SPNHC 2015
Small Collections Symposium

Why Small Collections: What is Unique, Valuable and Important

Anna Monfils
CMC Herbarium
Central Michigan University

Gil Nelson
iDigBio/FSU Herbarium
Florida State University
"Small Collection"

- ≤ 100,000 specimens (though varies by collection type)
- Regional in scope (typically)
- Ecological, taxonomic and geographic bias
- Often not included in inventory or monographic studies

“If you feel small, you are one of us!”
-Gil Nelson
Specimen and Collection Percentages by Herbarium Size Class*

Percent of Specimens

- > 100,000: 87%
- < 100,000: 13%

Percent of Collections

- < 100,000: 83%
- > 100,000: 17%

* 2014 entries in Index Herbariorum (Barbara Thiers)
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  - Not linked to reappointment, tenure or promotion
  - May not even be in job description!
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- We can finish!
We need a paradigm shift in our understanding of small collections

- Small collections professionals do not necessarily see themselves as collections professionals.
We need a paradigm shift in our understanding of small collections

• Small collections professionals do not necessarily see themselves as collections professionals.

• The institution supporting a small collection may not view the collection as part of the institutional mission.
We need a paradigm shift in our understanding of small collections

• Small collections professionals do not necessarily see themselves as collections professionals.
• The institution supporting a small collection may not view the collection as part of the institutional mission.
• Curators in large and small institutions may not see the quantitative and qualitative value of smaller collections for research, education and outreach.
Value of Small Collections to Scientific/Collections Community

- Unduplicated specimens
- Intense regional sampling
- Unrepresented temporal sampling
- Focused sampling of community composition
- Best source of data for biological hotspots (Biological Field/Research Stations)
- “Hidden source” of specimens representing curator’s expertise

Have the potential to significantly expand out knowledge of landscape-level Biogeography
The Contribution of Small Collections: A Case Study from Fuireneae (Cyperaceae)

Heather E. Dame 1,2*, Benjamin W. Heumann 1,3, J. Richard Carter 4, Jessica M. Bartek 4, Anna K. Monfils 1,2

(1) Central Michigan University, Institute for Great Lakes Research, Mount Pleasant, MI
(2) Central Michigan University, Department of Biology, Mount Pleasant, MI
(3) Central Michigan University, Department of Geography, Center for Geographic Information Science, Mount Pleasant, MI
(1) Department of Biology, Valdosta State University, Valdosta, GA
MaxEnt maps displaying the probability of suitable habitat

*Schoenoplectus tabernaemontani*

*GBIF Large Collections*

*GBIF Small & Large Collections*

*GBIF & CMC/VSC Collections*

**Probability of Suitable Habitat**
- 0.0 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- 0.8 - 1
Small collections are strong contributors to models of species distribution and niche models.

• Models inclusive of small collections data resulted in statistically significant increases in occurrence predictions
• Models inclusive of small collections data resulted in a 23% major change (10-50%) in geographic predictions
The role of small natural history collections in contributing to understanding species’ distributions

Travis D. Marsico¹, Jeremy J. Caron², Richard Carter³, Emily Gillespie⁴, Erica Krimmel⁵, Ross McCauley⁶, Ashley B. Morris⁷, Gil Nelson⁸, and Anna K. Monfils²

¹Arkansas State University; ²Central Michigan University; ³Valdosta State University; ⁴Marshall University; ⁵Chicago Academy of Sciences; ⁶Fort Lewis College; ⁷Middle Tennessee State University; ⁸Florida State University
Michigan: Percentage Contribution to Locality Occurrence by Species

- **S1**
  - Species 1: Large Collections
  - Species 2: Small Collections

- **S2**
  - Species 1: Large Collections
  - Species 2: Small Collections

- **Native**
  - Species 1: Large Collections
  - Species 2: Small Collections

- **Introduced**
  - Species 1: Large Collections
  - Species 2: Small Collections

Legend:
- Large Collections
- Small Collections
Value of Small Collections in Education

• More undergraduate students educated at institutions with small vs. large collections*

* 2014 entries in *Index Herbariorum* (Barbara Thiers)
Percentages of Students at Institutions by Herbarium Size Class*

Percent of Specimens

- < 100,000: 13%
- > 100,000: 87%

Percent of Students

- < 100,000: 65%
- > 100,000: 35%

* 2014 entries in Index Herbariorum (Barbara Thiers)
Value of Small Collections in Education

- More undergraduate students educated at institutions with small vs. large collections*
- Students working in collections are: §
  - Expressing increased understanding of the nature of science
  - Indicating collections based experience is influencing their undergraduate experience, course/major selection, and graduate school plans

* 2014 entries in *Index Herbariorum* (Barbara Thiers)
§ 2013 survey, “Undergraduate Learning Outcomes in Natural History Collections.”
Curator Survey

- 167 Curator responses
  - 85% university or college affiliated
  - 50% from “small collections” (<100,000)
  - 97% incorporate undergraduates
- >3000 UGs over 5 year period
  - 87% database
  - 72% conduct research
  - 62% field collect

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Student Survey

• 258 Responses (76% “Biology” Majors)
  – 68/165 Indicated this influenced their course selection or choice of major
  – 64/138 indicate collections experience influenced post-graduate plans
  – 47% Intend to pursue graduate work in life, earth or physical science immediately after graduation

2013 survey, “Undergraduate Learning Outcomes in Natural History Collections.”
Results on Nature of Science

- Skepticism motivates scientist
- Science is open to new ideas
- Curiosity motivates scientists
- Solutions create questions
- Science and society
- Importance of record-keeping
- Importance of protocols
- Testing of theories never ends
- Knowledge modification
- Science is a process

None = 0; Very Little = 1; Some = 2; A Lot = 3; Very Much = 4

2013 survey, “Undergraduate Learning Outcomes in Natural History Collections.”
Value of Small Collections in Education

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• Students working in collections are: §
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• Collections are a valuable resource that can be used by educators to authentically engage students in inquiry-based learning

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Brewer & Smith, 2011, *Vision and Change: A Call to Action*

# Advancing Integration of Museums into Undergraduate Programs – AIM-UP
AIM-UP (aimup.unm.edu)
Value of Small Collections to the Institution

- Enhanced outreach capabilities and volunteer involvement
McMinville Public Library Outreach

What do you get when you mix 75 energetic kids and an assortment of cool arthropods -- you get: McMinville Public Library's summer reading program, which focussed on insects this year. OSAC travelled up to participate in the event and brought with it a number of showy specimens to give kids some real life props to illustrate the many books they might find on the shelves of the library. Find out more

Curator's blog   Login to post comments
Value of Small Collections to the Institution

- Enhanced outreach capabilities and volunteer involvement
- Increased institutional visibility
Institutional Visibility

Arkansas State University News Highlights New TCN

Source:

Release Date: Tuesday, October 7, 2014
Contact: news@astate.edu

Dr. Travis D. Marsico, by Andrew Ferguson/A-State Marketing and Communications.
Value of Small Collections to the Institution

- Enhanced outreach capabilities and volunteer involvement
- Increased institutional visibility
- Enables archiving and data management within home institution (increase fundability in organismal disciplines)
NSF Data Management Plan

- Plans for data management and sharing of the products of research. Proposals must include a supplementary document of no more than two pages labeled “Data Management Plan”. This supplement should describe how the proposal will conform to NSF policy on the dissemination and sharing of research results (see AAG Chapter VI.D.4), and may include:

  1. the types of data, samples, physical collections, software, curriculum materials, and other materials to be produced in the course of the project;

  2. the standards to be used for data and metadata format and content (where existing standards are absent or deemed inadequate, this should be documented along with any proposed solutions or remedies);

  3. policies for access and sharing including provisions for appropriate protection of privacy, confidentiality, security, intellectual property, or other rights or requirements;

  4. policies and provisions for re-use, re-distribution, and the production of derivatives; and

  5. plans for archiving data, samples, and other research products, and for preservation of access to them.
Value of Small Collections to the Institution

- Enhanced outreach capabilities and volunteer involvement
- Increased institutional visibility
- Enables archiving and data management within home institution (increase fundability in organismal disciplines)
- Enhanced relationship with state and federal agencies (NatureServe, DNR, DEQ)
Partnerships with State and Federal Agencies

Robert W. Freckmann Herbarium
University of Wisconsin - Stevens Point

Wisconsin's Potentially New Invasive Plants

The Wisconsin Department of Natural Resources and the Wisconsin State Herbarium have announced a new initiative, Wisconsin Invasive Plants Reporting and Prevention Project. Prevent the spread of plants known to be newly invasive in Wisconsin or in nearby states. Identify these populations and control or destroy them before they can spread.

We hope the information presented here will assist in this effort.

Invasive Plants of the Future

<table>
<thead>
<tr>
<th>Invasive Plants Targeted</th>
<th>Upland Aquatic / Wetland</th>
</tr>
</thead>
</table>

You Can Help

Collecting & Reporting Guidelines (new window)
Invasive Plant Report Form (pdf - Adobe® Reader®) (new window)
From the Small Collection Perspective:
Why is it important for small collections to digitize?

- Expand accessibility
- Expose data – increase accuracy
- Enhance impact of data in holdings
- Ensure inclusion in larger research initiatives
- Increase connectivity between researchers
- Increase fundability
“Great things are done by a series of small things brought together”

Vincent Van Gogh
To join SCNet listserv go to http://scnet.acis.ufl.edu/tags/listserv
Goals of SCNet

• **Empower small collections by:**
  • Reaching out and incorporating them into the collections community,
  • Making digitization doable for small collections,
  • Mobilizing and incorporating the “dark data” held in small collections into major data repositories (GBIF, iDigBio, BISON, etc.) and available to science,
  • Encouraging large collections to assist with ensuring the sustainability of small collections,
  • Providing formal and informal networks that provide forums for and training in small collections issues,
  • Resurrecting or otherwise saving orphaned collections from being lost to science.
I. Small collections - the key to educating future generations of scientists
II. Digitization practices and challenges in small collections and museums
III. Reaching out to small collections