Introduction to SERNEC

Zack Murrell
Appalachian State University

A new NSF-Advancing Digitization in Biological Collections (ADBC) collaborative project in the southeast
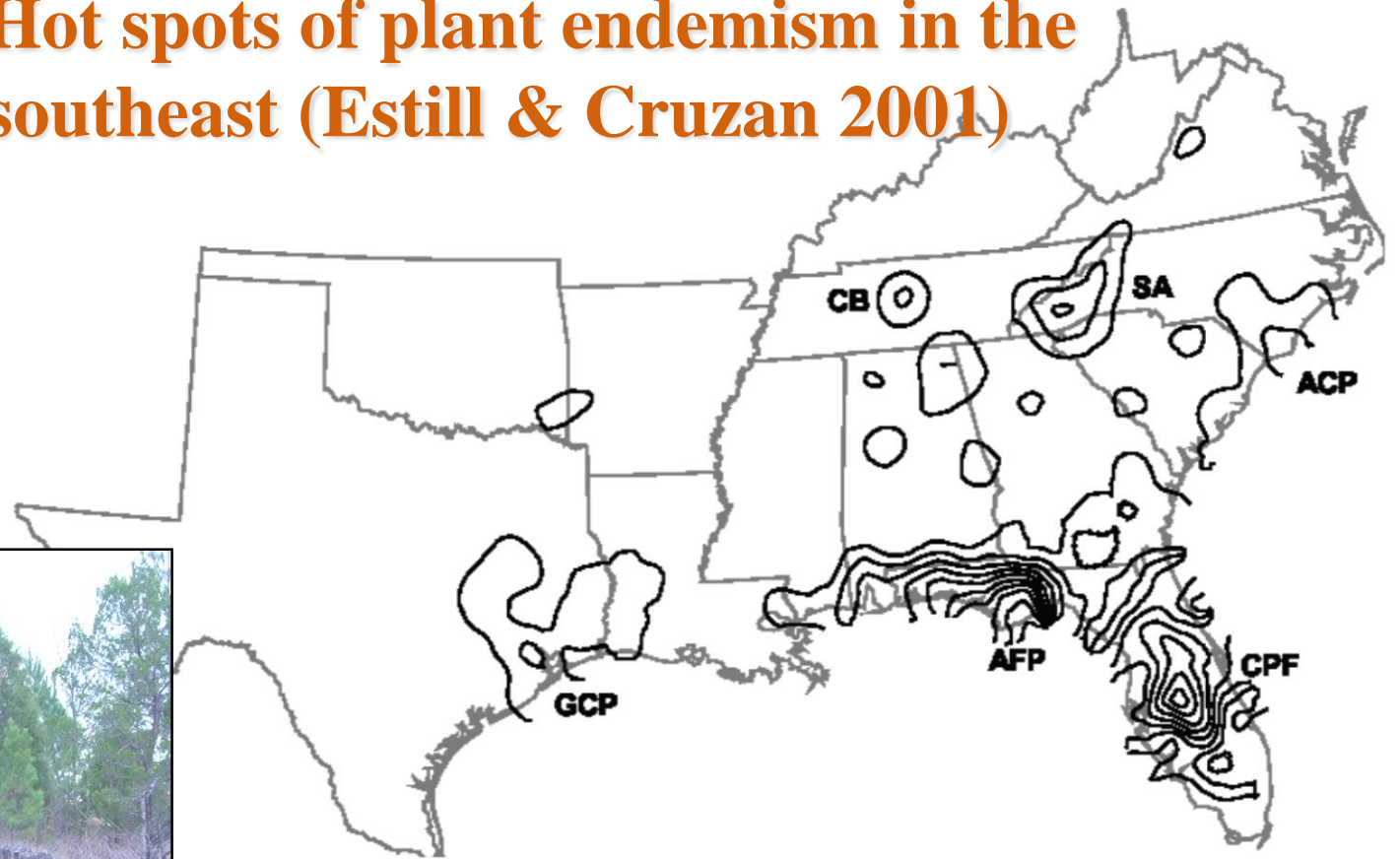
2020 Vision: Implementing a community approach to getting herbarium collections databased and online.

- In 2004, an NSF-supported workshop to gather 25 curators from the U.S. at Michigan State to discuss the future of herbarium collections
- A decision was made to write a proposal for an NSF RCN.

Hot spots of plant endemism in the southeast (Estill & Cruzan 2001)

New Communities discovered recently (Allison and Stevens 2001)

"As access to information dramatically expands, so that people increasingly have access to almost all the information they might need at any time and in any place (and, surprisingly, at low or no cost), *the value of the cognitive skills still unreplicable by silicon becomes greater.*"

But this value cannot be recognized without providing appropriate access for biologists.

L. Prusak, Where did knowledge management come from?, IBM Systems Journal Volume 40, Number 4, 2001 ["Knowledge Management"], http://www.research.ibm.com/journal/sj/404/prusak.html

Cyberinfrastructure

A combination of databases, network protocols and computational services that brings people, information and computational tools together to perform science in this information-driven world.
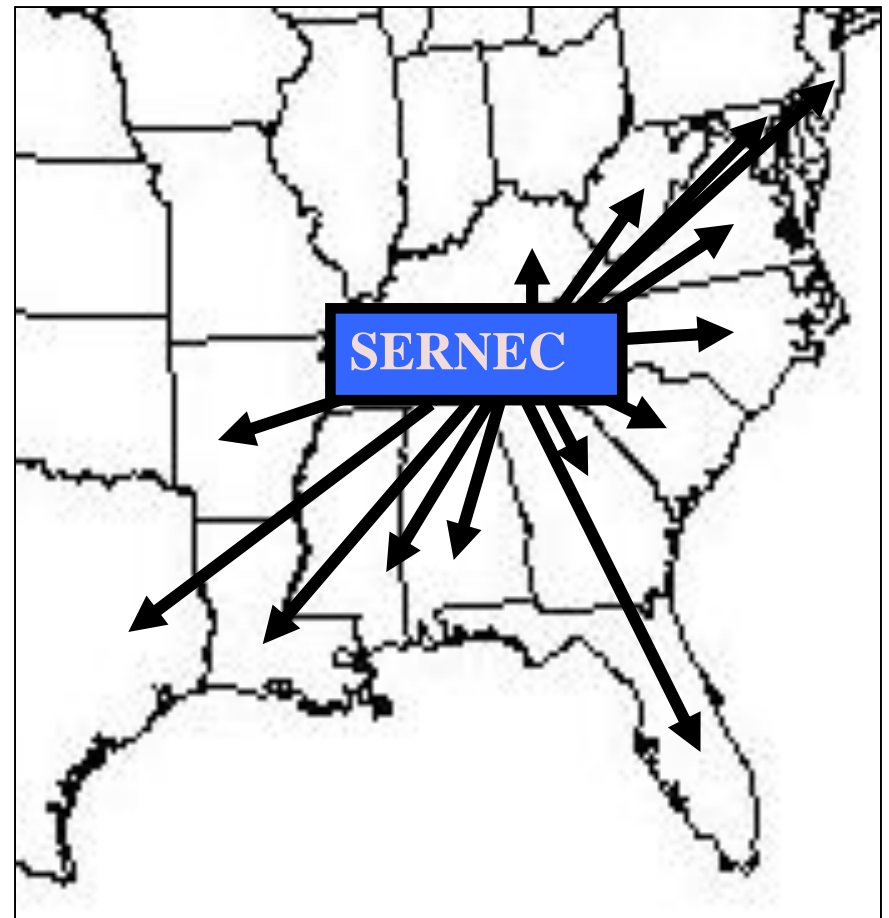
Lincoln D. Stein

www.nature.com/reviews/genetics

- 2005 NSF Research Coordination Network (RCN) awarded to build the 'human infrastructure' to begin the '2020 Vision effort'

- 5-year project

- 150 herbaria participated

- Used existing infrastructure of the Association of Southeastern Biologists

State of Herbaria in the Southeast USA

- 233 collections vary in size from 3,000 to 750,000 specimens.

- Curators are taxonomists, ecologists, paleobotanists, population biologists.

- Some institutions with significant budgets, IT support and curatorial staff.

- Some institutions are single person operations without budgets or IT support.

- ESTIMATED 15 MILLION SPECIMENS FROM THE SOUTHEAST.

Southeastern Herbaria
- **Closed**
- **Active**
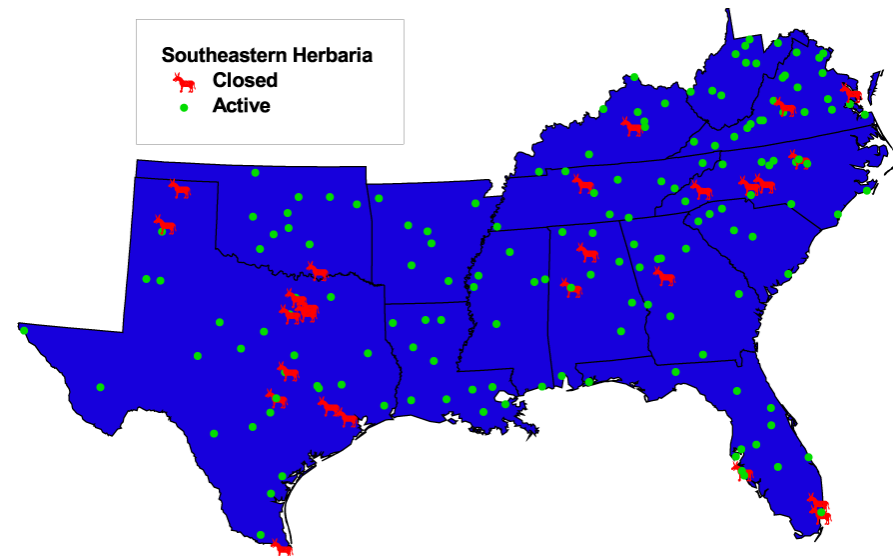
Data derived from Index Herbariorum (http://www.nybg.org/bsci/ih/ih.html) .

Goals: SERNEC Project

- Mobilize community of amateur and professional botanists

- Transform available data into more useable form (low cost?)

- Use this data to enhance the use of collections for teaching, research, planning and outreach

- Develop model system transferable to other efforts (collections, consortia)

SERNEC Business plan

- Use state or sub-region level groups to seek funding for digitization.

- Expedite information exchange among state consortia for ideas on education and outreach.

- Develop distributed network of IT support that could be shared by the total network.

Using the Society of Herbarium Curators for governance structure

State consortia

Regional Chapter

Decision-making
Consensus building
Conflict resolution

Utilize existing organization's
constitution structure

http://www.societyofherbariumcurators.org/

Openness

- Open Data
  - Data be freely available, without restrictions (e.g. copyright)
  - Data archiving policy of funding agencies
- Open analysis
  - How study was conducted, context for analysis
  - What data was used
    - Metadata about metadata

Principles
of the Conservation Commons

1. Promote Free and Open Access

2. Mutual Benefit (Reciprocity)

3. Rights and Responsibilities
   ❖ Attribution
   ❖ Integrity of Original Work

Merging content curation and content creation communities:

A model system using the herbarium community

P.I. Andrew Sallans, University of Virginia

Co. P.I. Michael Denslow, NEON

& Zack Murrell, Appalachian State University

Lead Partners

- Citizen Science Alliance (CSA)

- Vizzuality
  - Software development and design

- Successful projects through Zooniverse Portal
  - Galaxy Zoo
  - Old Weather
    - 939,760 pages, 26,795 volunteers

Partners

- Bio-transciption project
  - SERNEC
  - CalBug
  - Natural History Museum in London
  - Field Museum
  - Encyclopedia of Life
  - University of Colorado Natural History Museum
- Mostly ledger books
- Label data: first of its kind?

Transcribe museum records to

TAKE NOTES FROM NATURE

START TRANSCRIBING

SERNEC: SouthEast Regional Network of Expertise and Collections

233 herbaria in the region

Colleges
Universities
State and federal parks
Private collections
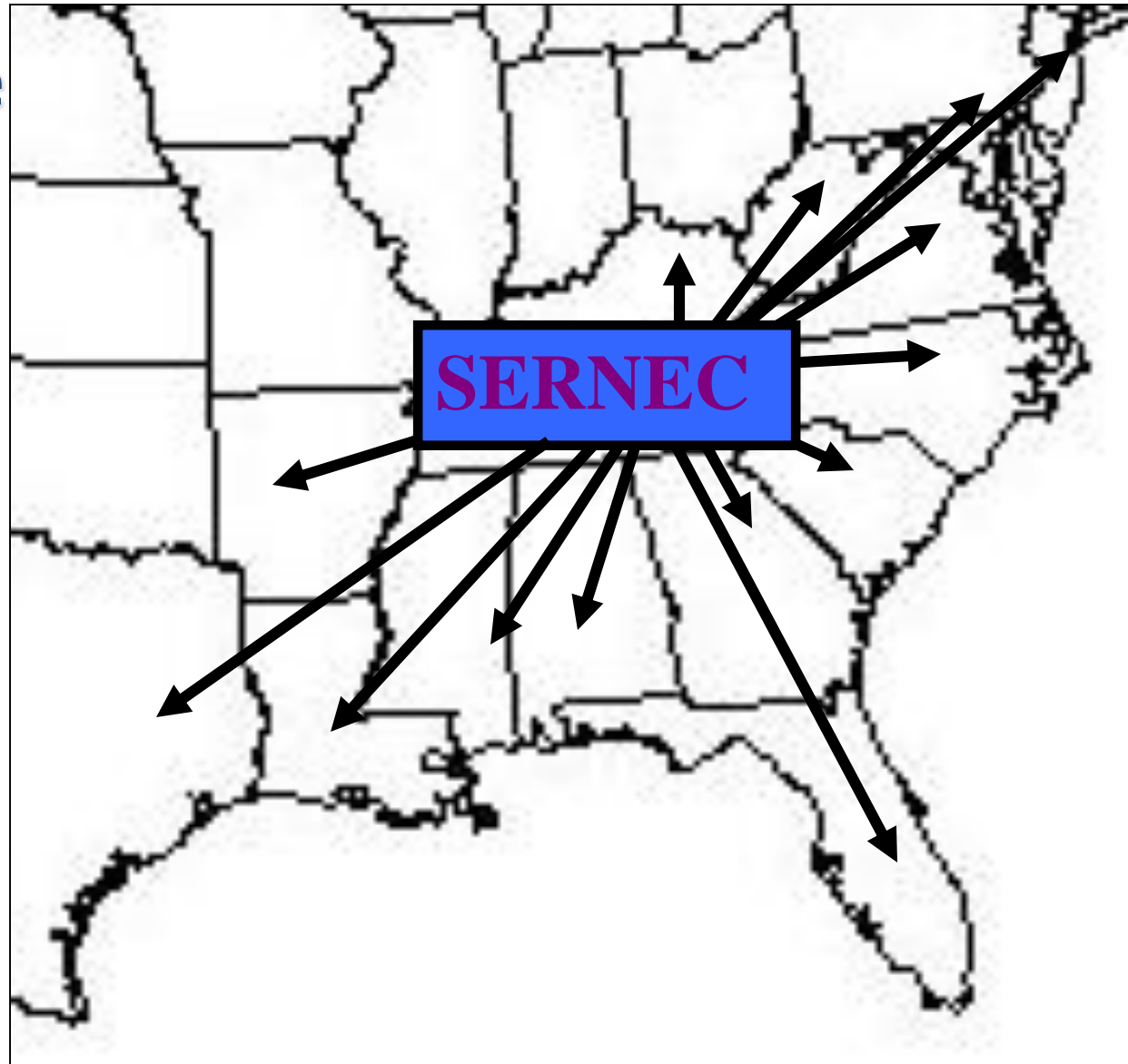
The Key to the Cabinets: Building and Sustaining a Research Database for a Global Biodiversity Hotspot

A new NSF-Advancing Digitization in Biological Collections (ADBC) collaborative project in the southeast

Selfish and contentious people will not cohere, and without coherence nothing can be effected.

Charles Darwin   Descent of Man. 1871
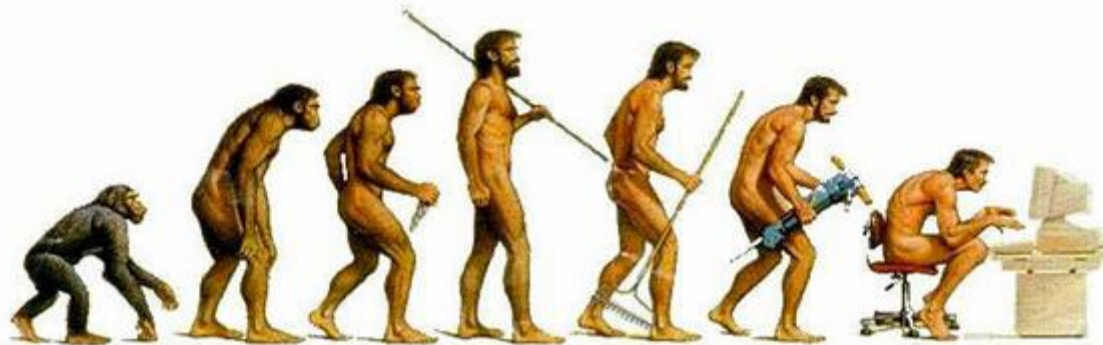
What are the project goals?

Use our robust human infrastructure

1) improve protocols at every stage of specimen digitization.

2) interface with citizen scientists to develop a strong collaborative community that will sustain high transcription and georeferencing rates through a multi-year effort.

Rarity-Weighted Richness Index
- Low
- High
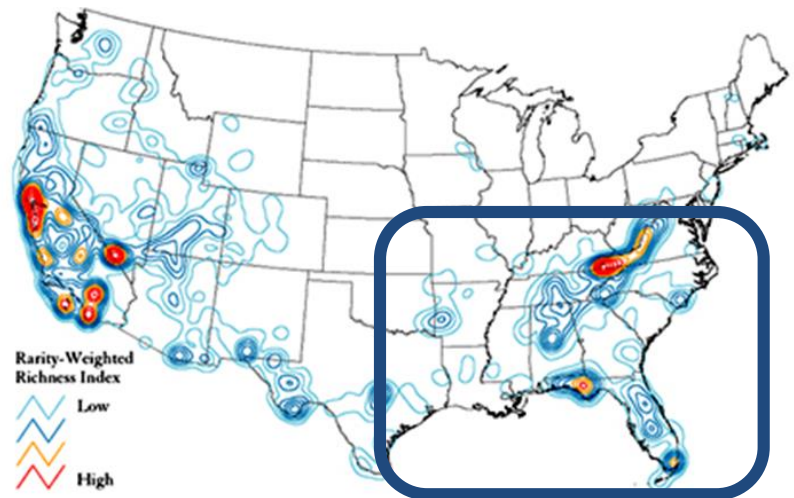
Source: Precious Heritage (2000) © TNC, NatureServe

Who is involved?

- 105 herbaria
- IT (Symbiota, GEOLocate, SPECIFY, iPLANT-TACC)
- Citizen scientists
  - Notes From Nature
  - Adler Museum
- Education
- iDigBio
- ...
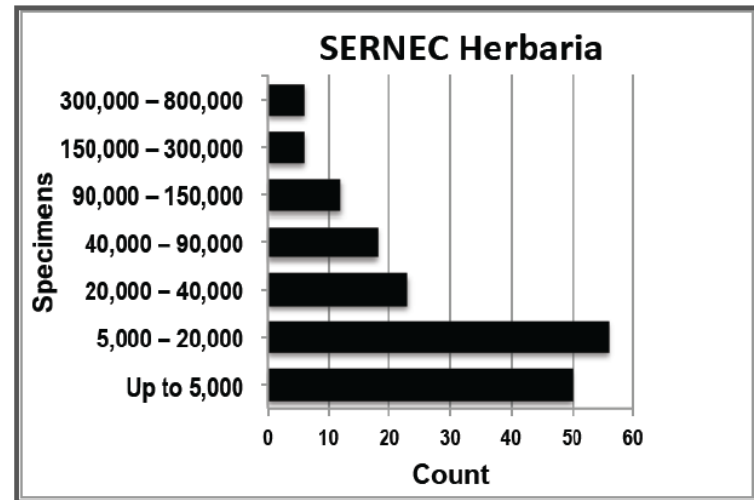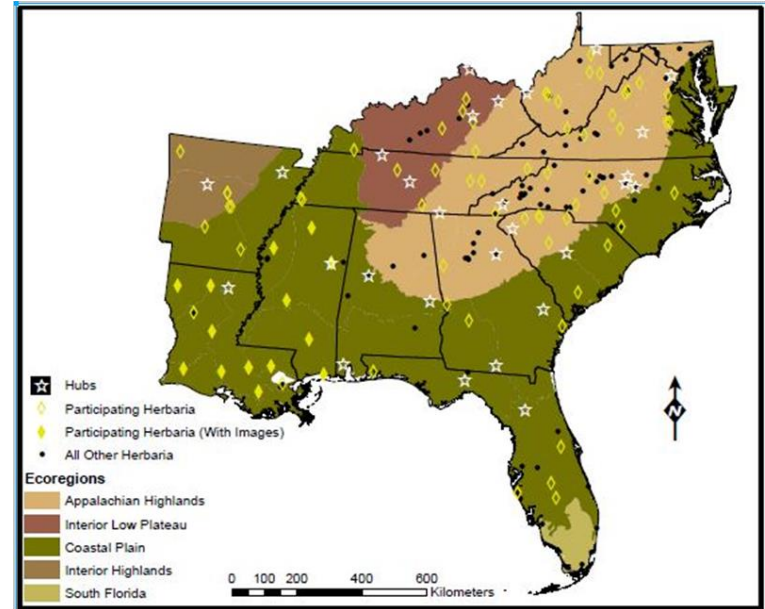
How will the project work?

Cat Herding

The challenges and rewards of managing online scientific communities

Arikia Millikan – Corie Lok – Ijad Madisch

- Two main issues:
  1. Data
  2. People

Data Management Workflow
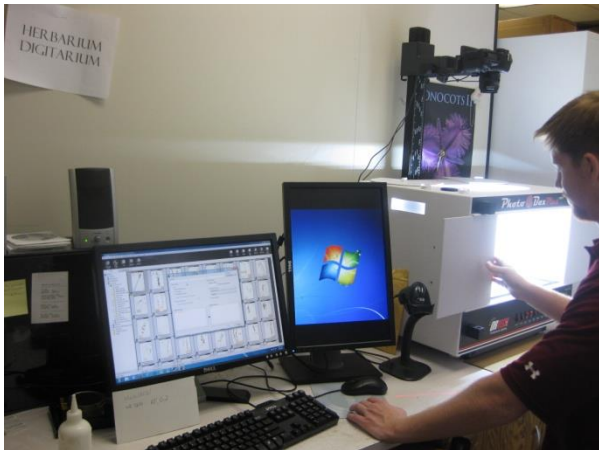
Specimen Image Capture "Herbarium Digitarium"

Texas Advanced Computing Center

4,700,000 SPECIMENS
100+ INSTITUTIONS
12 STATES

Archival Storage

Web Derivatives

Transcribe museum records to
TAKE NOTES FROM NATURE
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Citizen Scientists

SERNEC
Southeast Regional Network of Expertise and Collections

Home >> Collections

Collections to be Searched

| Specimens & Observations | Specimens | Observations | Federal Units |

☑ Select/Deselect all Collections

☑ ⊟ SERNEC

☑ Appalachian State University (BOON) more info

☑ Virginia State University Herbarium (VSUH) more info

☑ A. C. Moore Herbarium - University of South Carolina (USCH) more info

☑ Arkansas Tech University Herbarium (APCR) more info

☑ Auburn University - John D. Freeman Herbarium (AUA) more info

☑ Clemson University Herbarium (CLEMS) more info

Metadata to Portal

GEOLocate

Batch Georeferenced Data to Portal
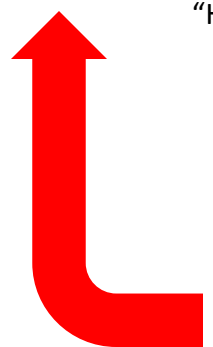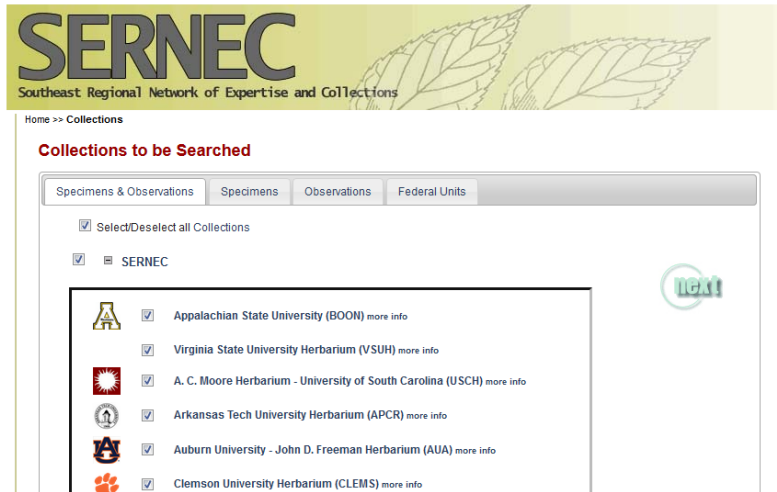
Repatriation of Metadata to Local Institution Symbiota and Specify

Ethics of Citizen Science

- Collaborators - not users

- Contribute to real research

- Don't waste people's time

Arfon Smith (2013) Zooniverse/Adler Museum

Lessons learned
(Arfon Smith, Zooniverse/Adler)

- Authenticity matters (it is not a game)
- Community matters (community must look after self)
- Researchers matter – they must be engaged in with the citizen scientists

SERNEC ADBC-TCN

- Advisory Committee
- Assessment Team
- Education Specialist
- Adler Planetarium
- Geo-referencing Team
- Education & Outreach Team
- Project Manager
- Project Director
- Notes from Nature
- GEO-Locate
- Data Manager
- Symbiota
- Specify
- iDigBio
- Steering Committee
  - WV
  - AL
  - AR
  - VA
  - FL
  - TN
  - GA
  - SC
  - KY
  - NC
  - MS
  - LA

Greater SERNEC Community

- Notes from Nature
- Citizen Scientists
  - *Transcribers*
- GEOLocate
- Citizen Scientists
  - *Georeferencing Experts*

Science Community

What can biologists do?

1. Build our communities (include amateurs and affiliates)
2. Embrace and promulgate new technologies.
3. Take part in the development of community best practices (among data creators, users, editors and publishers).
4. Expand the community to include computer, social and library scientists.
5. Generate a paradigm shift in how productivity is evaluated by administrators.
6. Utilize more effective means of communication.

Snapshot versus long-term shift in best practices. We need to train biologists in traditional studies of natural history, while at the same time encouraging the use of new technologies.

Developing the US Virtual Herbarium

U.S. Regional Consortia: 811 herbaria, 73,500,000 specimens

Rocky Mountains
2 states, 25 herbaria
2,150,000 specimens

Alaska
5 herbaria
230,000 specimens

Great Plains (GPHN)
4 states
22 herbaria
1,720,000 specimens

Pacific Northwest (CPNWH)
4 states
41 herbaria
2,250,000 specimens

Western Great Lakes (WGLHN)
8 states
161 herbaria
19,500,000 specimens

Intermountain Region (CIRH)
2 states
~30 herbaria
1,560,000 specimens

Northeastern (CNH)
9 states
90 herbaria
19,000,000 specimens

California (CCH)
146 herbaria
8,120,000 specimens

Pacific Islands (PIRCH)
2 states/territories
5 herbaria
916,000 specimens

Southeast (SERNEC)
15 states
220 herbaria
13,000,000 specimens

Southwest (SBC & SEINet)
2 states, 14 herbaria
1,500,000 specimens

New Mexico (NMBCC)
1 state, 6 herbaria
275,000 specimens

Texas / Oklahoma (TORCH)
2 states, 53 herbaria
3,500,000 specimens

Regional statistics compiled by consortia representatives and Index Herbariorum.

Map source: **Ben Legler,** University of Washington & Consortium of Pacific Northwest Herbaria
Modified by: **Derick B. Poindexter,** Appalachian State University, Southeast Regional Network of Expertise and Collections

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233 herbaria in the region

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