

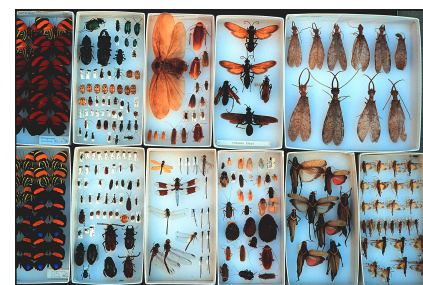


## American Society of Mammalogists

# TCNs & PENS: planning and organizing your digitization projects

*Larry M. Page*

*Florida Museum of Natural History*

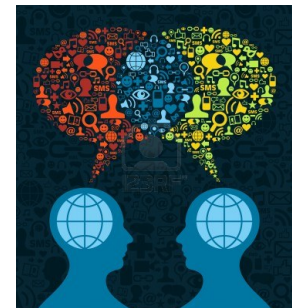




## Coordinating Center for Advancing Digitization of Biodiversity Collections (ADBC)



***ADBC: \$100 million over 10 years  
from U.S. National Science Foundation***



# 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

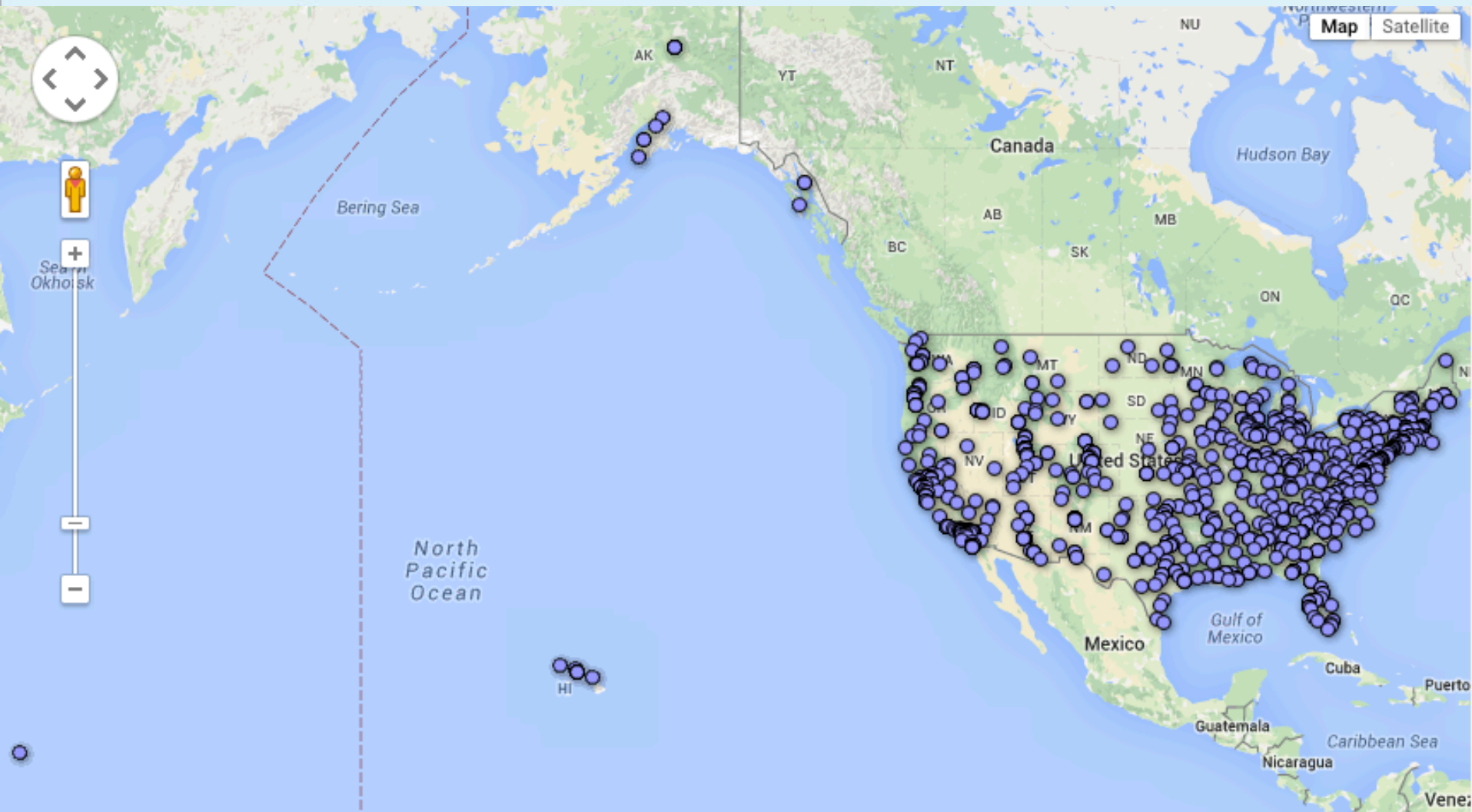


## 13 (15) Thematic Collections Networks (TCNs)

- **InvertNet**: An Integrative Platform for Research on Environmental Change, Species Discovery and Identification (*Illinois Natural History Survey, University of Illinois*)
- **Plants, Herbivores, and Parasitoids**: A Model System for the Study of Tri-Trophic Associations (*American Museum of Natural History*)
- North American **Lichens and Bryophytes**: Sensitive Indicators of Environmental Quality and Change (*University of Wisconsin Madison*)
- 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*)
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- **The Key to the Cabinets**: Building and Sustaining a Research Database for a Global Biodiversity Hotspot (*Appalachian State University*)



# NATIONAL HUB, THEMATIC COLLECTION NETWORKS, AND COLLABORATORS



**13 TCNS: 200 institutions in 50 states**

## 13 (15) Thematic Collections Networks (TCNs)

- **InvertNet:** (*Illinois Natural History Survey, University of Illinois*) **Arthropods, mostly insects**
- **Plants, Herbivores, and Parasitoids:** (*American Museum of Natural History*) **Vascular plants, insects**
- **North American Lichens and Bryophytes:** (*University of Wisconsin Madison*) **Lichens and Bryophytes**
- **Digitizing Fossils ... PALEONICHES** (*University of Kansas*) **Fossils**
- **The Macrofungi Collection Consortium** (*New York Botanical Garden*) **Fungi**
- **Mobilizing New England Vascular Plants** (*Yale University*) **Vascular Plants**
- **Southwest Collections of Arthropods Network (SCAN)** (*Northern Arizona University*) **Arthropods, mostly insects**
- **The Macroalgal Herbarium Consortium** (*University of New Hampshire*) **Algae**
- **Digital Archive of Animal Communication Signals** (*Cornell University*) **Audio recordings (mostly birds)**
- **Fossil Insect Collaborative** (*University of Colorado at Boulder*) **Fossils**
- **Great Lakes Invasives:** (*University of Wisconsin Madison*) **Vascular plants, fishes**
- **InvertEBase: Reaching Back to See the Future:** (*Field Museum of Natural History*) **Arthropods, mostly insects**
- **The Key to the Cabinets** (*Appalachian State University*) **Vascular plants**

## 13 (15) Thematic Collections Networks (TCNs)

Vascular plants: 4

Arthropods: 4

Non-vascular plants: 2

Fungi: 1

Fossils: 2

Vertebrates: 2 (audio; fishes only)

## 13 (15) Thematic Collections Networks (TCNs)

Vascular plants: 4

Arthropods: 4

Non-vascular plants: 2

Fungi: 1 -> 2

Fossils: 2 -> 3

Vertebrates: 2 (audio; fishes only)

# Advancing Digitization of Biodiversity Collections (ADBC)

Solicitation [15-576](#)

ADBC was developed in response to the Network Integrated Biocollections Alliance (NIBA) *Strategic Plan* ([digbiocol.wordpress.com/brochure/](http://digbiocol.wordpress.com/brochure/)) for a sustained program to digitize information in the nation's vast biodiversity collections.

Digitization is the process of capturing and storing digital information about physical objects. This information includes text from labels, catalogs and field books, high-resolution digital photographs, sound and video, and 3-D models created from a variety of sources.

## Biodiversity Collections

**The single largest source  
of information on biological  
diversity (outside nature)**

**1,300 – 1,500 collections in U.S.A.**



**1 billion specimens  
in USA**

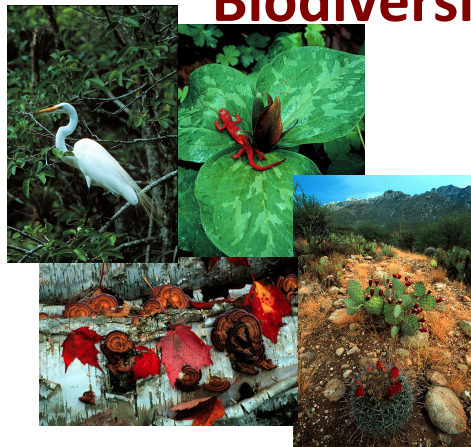


**3 billion specimens  
globally**



# Biodiversity

Collections: Specimens, Images, DNA



billions of  
specimens

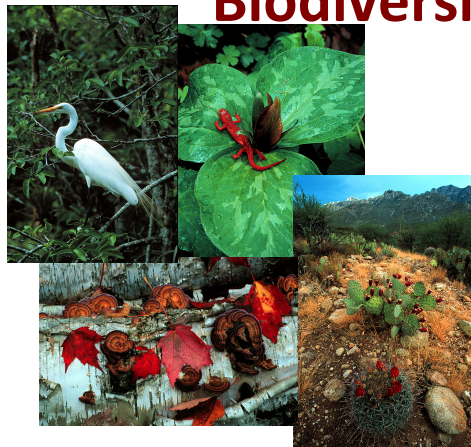
Environmental Policy  
Management, Use,  
Protection

New  
Discoveries  
Understanding  
Appreciation

Research  
Education  
Outreach

# Biodiversity

Collections: Specimens, Images, DNA



billions of  
specimens

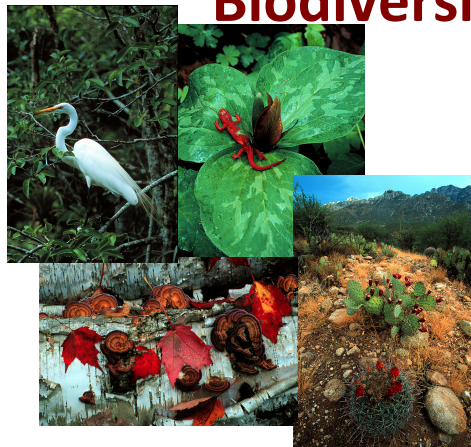
*Benefits*

Environmental Policy  
Management, Use,  
Protection

New  
Discoveries  
Understanding  
Appreciation

Research  
Education  
Outreach

# Biodiversity



**Collections: Specimens, Images, DNA**



*Benefits*

**billions of  
specimens**

*Benefits*

**Environmental Policy**  
Management, Use,  
Protection

**New  
Discoveries**  
**Understanding**  
**Appreciation**

**Research**  
**Education**  
**Outreach**



**Problem:**



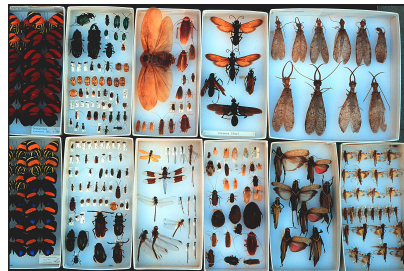
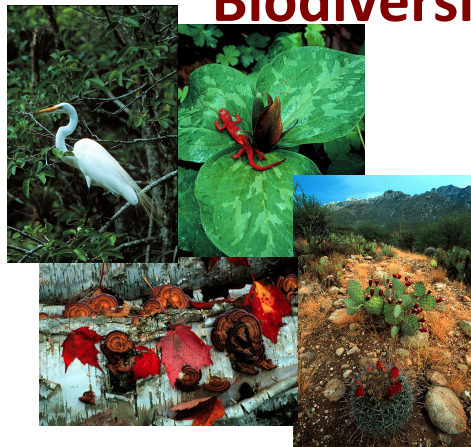
**The data in biodiversity collections are inaccessible to most potential users**





# Biodiversity

**Collections: Specimens, Images, DNA**



**Environmental Policy**  
Management, Use,  
Protection

**New  
Discoveries**  
**Understanding**  
**Appreciation**

**Research**  
**Education**  
**Outreach**

## U.S. National Science Foundation

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

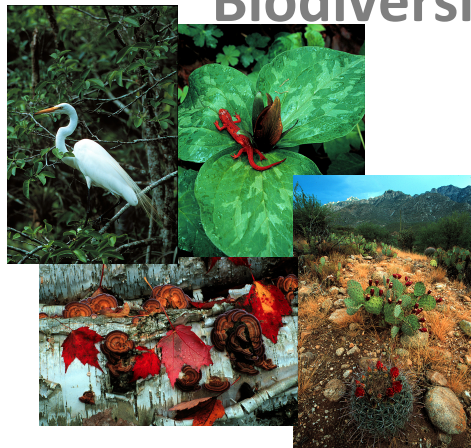
The goal of **ADBC** *is to remove this inaccessibility* through **digitization**: putting information online so that researchers, educators, students, natural resource managers, environmentalists, and policymakers have access.

**\$100 million over 10 years to digitize specimen-based data in non-federal U.S. collections**





# Biodiversity

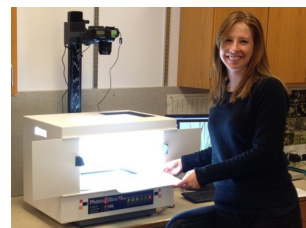


Collections: Specimens, Images, DNA



## Digitization

Databasing  
Georeferencing  
Imaging

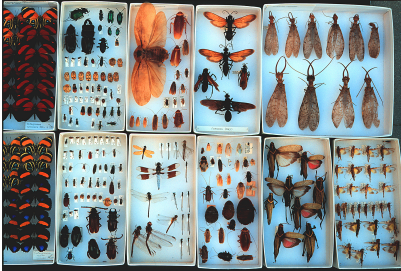


Environmental Policy  
Management, Use,  
Appreciation, Protection

New  
Discoveries  
Understanding  
Appreciation

Research  
Education  
Outreach

## Collections: Specimens, Images, DNA

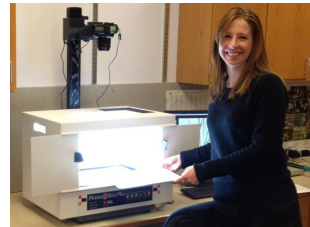


### Digitization

Databasing

Georeferencing

Imaging



Research

Education

Outreach



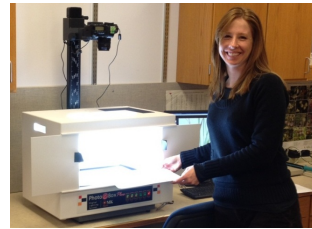
New

Discoveries

Understanding

Appreciation

## Collections: Specimens, Images, DNA



### Digitization

Databasing  
Georeferencing  
Imaging

### Vertebrate collections

-- far ahead of most  
-- variable  
-- minimal

**New  
Discoveries  
Understanding  
Appreciation**

Research

Education

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.)

## 13 (15) Thematic Collections Networks (TCNs)

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**What are the likely impacts of climate change?**

**What are the effects of invasive species?**

**What are the effects of landscape modification?**

**What is the history of life on Earth?**

**How are species distributed in geographical, ecological, and temporal space?**

**What factors lead to speciation, dispersal, and extinction?**

**What information is needed for effective conservation strategies?**

**How are specific genotypes distributed in geographical and ecological space?**

**How do species (and genotypes) covary across the landscape, and are those covariances likely to persist into the future?**

**How are ecologically significant traits distributed geographically?**

**What is the extent of phylogenetic constraints on ecological niche evolution?**

**What connections between biodiversity and ecosystem services contribute to human welfare?**





# **Advancing Digitization of Biodiversity Collections**

## **Funds**

### **‘Thematic Collections Networks’ or TCNs**

- **Full Proposal Deadline: October 09, 2015**
- **\$10,000,000 available in ADBC**
- **~ \$7,000,000 for TCNs and PENs**
- **Each year 2-4 TCNs are funded**



# Advancing Digitization of Biodiversity Collections

## Funds

### ‘Partners to Existing Networks’ or PENs

- Full Proposal Deadline: October 09, 2015
- Partner with an existing TCN
- awards for 2 to 3 years with a maximum request of \$175,000



## **Collections in Support of Biological Research (CSBR)**

**Funding for:**

- 1) improvements to secure and organize collections  
that are significant to the NSF BIO-funded research community;**
- 2) to secure collections-related data for sustained, accurate,  
and efficient accessibility to the biological research community;**
- 3) to transfer ownership of collections.**



## **Collections in Support of Biological Research (CSBR)**

**Full Proposal Deadline: September 10, 2015**

**Average award ca. \$200,000-\$300,000**



# BIODIVERSITY



Thank you

Photos: M. Jeffords & G. Paulay