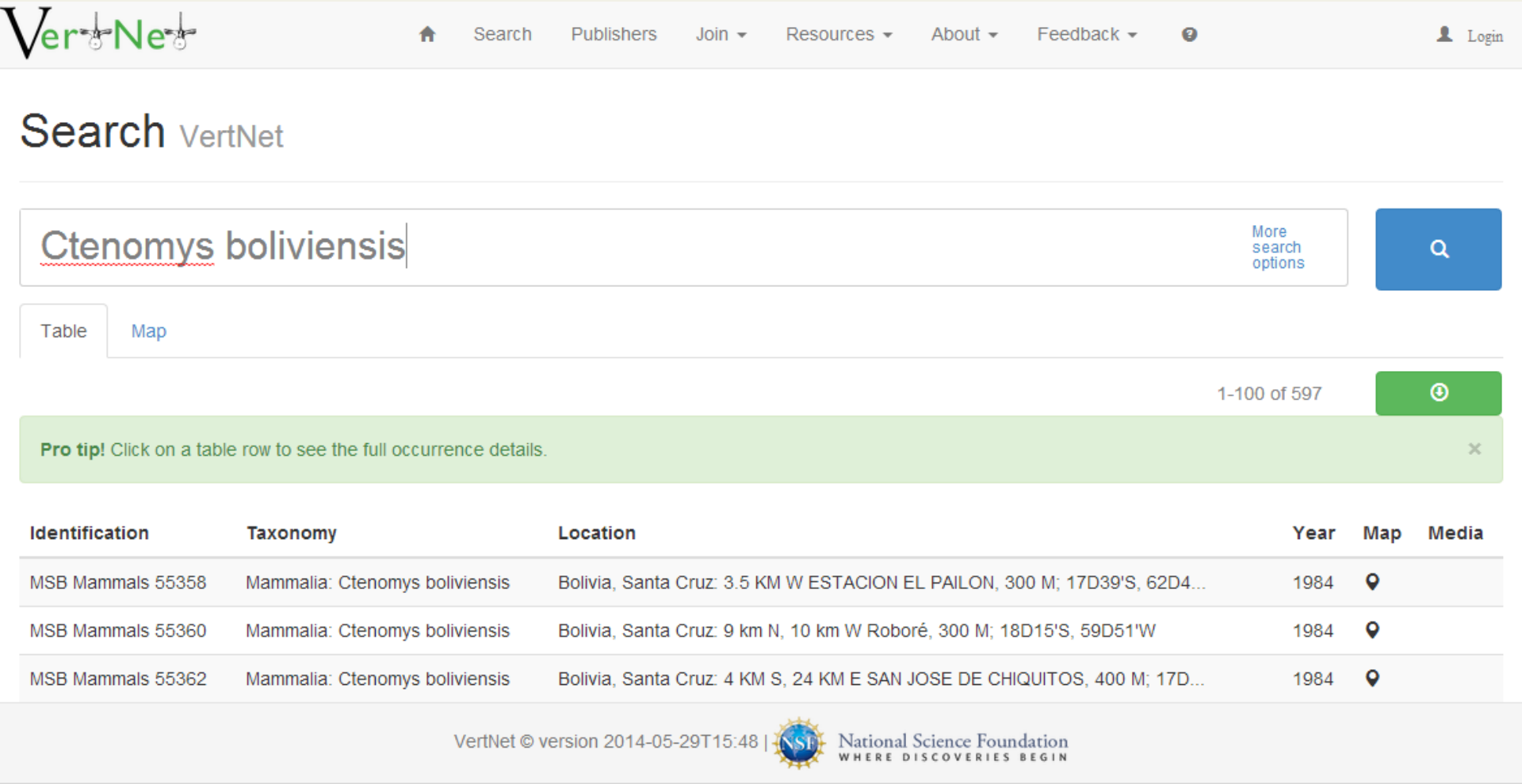
arkive.org

Databases & Portals

- Simple searches by taxonomy



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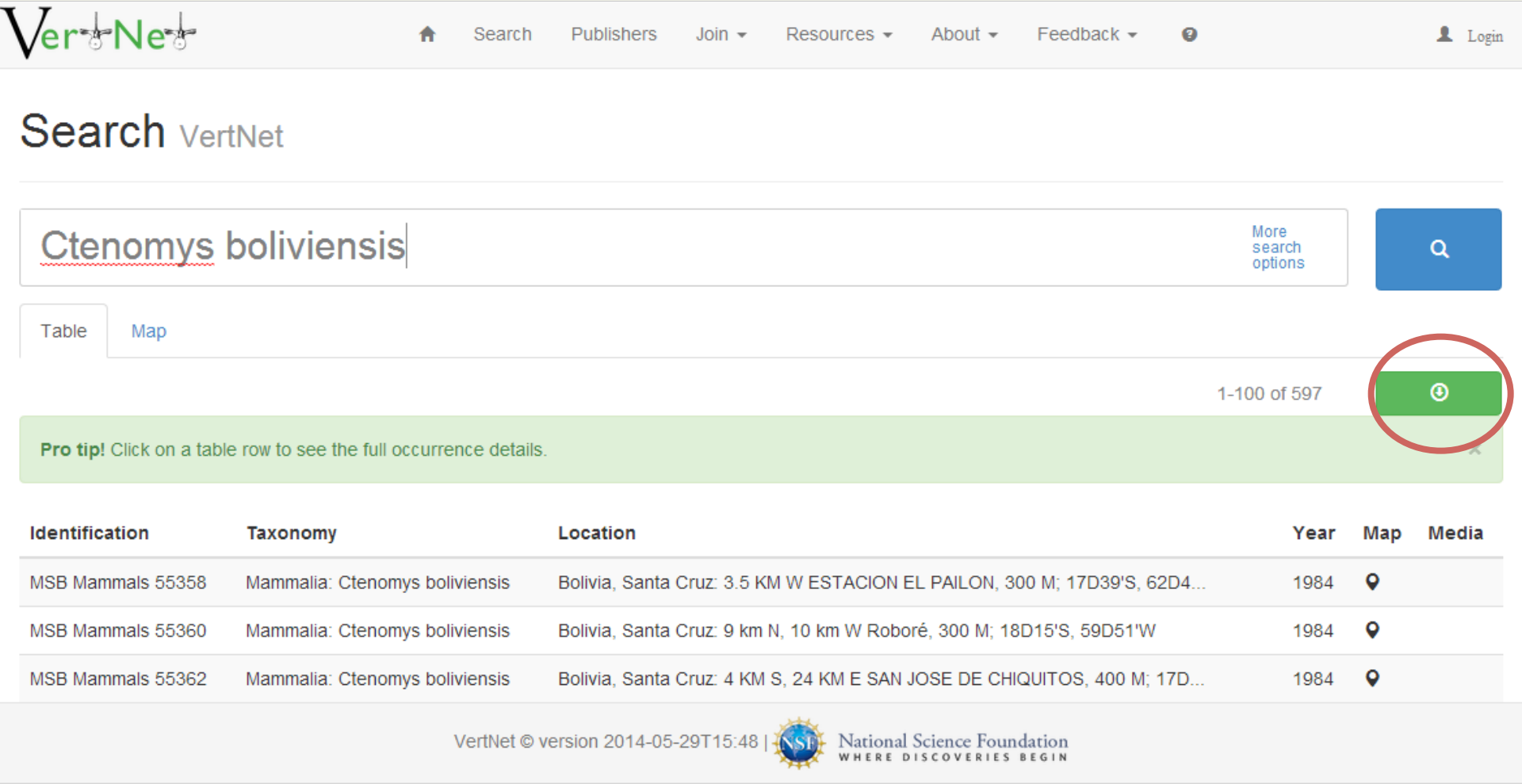

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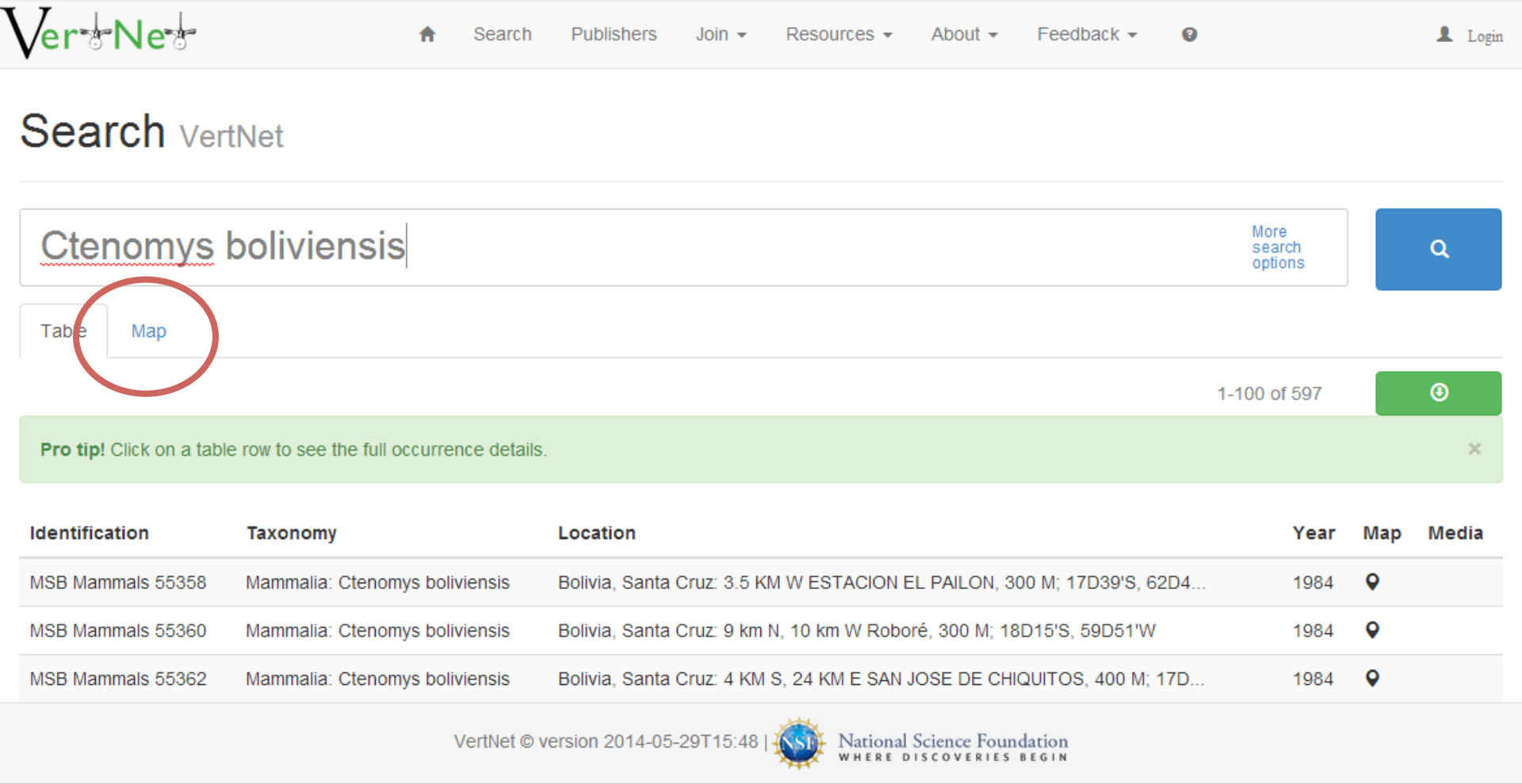

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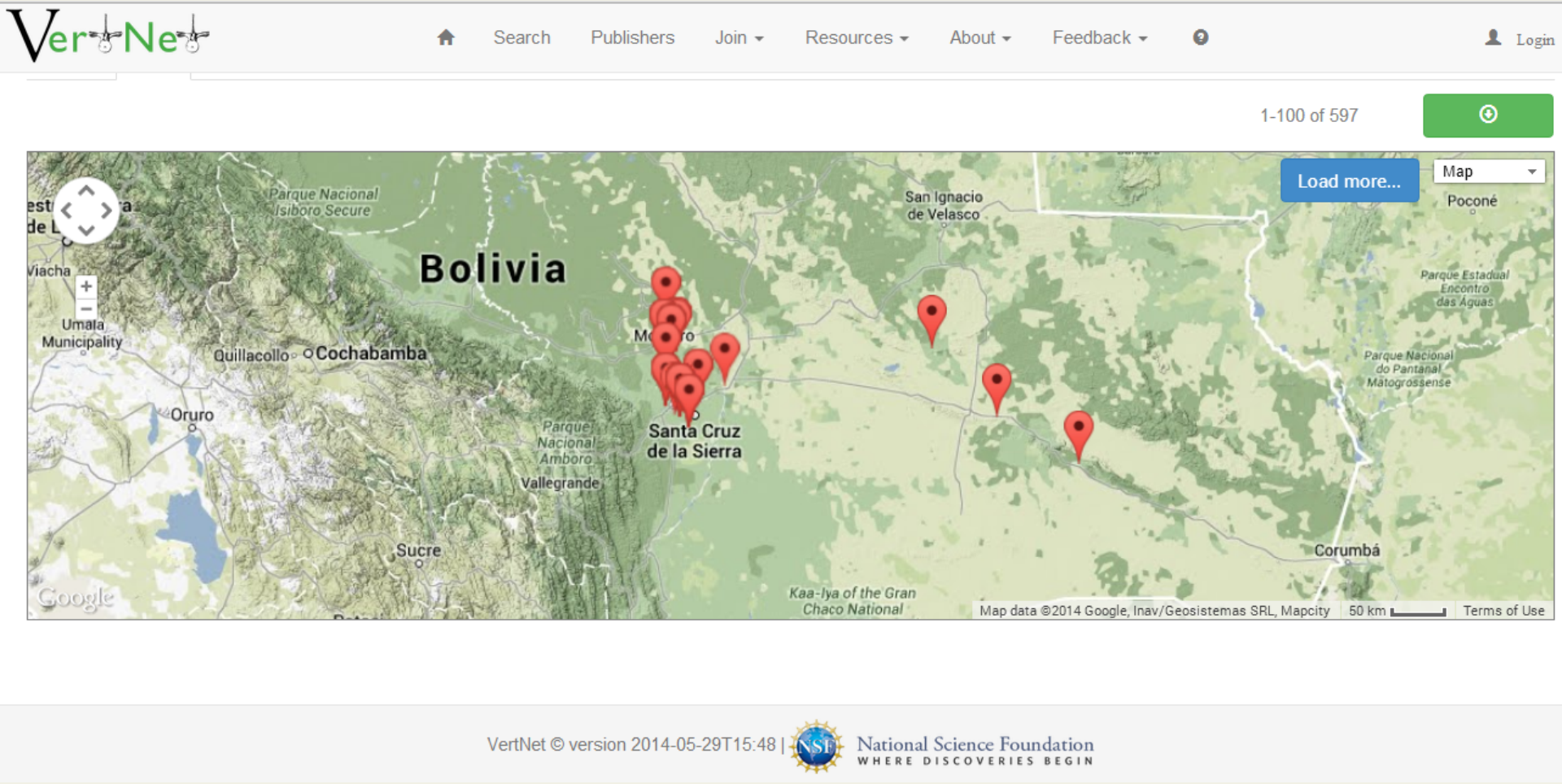

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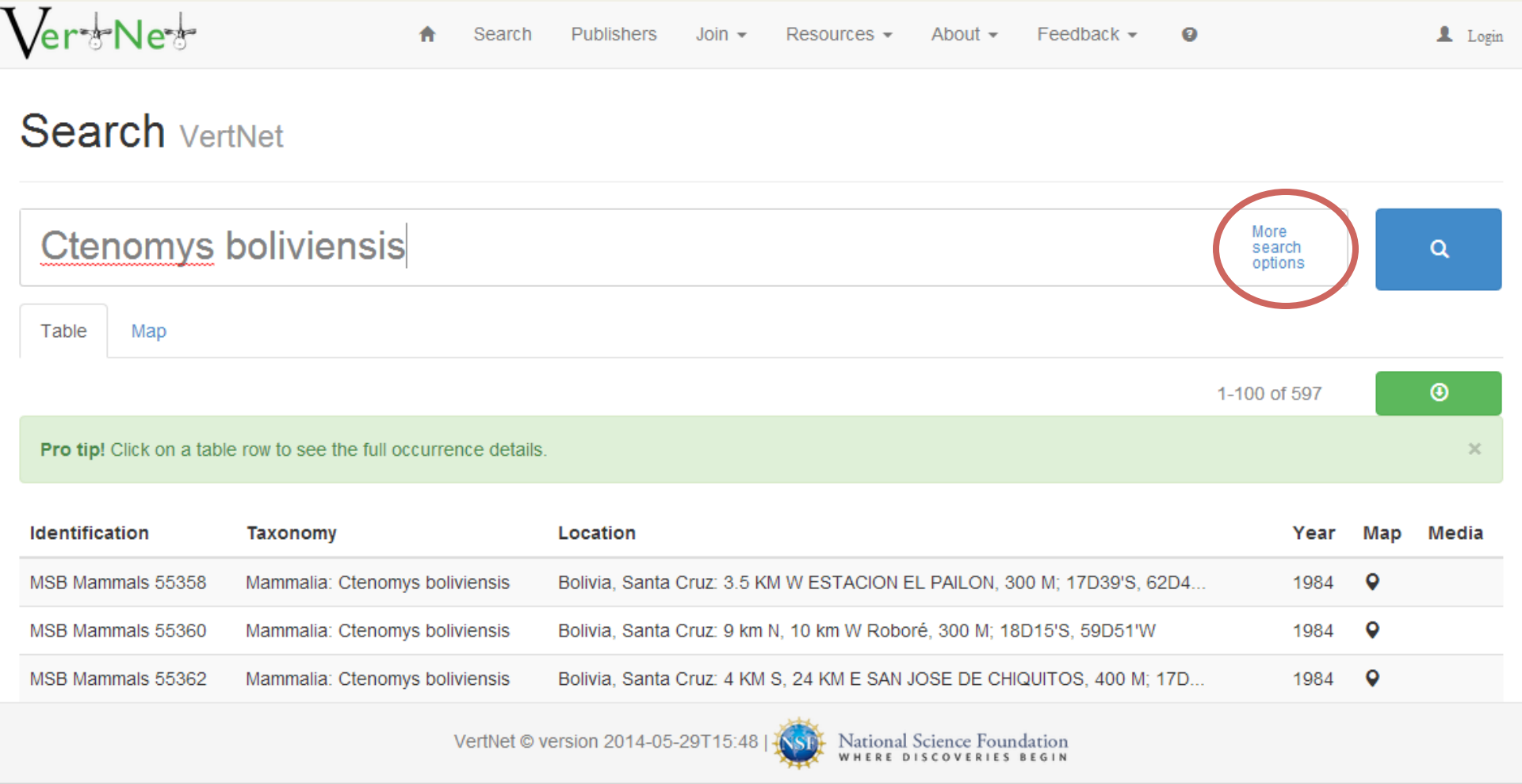
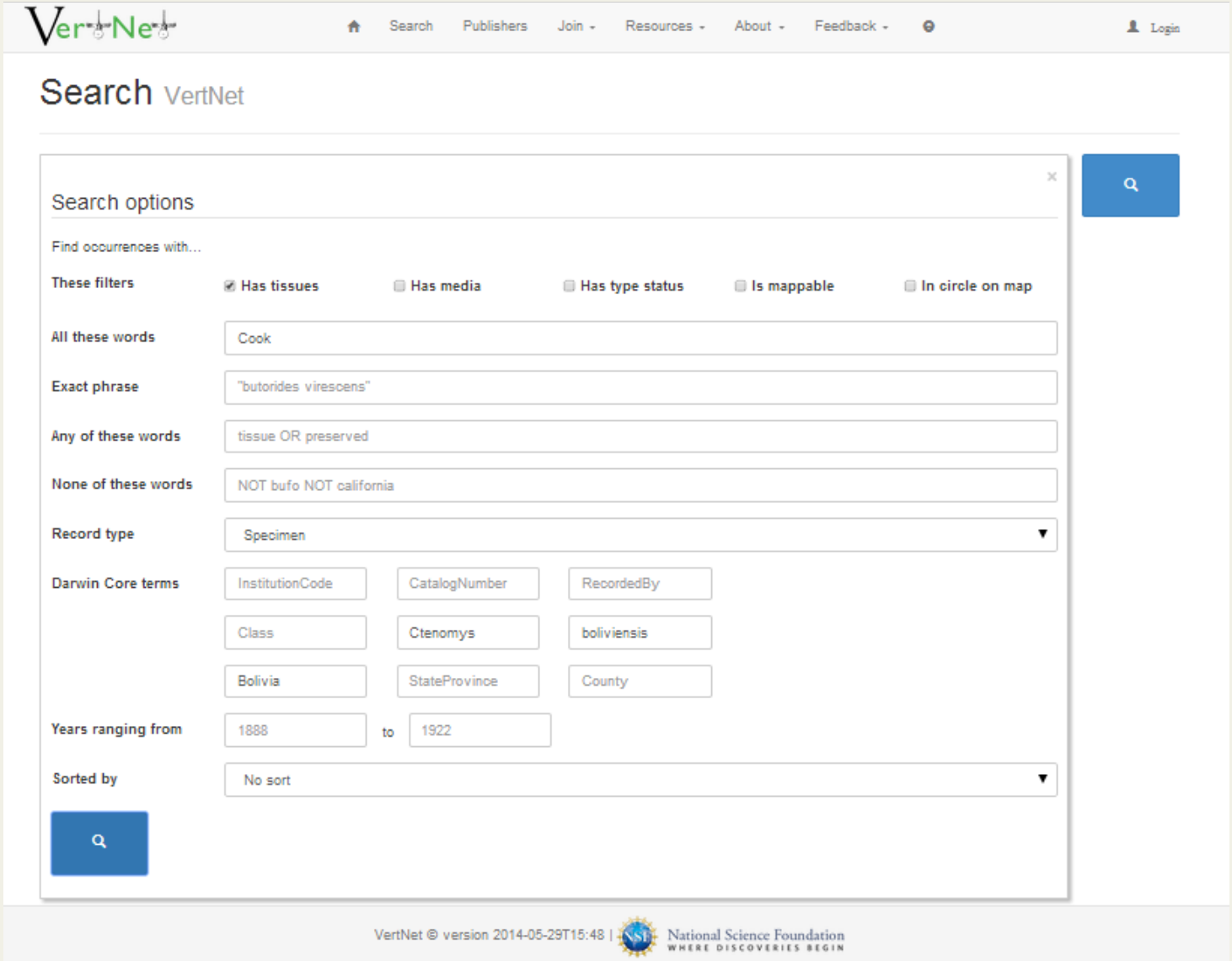


Databases & Portals

- Simple searches by taxonomy
- More complex searches by geography, collector, or date



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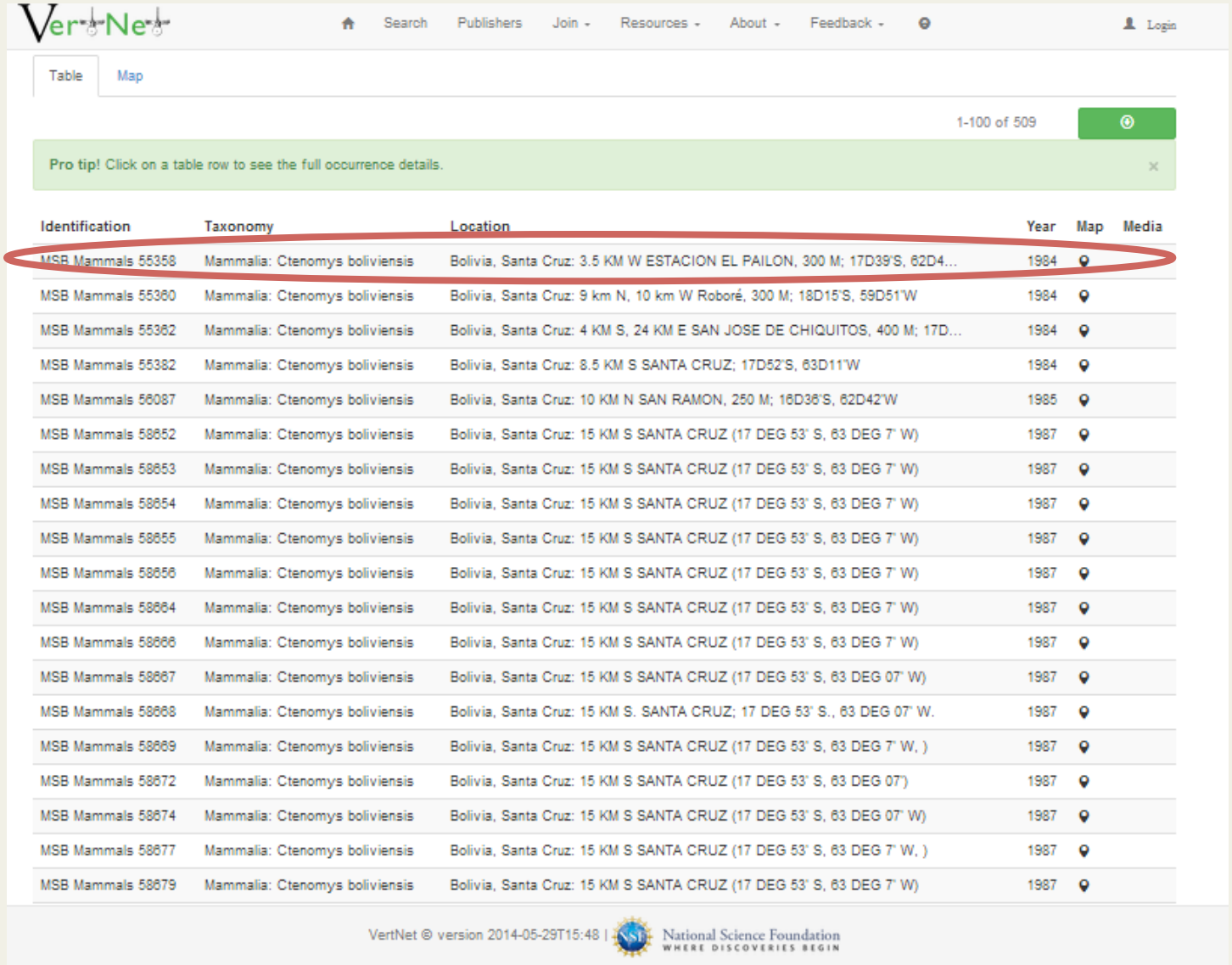

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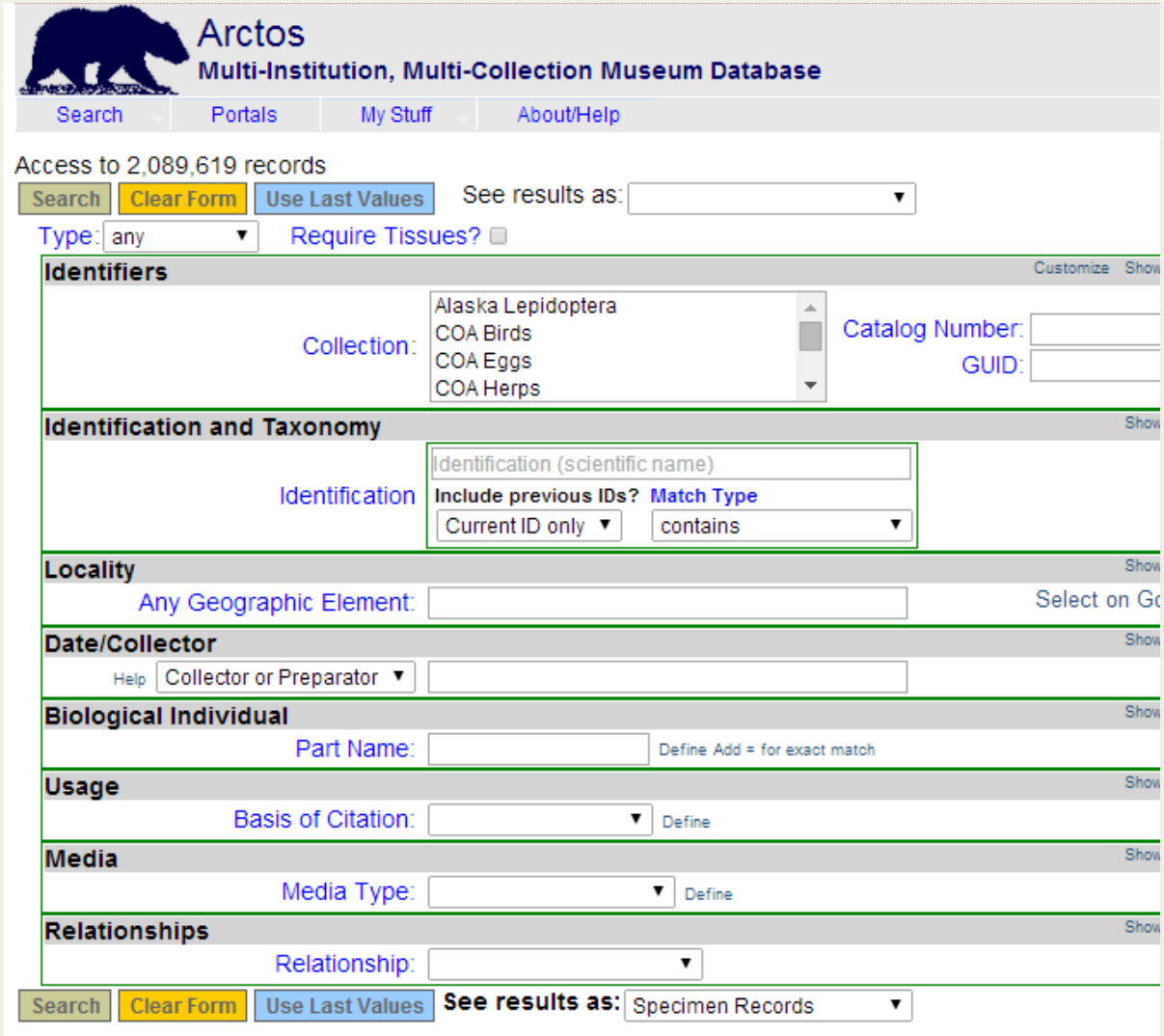
- Additional links and media



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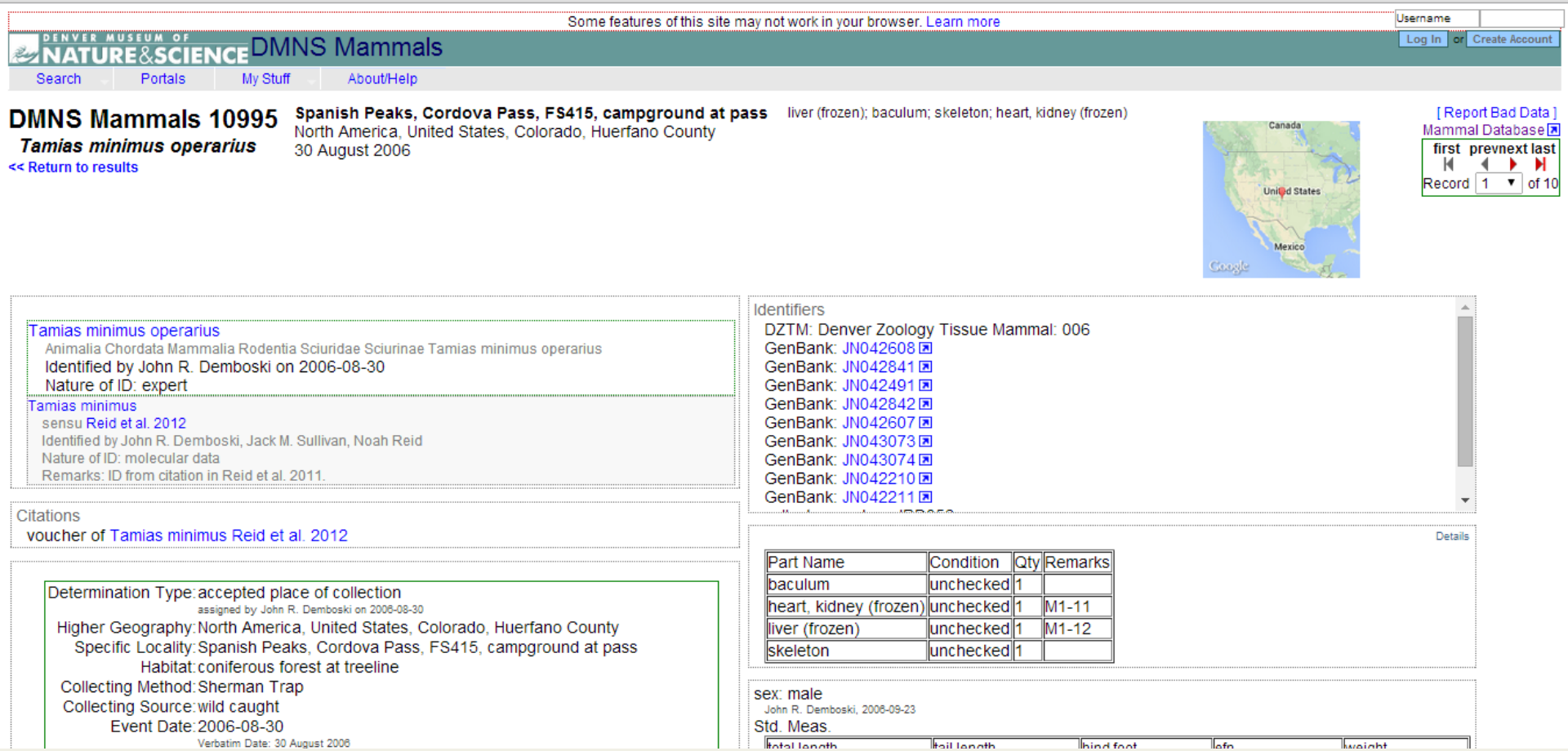

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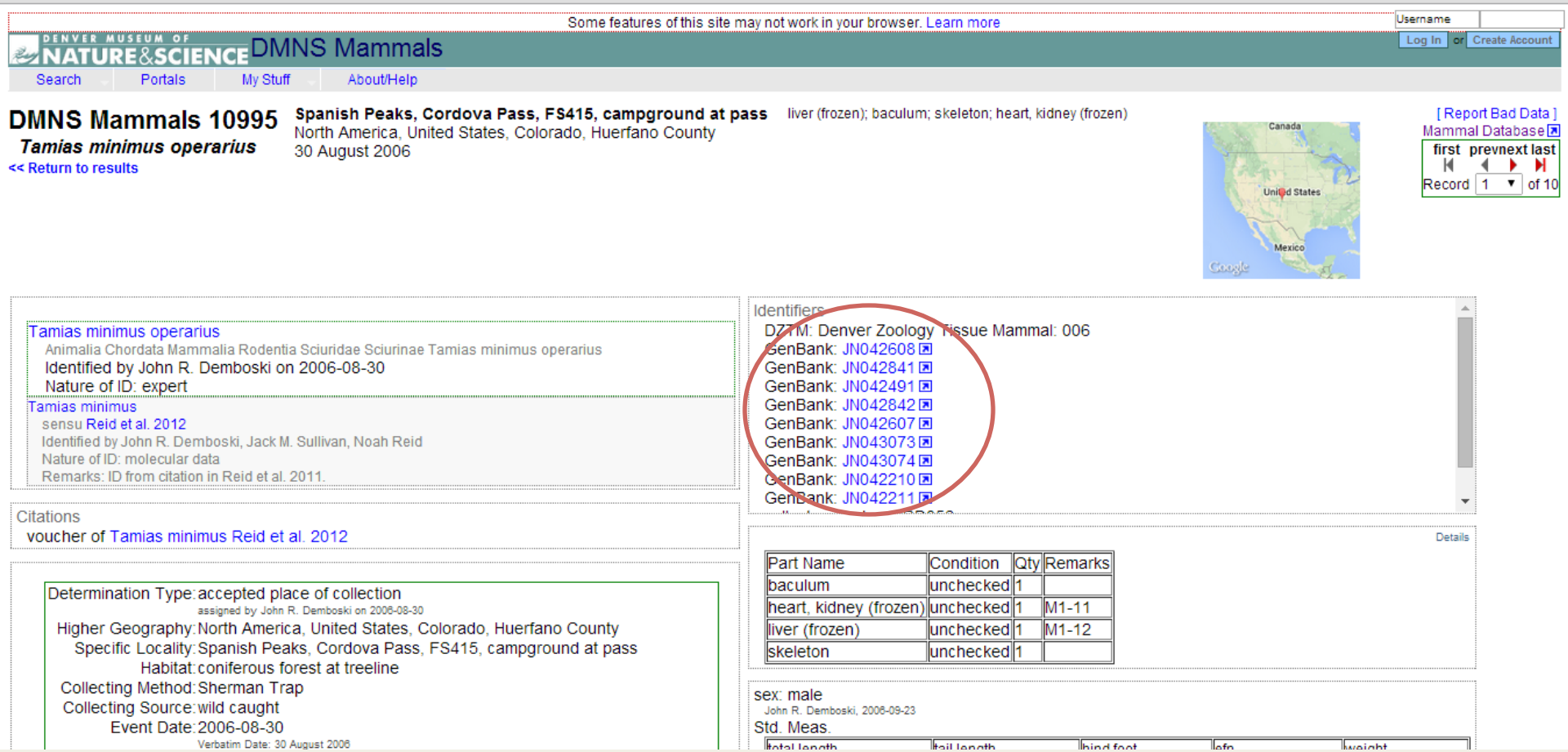

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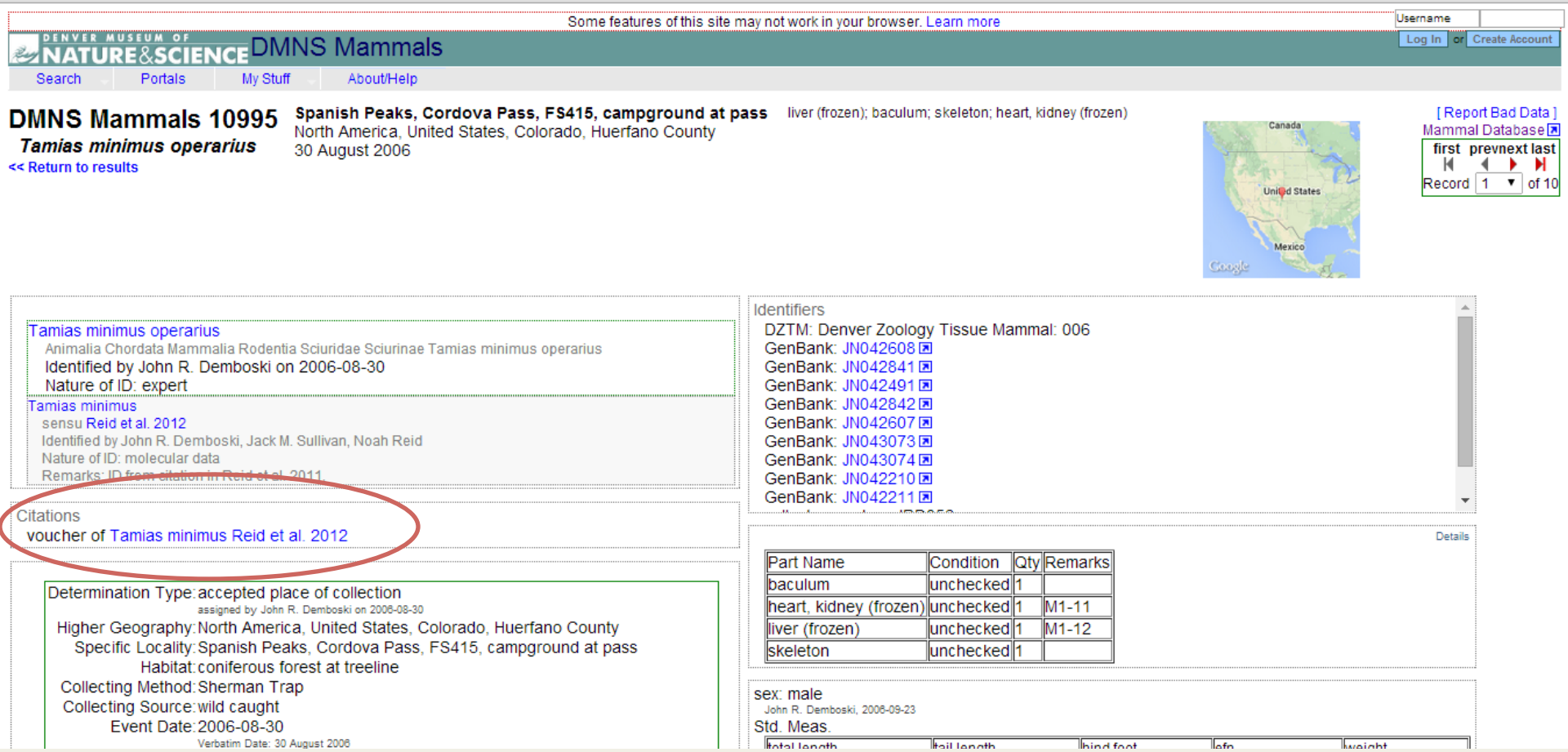
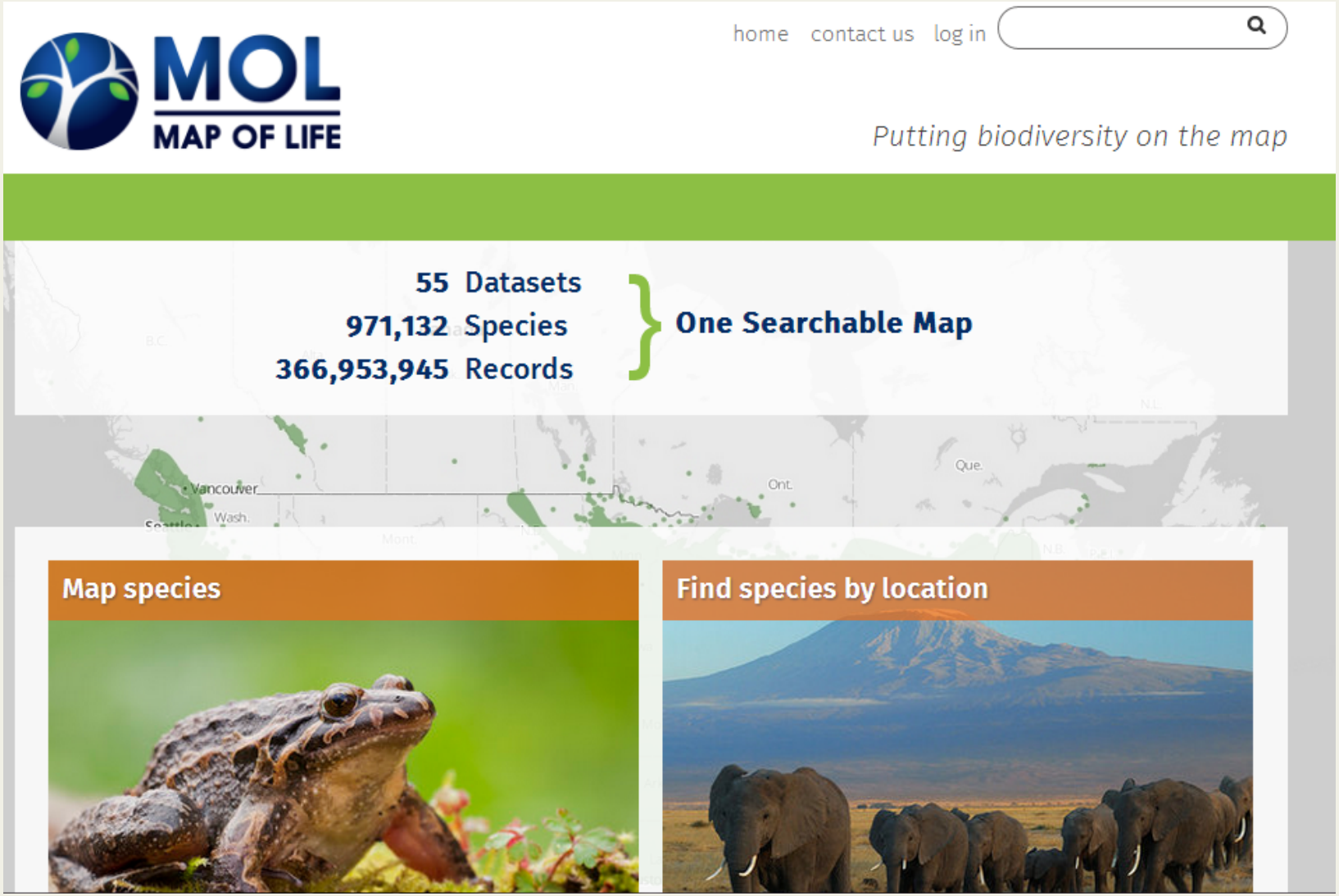


Other Specimen Resources

Some tools incorporate specimen and other types of data.



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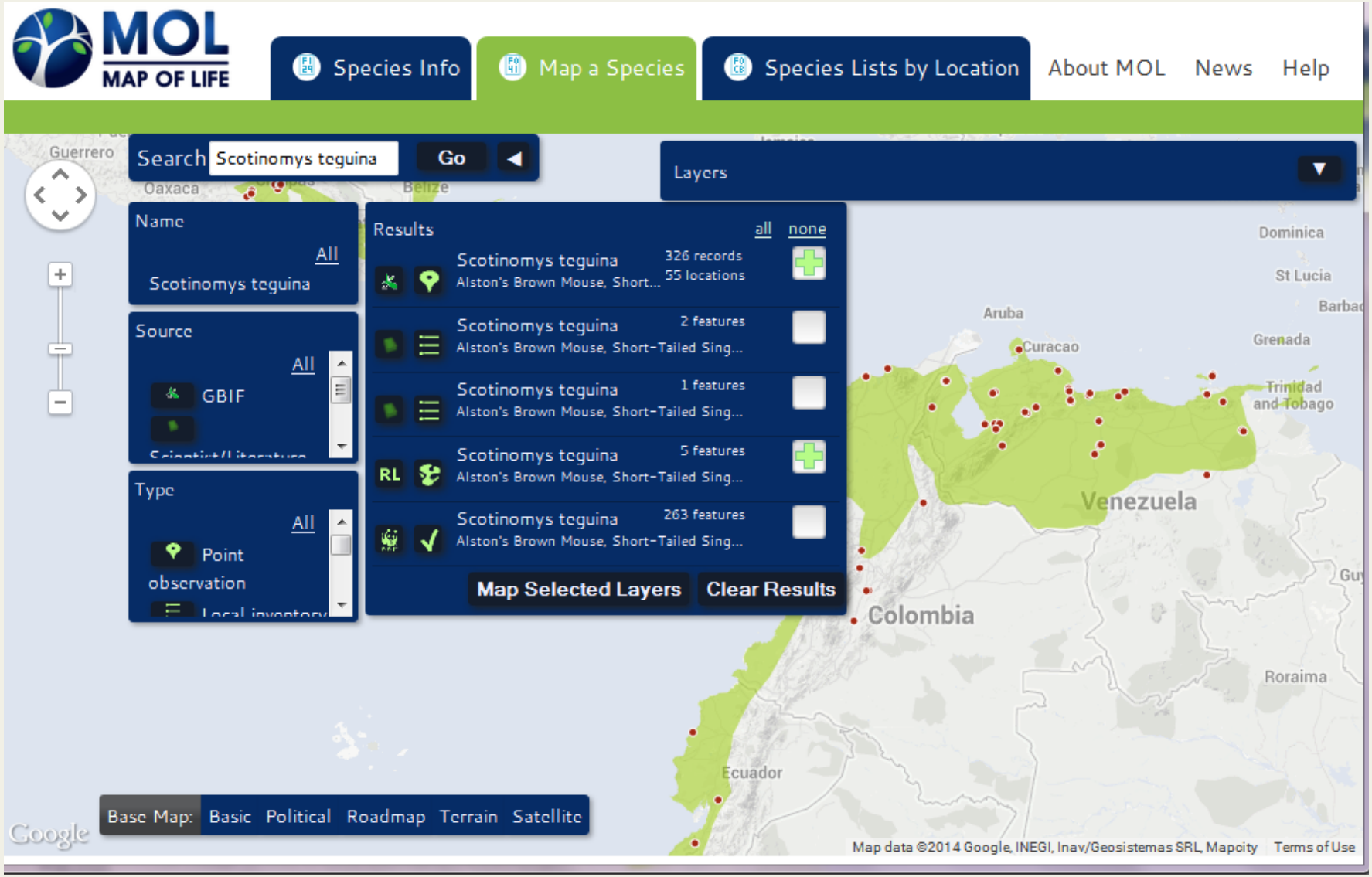

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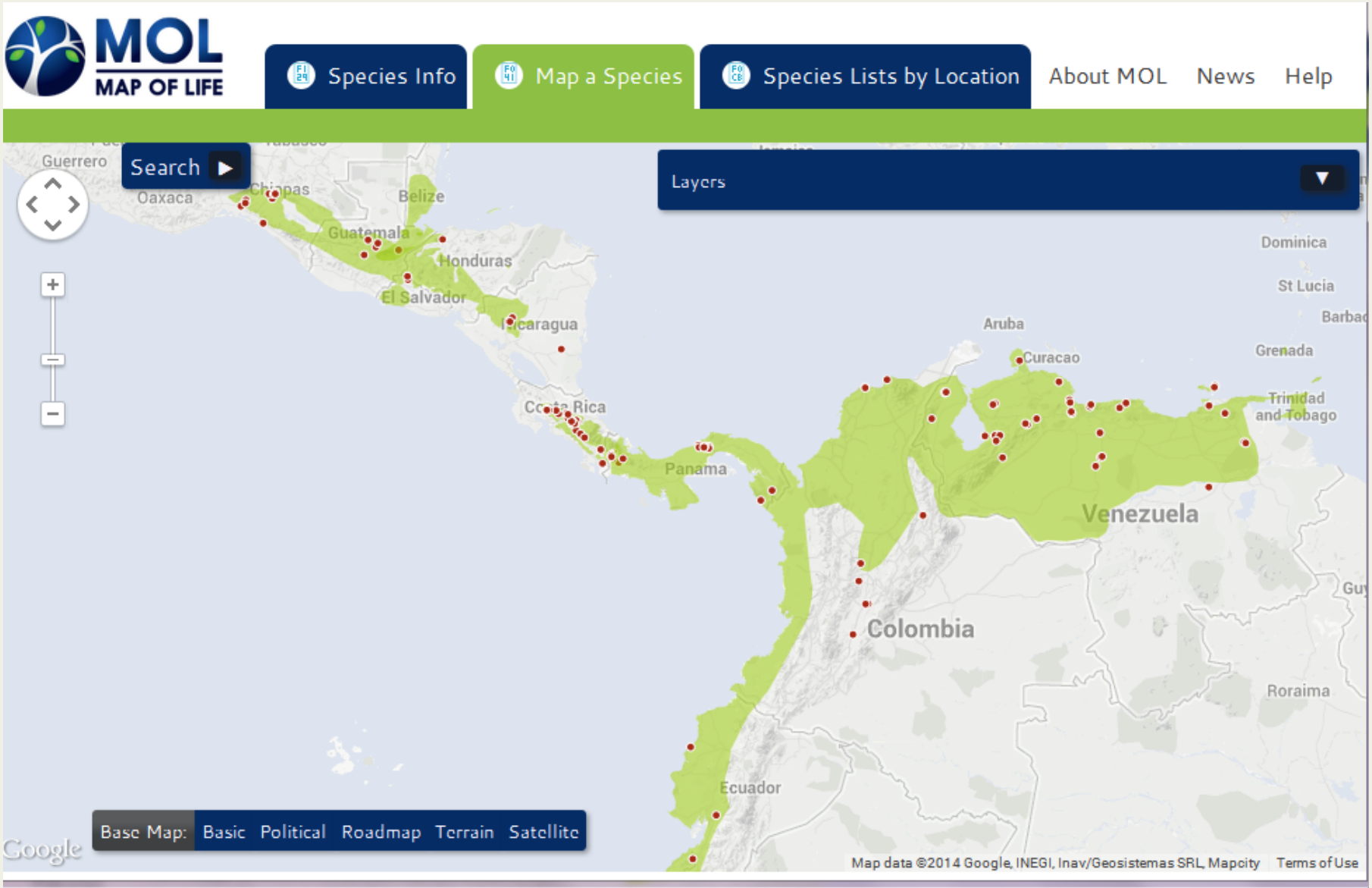


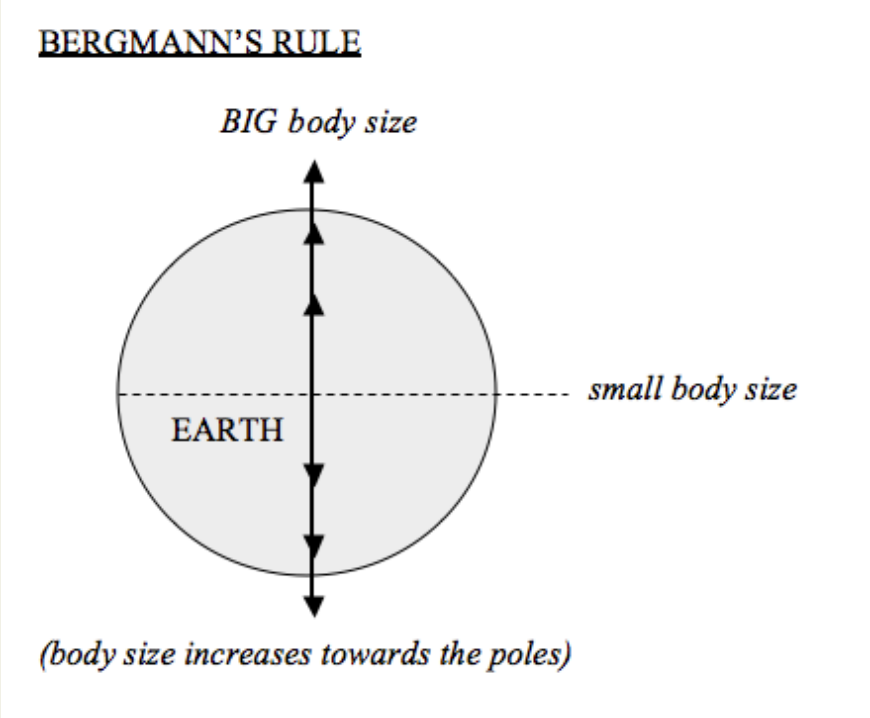
Types of Investigations

Species distributions through time

Biogeographic/ecologic rules

Invasive species

Phenology, phenological shifts

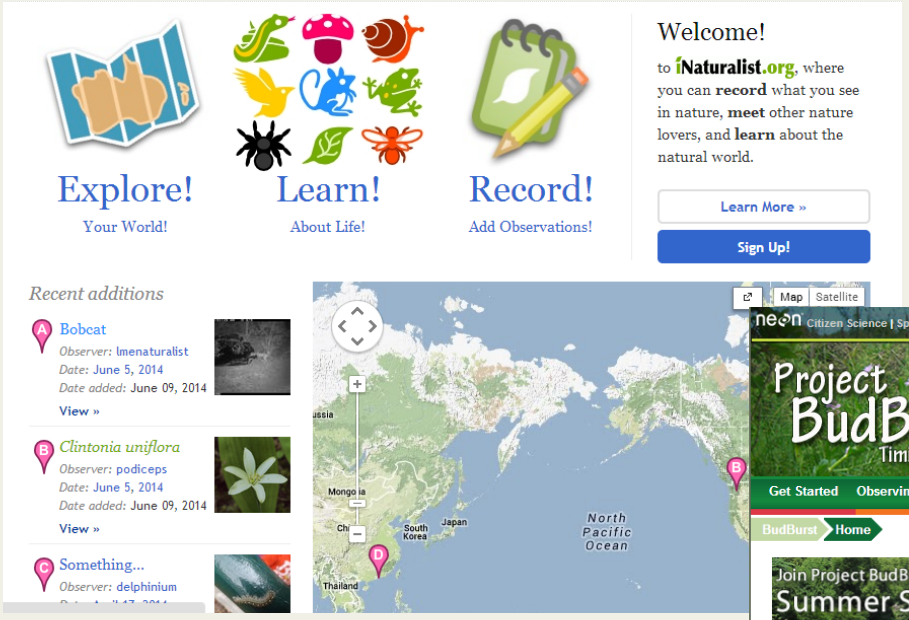


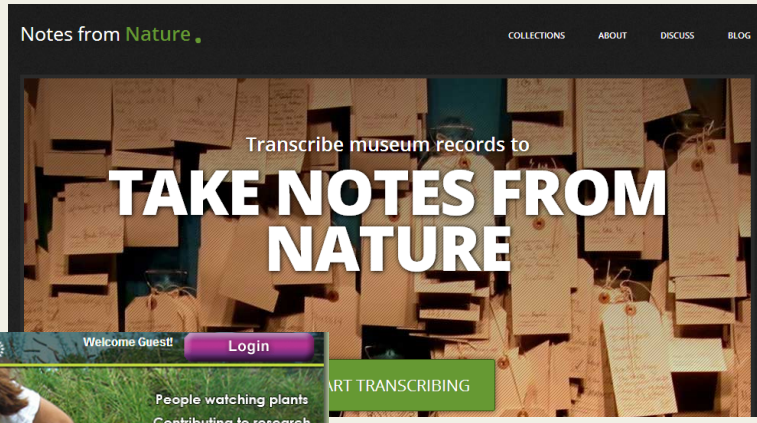
Citizen Science Initiatives

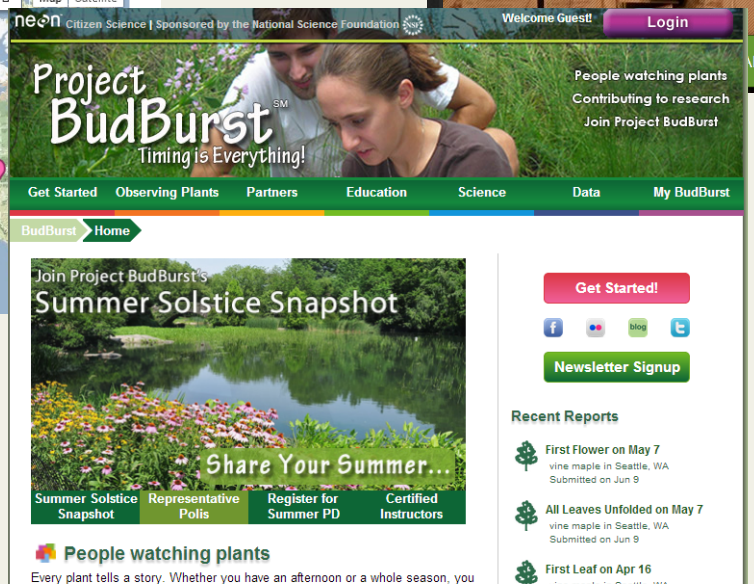
iNaturalist

Zooniverse – Notes from Nature

Project BudBurst







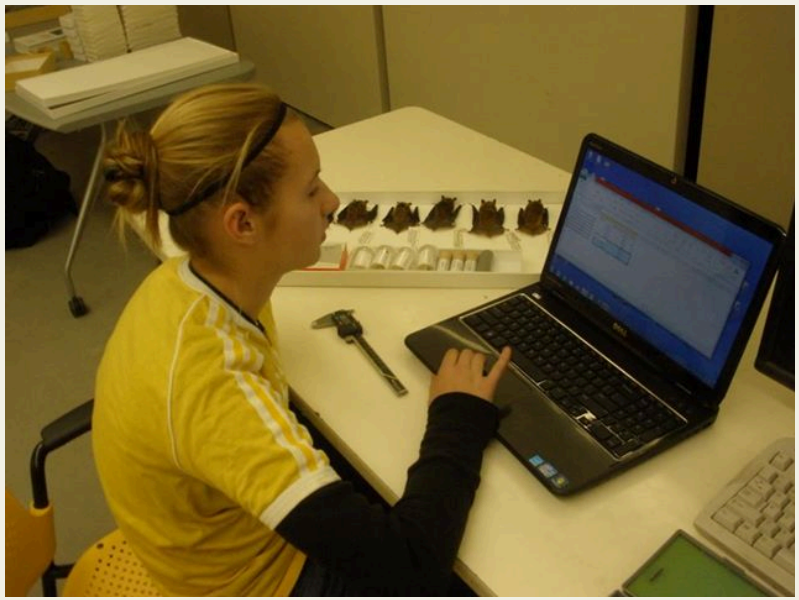
Challenges

Databases and collections not originally developed for education

- databases developed for collection management
- collections developed and used for research

Specimen & data availability

- data not available to address many types of questions



Challenges

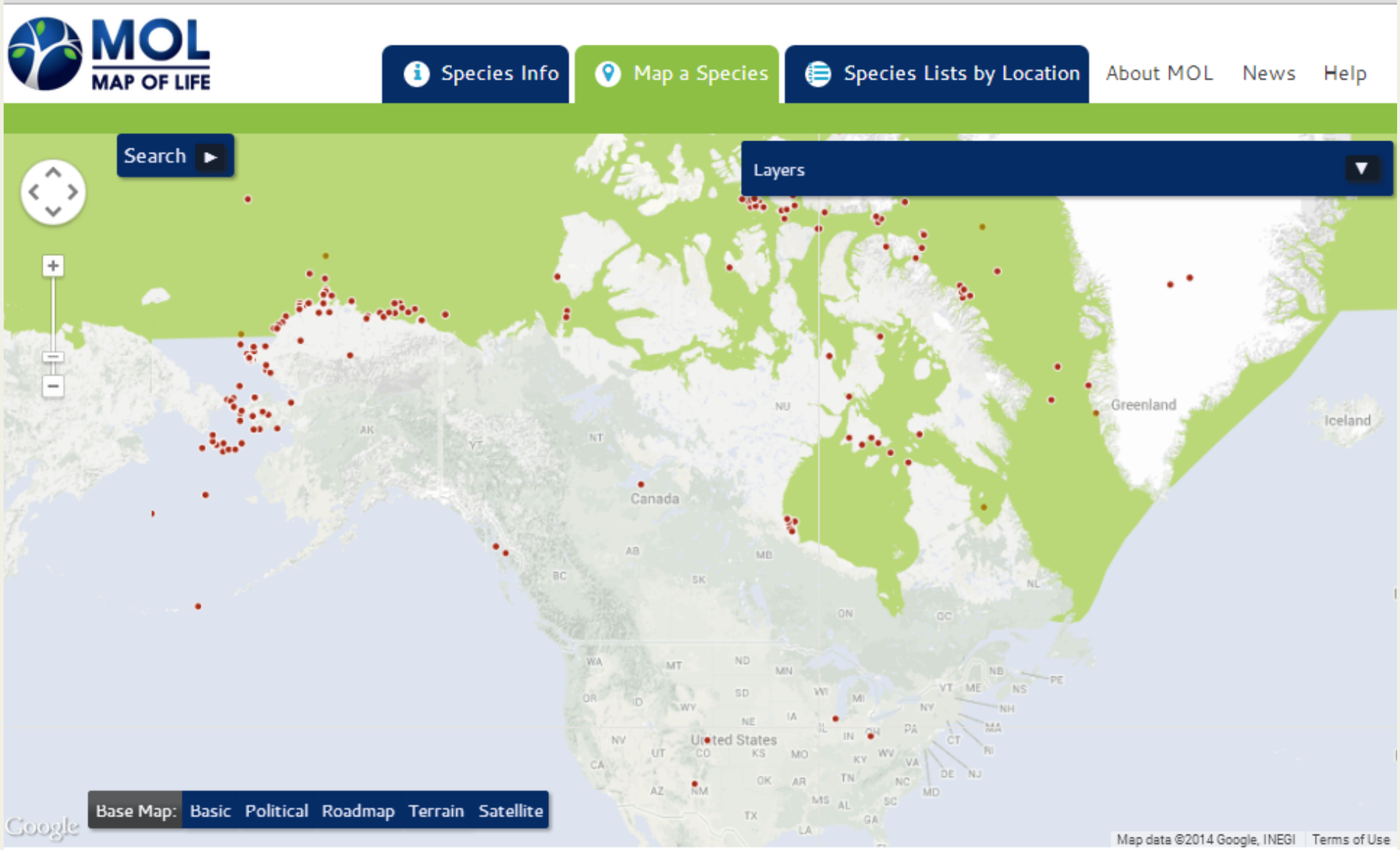
Educators & students are not aware of existence and value of collections.

Accessing and using databases can be tricky.

- sometimes need certain browsers
- databases go down
- learning curve for how to do searches
- using downloaded data usually requires clean-up and verification

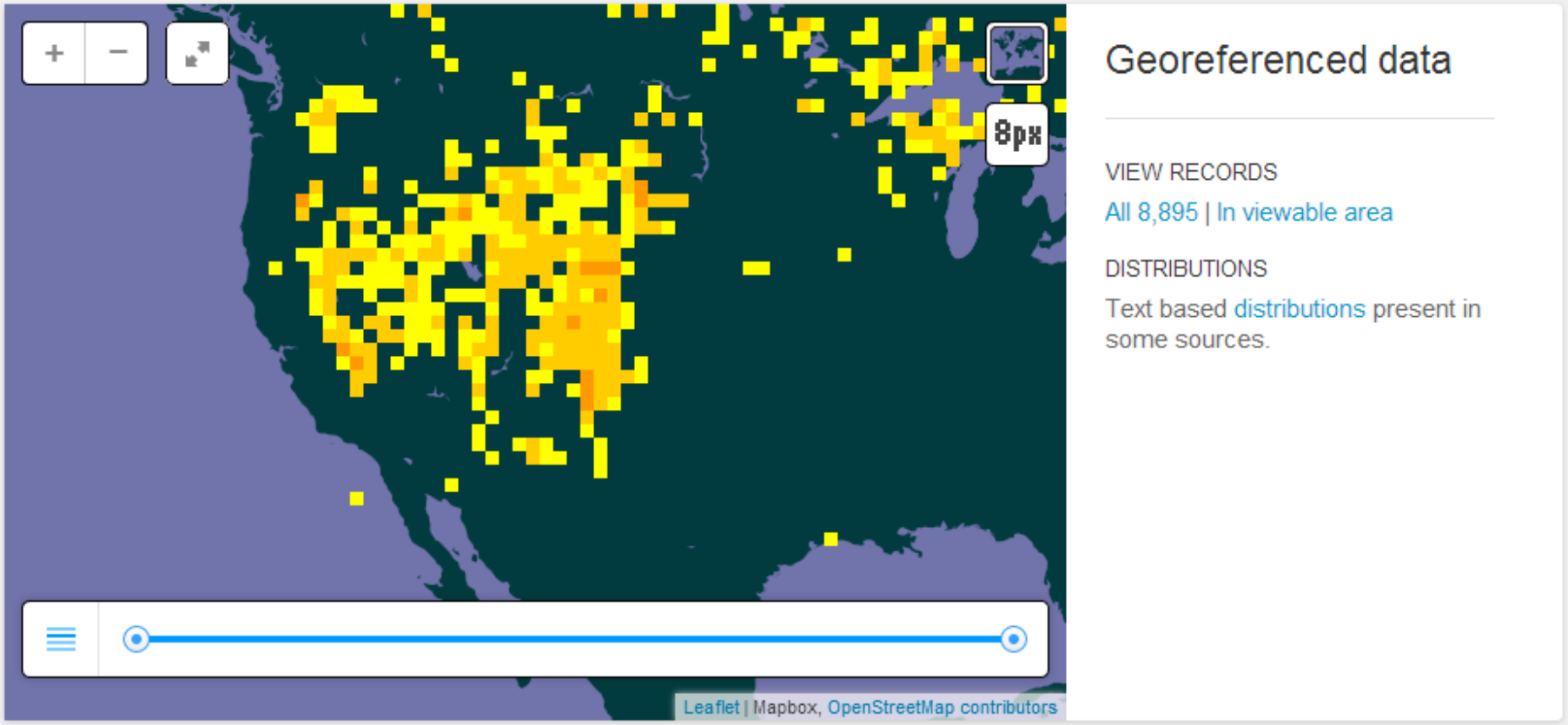
Challenges

Map of Life – *Ursus maritimus*



Challenges

GBIF – *Tamias minimus*



Benefits

Most classrooms have internet access.

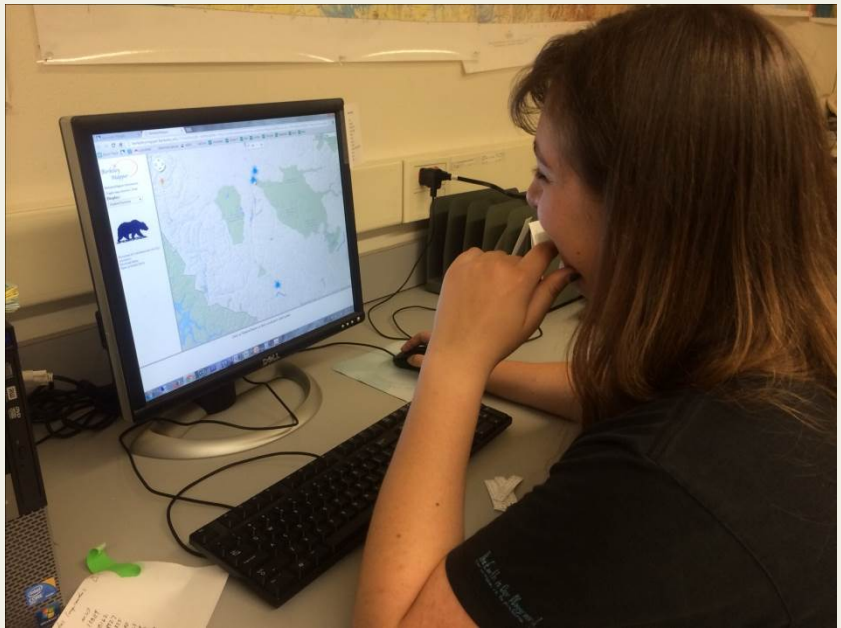
Using on-line (specimen) data allows

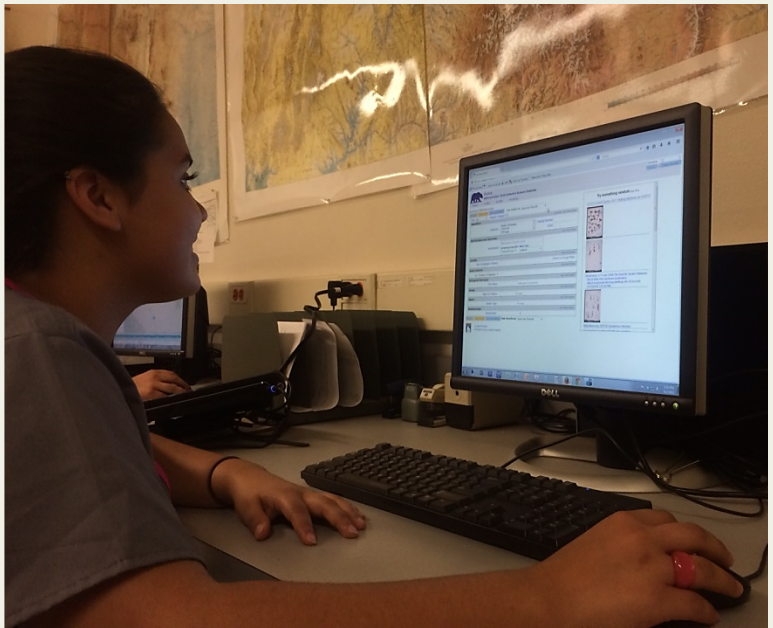
- student access to real data
- inquiry-driven education
- addressing questions of local significance

Benefits

Natural history collection data is real, can be verified, and interesting.

Students learn the limits of data, the importance of data quality, and critical thinking about what the data mean.





Funding and Participation

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University of New Mexico; University of Alaska, Fairbanks; Harvard University; University of California, Berkeley; Texas A&M University; City University of New York; Occidental University; University of Nevada, Reno; Arizona State University; University of Ohio; Florida Natural History Museum; University of Illinois, Champaign-Urbana; College of Southern Nevada; Northern Michigan University; University of Michigan; Massachusetts College of Liberal Arts; University of Colorado, Boulder; Denver Museum of Nature & Science; United States Geological Survey; United States Department of Agriculture