

NIBA, ADBC, iDigBio & Digitization of Natural History Collections Data



Larry M. Page
PD, iDigBio
Curator, FLMNH



20 June 2013

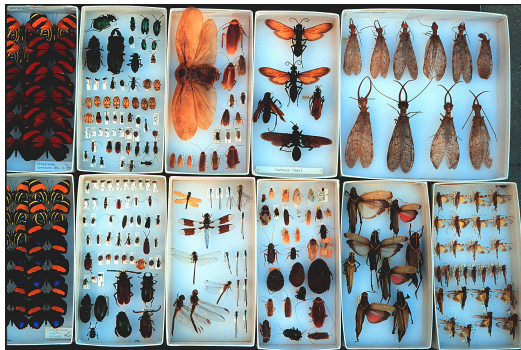


This material is based upon work supported by the National Science Foundation under Cooperative Agreement EF-1115210. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

NIBA, ADBC, iDigBio & Digitization of Natural History Collections Data NSCA, SPNHC, AIBS



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Biodiversity Collections:



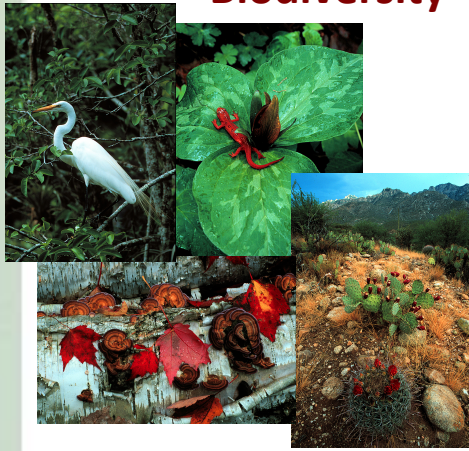
Over 1 billion specimens are housed in institutional collections in U.S.A.

Specimens are the vouchers for much of biological research

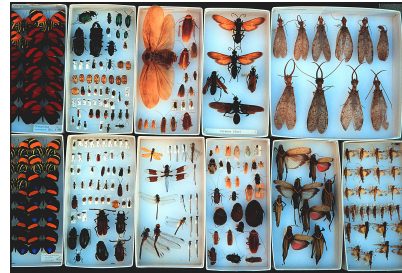
Enormous amount of data associated with the specimens – for uses beyond biological research



Biodiversity



Collections: Specimens, Observations, DNA



1 billion
specimens

Environmental Policy
Management, Use,
Protection

New Discoveries

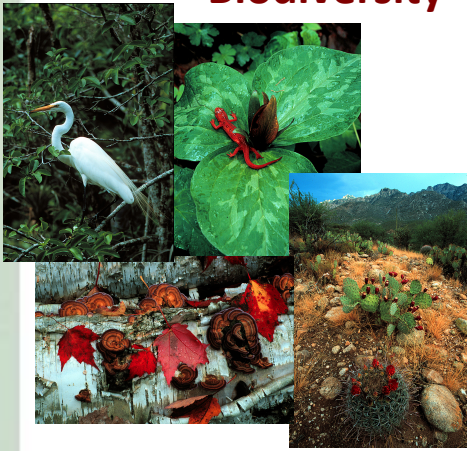
Understanding

Appreciation

Research

Education
Outreach

Biodiversity



Collections: Specimens, Observations, DNA



1 billion
specimens

Benefits

Environmental Policy
Management, Use,
Protection

New Discoveries

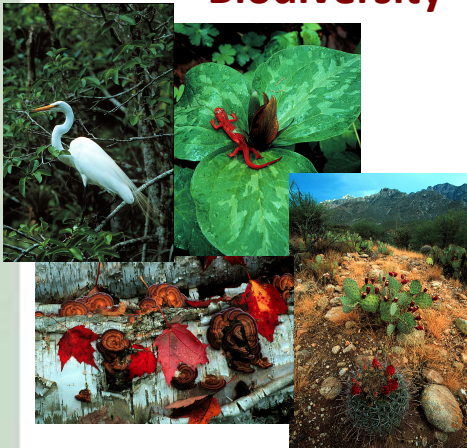
Understanding

Appreciation

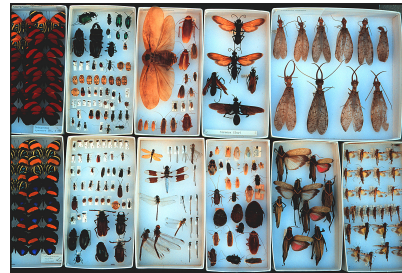
Research

**Education
Outreach**

Biodiversity



Collections: Specimens, Observations, DNA



Benefits
\$

**1 billion
specimens**

Benefits

Environmental Policy
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Research

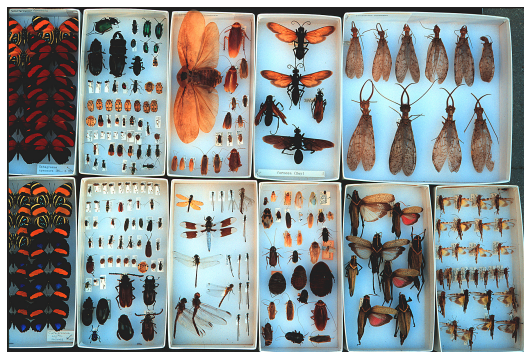
**Education
Outreach**



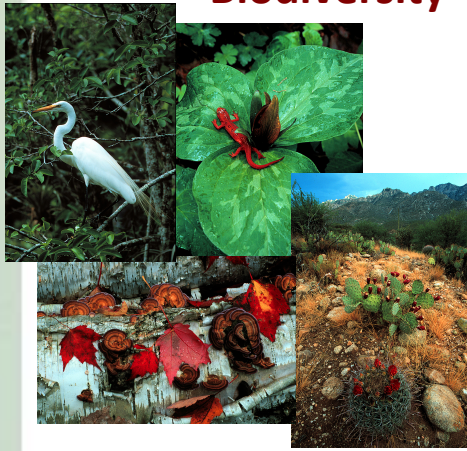
PROBLEM:



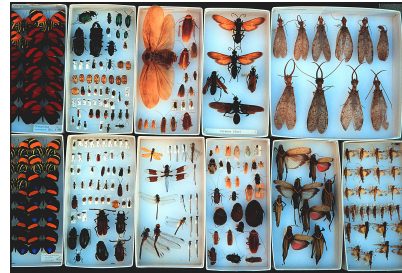
**The data in biodiversity collections are
inaccessible to most potential users**



Biodiversity



Collections: Specimens, Observations, DNA



1 billion
specimens

Environmental Policy
Management, Use,
Protection

New Discoveries

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NIBA: Network Integrated Biocollections Alliance

Recognizing the significant value of collections for research, education, and society, the biocollections community in 2010 developed

“A Strategic Plan for Establishing a Network Integrated Biocollections Alliance (NIBA)”



U.S. National Science Foundation followed NIBA with:

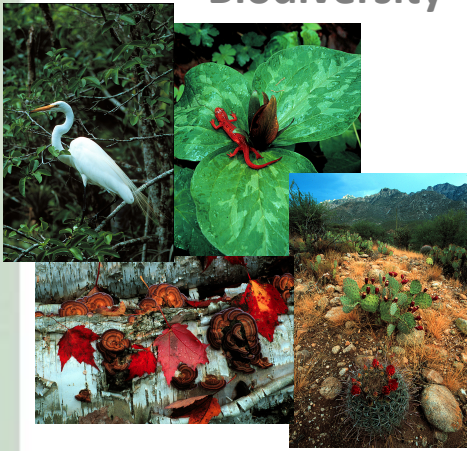
**Advancing Digitization of
Biodiversity Collections Program (ADBC)**

The goal of **ADBC** *is to remove this inaccessibility* through **digitization**: putting information online so that researchers, educators, students, natural resource managers, environmentalists, and policymakers have access.

- \$100 million over 10 years
non-federal collections



Biodiversity

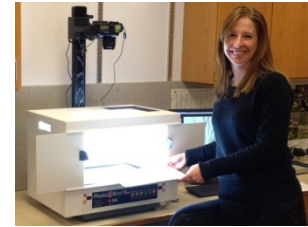


Collections: Specimens, Observations, DNA



Digitization

Databases
Georeferencing
Images



Environmental Policy
Management, Use,
Appreciation, Protection

New Discoveries

Understanding

Appreciation

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Outreach



Advancing Digitization of Biodiversity Collections

Funds

‘Thematic Collections Networks’ or **TCNs**
– groups of institutions that digitize data
organized around a research question.

(climate change, invasive species,
agricultural pests, etc.)

Seven Thematic Collections Networks (TCNs)

- **InvertNet**: An Integrative Platform for Research on Environmental Change, Species Discovery and Identification (*Illinois Natural History Survey, University of Illinois*) <http://invertnet.org>
- **Plants, Herbivores, and Parasitoids**: A Model System for the Study of Tri-Trophic Associations (*American Museum of Natural History*) <http://tcn.amnh.org>
- North American **Lichens and Bryophytes**: Sensitive Indicators of Environmental Quality and Change (*University of Wisconsin – Madison*) <http://symbiota.org/nalichens/index.php>
<http://symbiota.org/bryophytes/index.php>
- Digitizing **Fossils** to Enable New Syntheses in Biogeography-Creating a PALEONICHES-TCN (*University of Kansas*)
- The **Macrofungi** Collection Consortium: Unlocking a Biodiversity Resource for Understanding Biotic Interactions, Nutrient Cycling and Human Affairs (*New York Botanical Garden*)
http://www.nybg.org/science/new_20120723.php
- Mobilizing New England **Vascular Plant** Specimen Data to Track Environmental Change (*Yale University*) <http://herbarium.peabody.yale.edu/NEVP>
- Southwest Collections of **Arthropods** Network (SCAN): A Model for Collections Digitization to Promote Taxonomic and Ecological Research (*Northern Arizona University*) <http://scanbugs.org/index.html>



Advancing Digitization of Biodiversity Collections



Central resource (“HUB”) for digitization of
institutional natural history collections

University of Florida & Florida State University

NATIONAL HUB, THEMATIC COLLECTION NETWORKS, AND COLLABORATORS



Advancing Digitization of Biodiversity Collections

- Facilitate use of biodiversity data to address environmental and economic challenges
 - Researchers
 - Educators
 - General public, citizen scientists
 - Policy-makers
- Develop efficient and effective digitization standards and workflows
- Respond to cyberinfrastructure needs
- Develop research, education and outreach collaborations
- Plan for long-term sustainability of the national digitization effort



Years 1 & 2: Workshops and Working Groups

- **Active (11)**

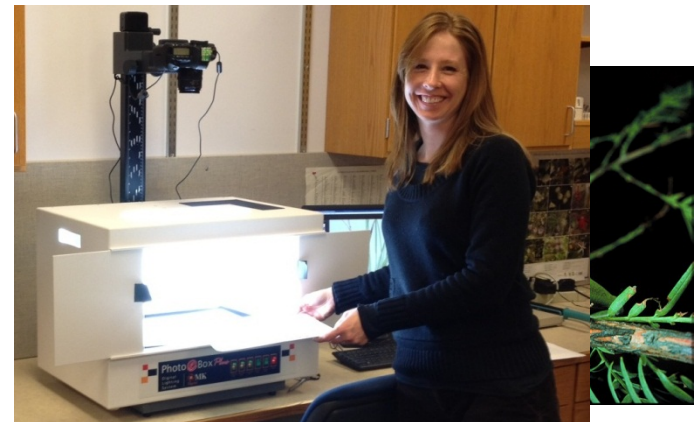
- Augmenting OCR (aOCR)
- Biodiversity Informatics Management
- Cyberinfrastructure
- Developing Robust Object to Image to Data (DROID1)
- Developing Robust Object to Image to Data (DROID2)
- Developing Robust Object to Image to Data (DROID3): 3D Objects and Things in Spirits
- Education & Outreach Subcommittee
- Georeferencing Working Group (GWG)
- Minimum Information Standards, Authority Files, & Semantics (MISC)
- Paleontology
- Public Participation in Digitization

- **Proposed (3)**

- Strategic Communication
- Research
- Sustainability

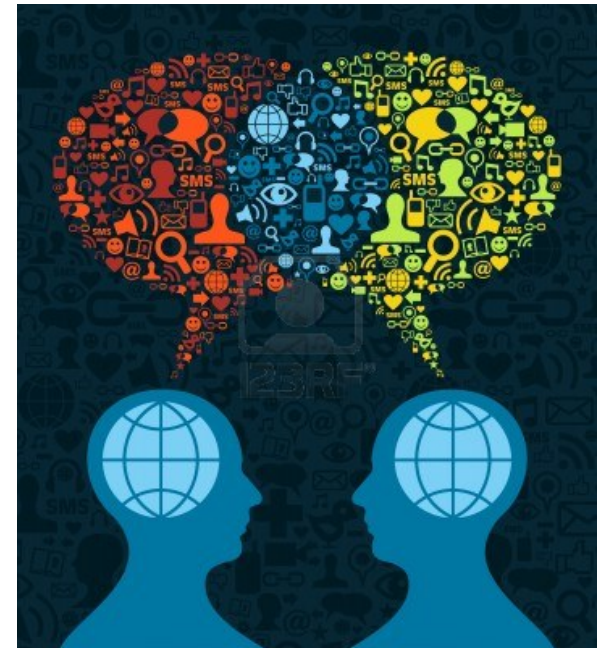
- **Inactive (2)**

- Authority Files
- Intellectual Property Policy




Working with other biodiversity projects

- pro-iBiosphere (Leiden, Berlin)
- Dimensions of Biodiversity, Panama
- CollectionsWeb
- JSTOR Global Plants
- NESCent
- AIBS
- USGS / BISON
- OBIS
- NSCA
- SPNHC
- ASB
- CODATA – Taiwan
- AVAToL
- COLLABIT (sharing resource info across Science Centers) e.g., [SESYNC, NCEAS]



- Website
- Specimen portal version 1.0

Demo on Friday



3,270,330
Specimen Records


391,312
Media Records

80
Recordsets

Making data and images of millions of biological specimens available in electronic format for the research community, government agencies, students, educators, and the general public

Search the specimen portal: Portal Search

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Entomologists Gather for Insect Digitization Workshop in Chicago

Chicago's [Field Museum of Natural History](#) (FMNH) turned out to be the perfect venue for iDigBio's April 23-25 Dried Insect Digitization workshop. Overlooking Grant Park and the Chicago lakefront, FMNH provided an exceptionally attractive and hospitable environment with outstanding amenities. About 50 entomologists and digitization professionals from the U.S., Australia, and the United Kingdom attended, bringing together a diverse assemblage of knowledge and skill to address the complex job of digitizing pinned insect collections.

iDigBio Pamphlet Available

05-15-2013

iDigBio has developed a new pamphlet featuring brief descriptions about the aims of ADBC and iDigBio, with colorful, eye-catching digitization-related images. This material provides a simple and visual representation of iDigBio's mission, suitable for almost any audience.

We would love...

[click for full article >>](#)

Blog Archives

iDigBio Tours New UF CNS Data Center
Post date: 04-08-2013

SPNHC 2013 Registration Now Open
Post date: 03-15-2013

Hackathon and iConference Update Part II
Post date: 03-01-2013

[more archives >>](#)

Upcoming Events

iDigBio Symposium at the Society for the Preservation of Natural History Collections 28th Annual Meeting
06-20-2013

2013 Society for the Preservation of Natural History Collections (SPNHC): DemoCamp
06-21-2013

iDigBio Symposia at Botany 2013
07-27-2013 to 07-31-2013

Second Train-the-Trainers Georeferencing Workshop (TTT #2)
08-12-2013 to 08-16-2013

[more events >>](#)

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- [iDigBio Resources](#)
- [iDigBio Specimen Portal](#)
- [iDigBio Wiki](#)


Latest Publications

[DataIngestionGuide.pdf](#)
Posted Date: 1 week 6 days ago

[iDigBioGuides2013-05-14.pdf](#)
Posted Date: 4 weeks 1 day ago

[iDigBioTermsOfUsePolicy.pdf](#)
Posted Date: 6 months 1 week ago

232 people like this. Sign Up to see what your friends like.



portal.idigbio.org

[Home](#)[Specimen Records](#)[Media Records](#)[Tutorial](#)[Home](#)[Specimen Records](#)[Media Records](#)[Tutorial](#)[Feedback? Need Help? Contact Us!](#)[Login](#)

Identifiers

iDigBio Record GUID	0001a88e-ba5f-4ba7-b3b9-70d616fece10
Provider GUID	urn:uuid:lichenportal.org:0001a88e-ba5f-4ba7-b3b9-70d616fece10

Specimen

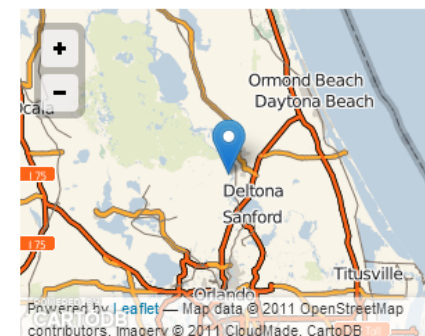
Basis of Record	PreservedSpecimen
Identification Remarks	certain
Institution Code	SRP

Taxonomy

Family	Cladoniaceae
Scientific Name	Cladonia incrassata
Scientific Name Authors	Flörke

• Country: Canada

Georeference Data



The blue marker indicates the location of the current record, the red points are locations of similar specimens in the iDigBio system.

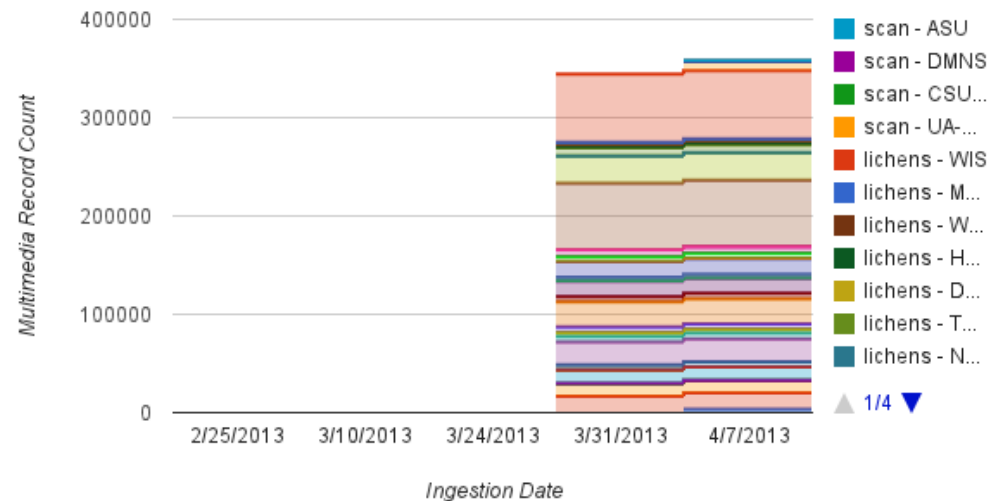


Data Ingestion

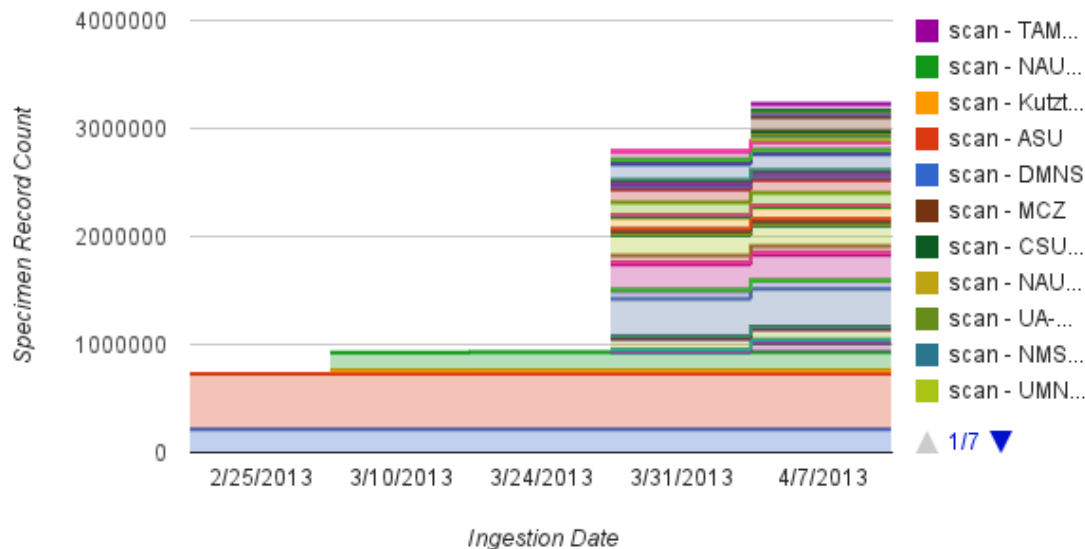
As of 4/2/2013:

- 3,300,000 Specimen Records
- 344,373 Media Records
- 80 Recordsets

iDigBio Multimedia Data



iDigBio Specimen Data



Opportunities

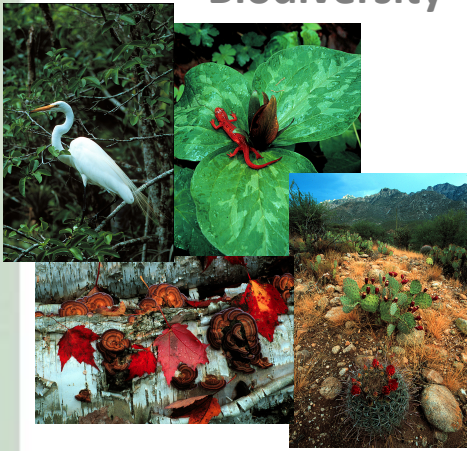
- **New research initiatives**
- One billion records – huge repository of biodiversity data
- Opportunities for previously intractable large-scale research requiring large amounts of spatial and temporal data



Big-science questions related to human health, climate change, agriculture, species discovery, species extinctions, rates of evolutionary change, and ecosystem services

Other data layers (environmental data, human diseases; TCNs plan to look at climate change – will need access to GIS layers, other data)

Biodiversity



Collections: Specimens, Observations, DNA



Digitization

Databases
Georeferencing
Images

Collections Computational Cloud

Environmental Policy
Management, Use,
Appreciation, Protection

New Discoveries

Understanding

Appreciation

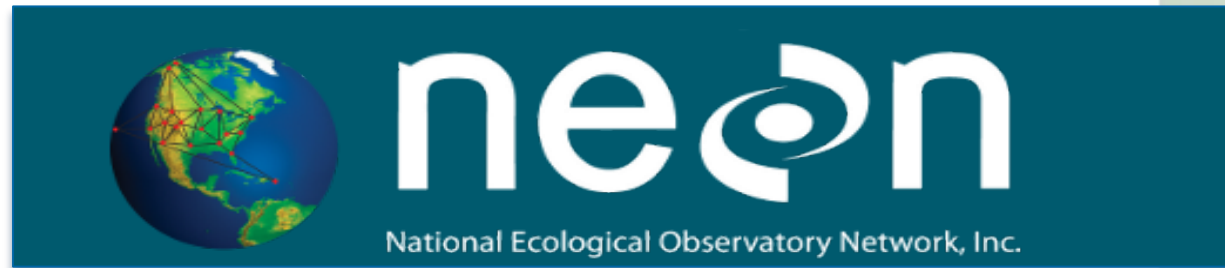
Research

Education

Outreach

Linking Collections to Ecology

- Through NEON



National Ecological Observatory Network

- Biological monitoring at sites across USA; collections
- Baseline for changes in species distribution and abundance over time

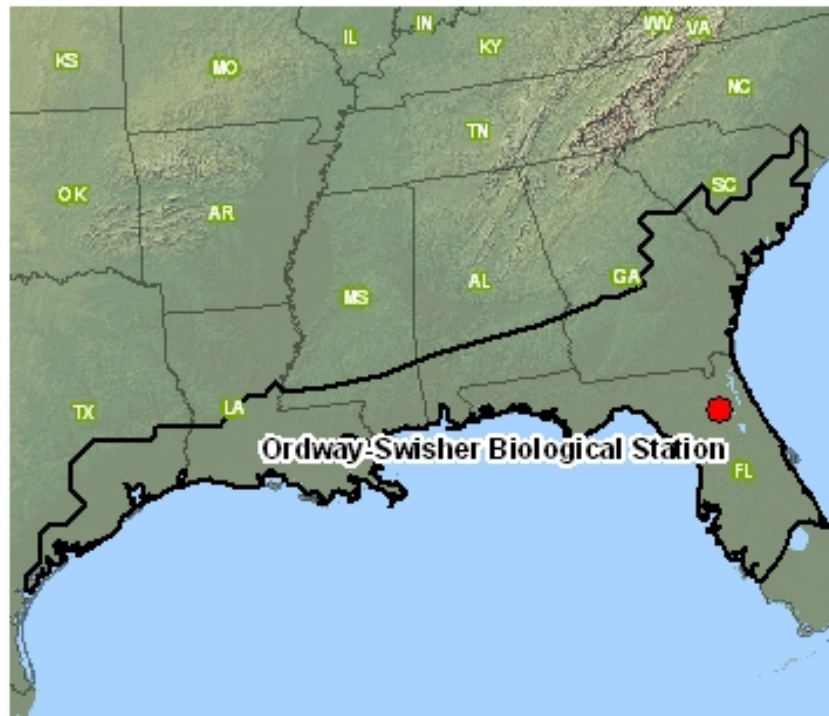


• home \ neon

topics of interest


- about osbs •
- research •
- education •
- conservation •
- NEON •
- ERT •
- support osbs •

national ecological observatory network, inc



Linking Collections to Paleobiology








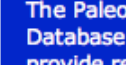
- Paleobiology Database
 - (<http://paleodb.org/cgi-bin/bridge.pl>)




Paleobiology Database

Quick search

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[Analyze](#)
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[Log in](#)



Mammals

Hypsoparia timmi

Microchiropteryx folieae

Reptiles

Africa

Kleinberg Farm, Calitzdorp, Kannaland

Asia

Okubata

This hour's totals

35455 references

180042 taxa

106280 collections

917311 occurrences

247 contributors

105 institutions

20 countries

This month's top contributors

Matthew Clapham
UC Santa Cruz
Uta Merkel
Museum für Naturkunde
Jered Karr
UC Santa Cruz
Melanie Hopkins
Field Museum
John Alroy

About the site

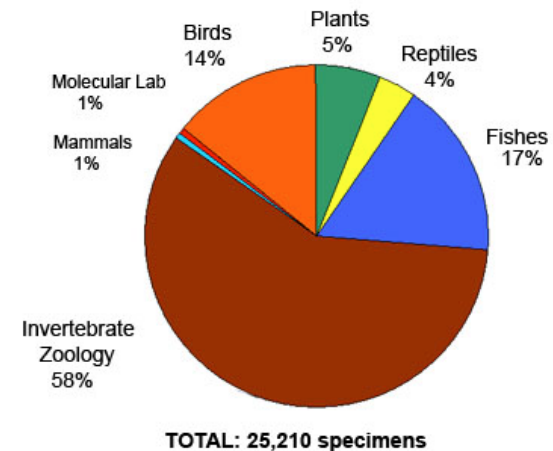
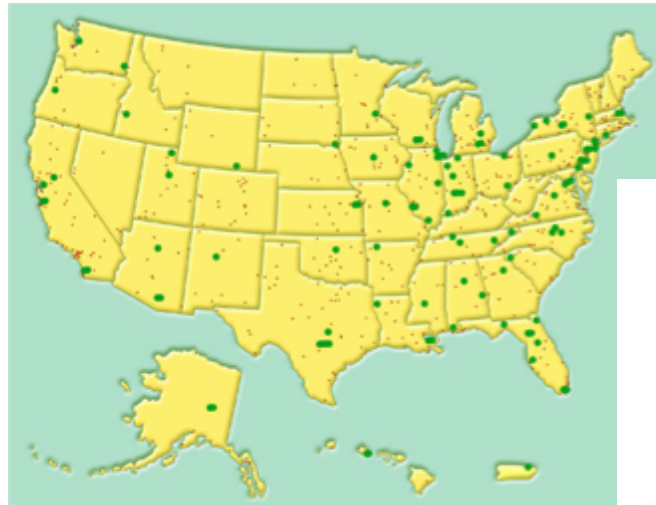
The Paleobiology Database seeks to provide researchers and the public with information about the entire fossil record.

You can use the site to find out about fossil collections, individual plants and animals, taxonomic groups, references to publications, stratigraphic units, time scales, and time intervals.

All of our data can be downloaded, including collection, occurrence, or specimen records, taxonomic names and opinions, measurements of specimens, and Neptune occurrences.

Linking Collections to Genomics

- National network of tissue and genetic resources



FLMNH GRR: the Genetic Resources Repository
Florida Museum of Natural History



Educational Opportunities

- Education: Investigating new ways to teach biodiversity courses
 - *FLMNH, iDigBio and UF Biology to experiment with modular courses*
 - courses for 5 intensive weeks in the semester
 - full attention of the student on the course
- allows activities take require several full days (lab experiments; overnight fieldwork)
- primarily field and lab courses; also biodiversity informatics and uses of digitized data to test hypotheses



Priorities

Ingesting data into portal ...

Incorporating institutions not in TCNs:

1,600 collections

Developing state-of-the-art user interface ...

Cloud Computing Environment

TCNs, GBIF, BISON, VertNET, NEON

Digitization

Validation
Synthesis
Databases
Images



New Discoveries

Understanding

Appreciation

Research

Education

Outreach

Challenge

Sustainability: long-term sustainability of the **national knowledge base and digitization network** so information remains available, and digitization keeps pace with collection growth

Requires large-scale involvement: the more stakeholders, the easier sustainability will be to achieve

- **Broadening use of data in scientific research**
- **Broadening use of data outside research**
 - **Education**
 - **Conservation**
 - **Ecosystem services**
 - **Public policy**

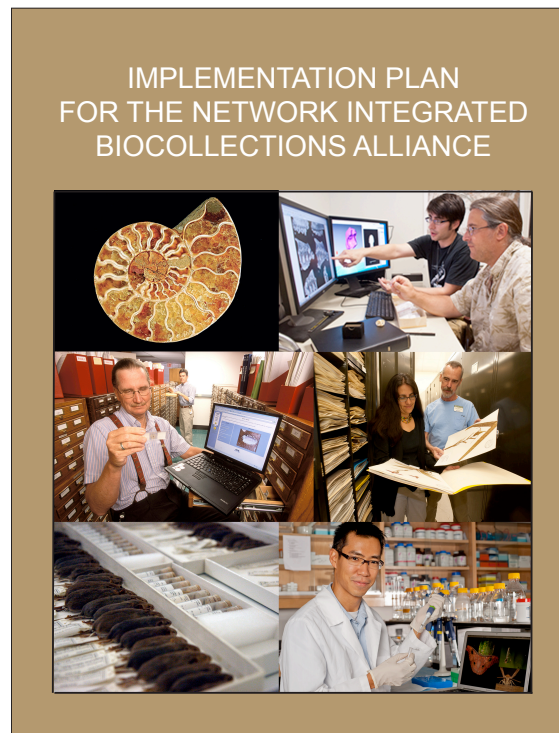




NIBA IMPLEMENTATION PLAN



2013



FUTURE

NIBA IMPLEMENTATION PLAN

This *Implementation Plan* goals:

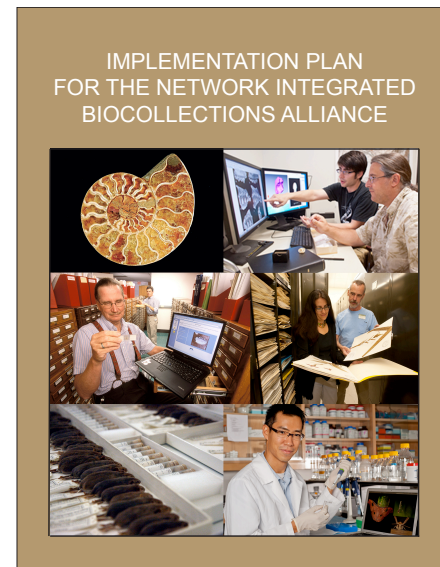
- (1) to **establish organizational structure** that will provide national leadership required to fully realize *Strategic Plan*
- (2) advance engineering of US biocollections cyberinfrastructure
- (3) enhance training of collections staff, create next generation of biodiversity information managers
- (4) increase support for and participation in NIBA by the research community, other stakeholders
- (5) infuse specimen-based learning and exploration into formal and informal education
- (6) establish **sustainable knowledge base**

Challenge

Sustainability

Requires a viable economic model

- **NIBA Implementation Plan calls for a “NIBA Management Organization” to evaluate and recommend ways to sustain a biodiversity data network**



NIBA IMPLEMENTATION PLAN

American Institute of Biological Sciences (AIBS)

+

Natural Science Collections Alliance (NSCA)

+

Society for the Preservation of Natural History Collections (SPNHC)

Proposal for an RCN to move forward with Implementation Plan



NIBA IMPLEMENTATION PLAN

American Institute of Biological Sciences (AIBS)

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Natural Science Collections Alliance (NSCA)

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Society for the Preservation of Natural History Collections (SPNHC)

Proposal for an RCN to move forward with Implementation Plan

HAS THE POTENTIAL TO HAVE A HUGE IMPACT!

- expand digitization effort***
- more recognition of value of collections***
- sustainability (funding)***





NATURAL SCIENCE COLLECTIONS ALLIANCE

[Academy of Natural Sciences](#)
[American Museum of Natural History](#)
[Arizona State University](#)
[Arkansas State University](#)
[Bailey-Matthews Shell Museum](#)
[Bishop Museum](#)
[Brigham Young University](#)
[Brooklyn Botanic Garden](#)
[California Academy of Sciences](#)
[Carnegie Museum of Natural History](#)
[College of William and Mary](#)
[Cornell University](#)
[Delaware Museum of Natural History](#)
[Denver Museum of Nature and Science](#)
[Field Museum of Natural History](#)
[Florida Department of Agriculture](#)
[Harvard University-Arnold Arboretum](#)
[Harvard University-Herbaria](#)
[Harvard University-MCZ](#)
[Harvard University-MNH](#)
[Illinois State Museum](#)
[Instituto de Geologia Museo de Paleontologia](#)
[Louisiana State University-MNH](#)
[Michigan State University](#)
[Mississippi Museum of Natural Science](#)
[Missouri Botanical Garden](#)
[National Tropical Botanical Garden](#)

[Natural History Museum of Utah](#)
[Natural History Museum-LA County](#)
[New Mexico State University](#)
[New York Botanical Garden](#)
[North Carolina Museum Natural Science](#)
[Occidental College-Moore Lab Zoology](#)
[Purdue University](#)
[San Bernadino County Museum](#)
[San Diego Natural History Museum](#)
[Santa Barbara Museum of Natural History](#)
[Texas A & M University](#)
[Texas Tech University](#)
[University of Alaska](#)
[University of Florida](#)
[University of Iowa](#)
[University of Kansas](#)
[University of Minnesota](#)
[University of Nebraska](#)
[University of New Mexico-](#)
[Museum of Southwestern Biology](#)
[University of Oklahoma](#)
[University of Texas, Austin-](#)
[Texas Natural Science Center](#)
[University of Texas-El Paso](#)
[Washington State University-](#)
[Natural History Museum](#)
[Yale University](#)

[American Institute of Biological Sciences](#)
[American Ornithologists Union](#)
[American Society of Ichthyologists & Herpetologists](#)
[American Society of Mammalogists](#)
[American Society of Parasitologists](#)
[American Society of Plant Taxonomists](#)
[Botanical Society of America](#)
[Crustacean Society](#)
[Herpetologists' League](#)
[Lepidopterists' Society](#)
[Mycological Society of America](#)
[Paleontological Society](#)
[Phycological Society of America](#)
[Society for Economic Botany](#)
[Society for Integrative & Comparative Biology](#)
[Society for Study of Amphibians & Reptiles](#)
[Society of Mineral Museum Professionals](#)
[Society of Nematologists](#)
[Society of Vertebrate Paleontology](#)



NATURAL SCIENCE COLLECTIONS ALLIANCE



JOIN!



SPNHC

ADVANCING COLLECTIONS CARE

The Society For The
Preservation of Natural
History Collections

Taxon-oriented societies





THANK YOU!



SPNHC

ADVANCING COLLECTIONS CARE

The Society For The
Preservation of Natural
History Collections

Taxon-oriented societies

