

# DOCUMENTING THE IMPORTANCE OF SMALL COLLECTIONS

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Travis D. Marsico  
Arkansas State University

# USES FOR HERBARIUM COLLECTIONS DATA

## *Application*

Quantifying environmental niche of species

Testing biogeographical, ecological, and evolutionary hypotheses

Testing hypotheses of paleoendemism, neoendemism, and maintenance of diversity over geologic time

Assessing species invasion and proliferation

Assessing impact of climate, land-use, and other environmental changes on species distributions

Suggesting unsurveyed sites of high potential of occurrence for rare species

Supporting appropriate management plans for species recovery and mapping suitable sites for reintroduction

Supporting conservation planning and reserve selection

Modeling species assemblages (biodiversity, composition) from individual species predictions

## *References*

Vetaas 2002, Anderson & Ferree 2010, Broennimann et al. 2012, Pagel & Shurr 2012

Graham et al. 2004, Thuiller et al. 2004, Bystriakova et al. 2010, Graham et al. 2013, Maiorano et al. 2012

Davis et al. 2007, Kissling et al. 2012

Peterson 2003, Ward 2007, Kleinbauer et al. 2010, Smolik et al. 2010, Gallien et al. 2012, Petitpierre et al. 2012

Thomas et al. 2004, Thuiller 2004, Greve et al. 2012, Anacker et al. 2013

Elith & Burgman 2002, Engler et al. 2004, Raxworthy et al. 2007

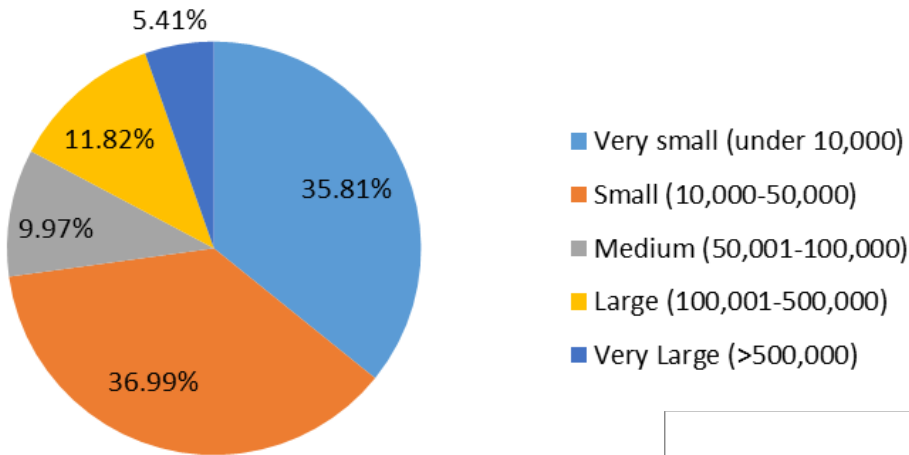
Anderson et al. 2009, Bartel & Sexton 2009, Cianfrani et al. 2010, Harris et al. 2013

Ferrier 2002, Araujo et al. 2004, Johnson & Gillingham 2005, Anderson & Ferree 2010, Franklin 2010

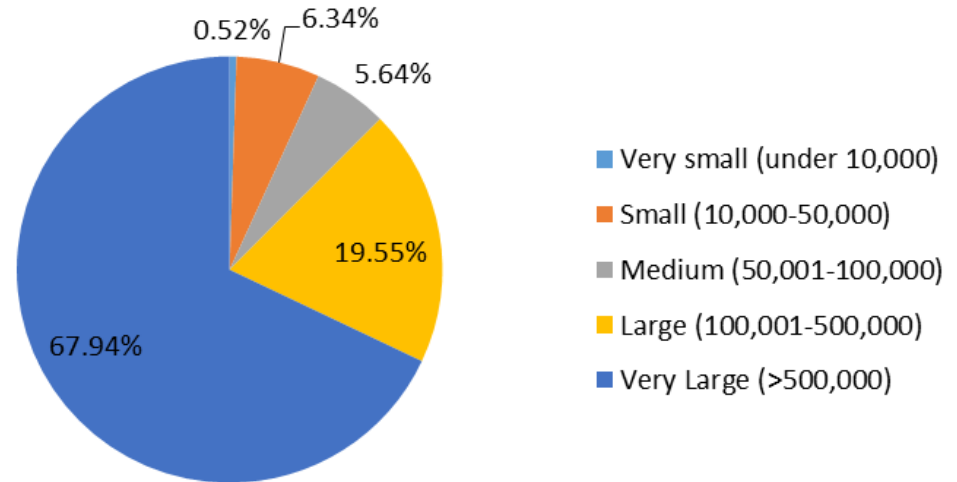
Ferrier et al. 2002, Guisan & Thuiller 2005, Aranda & Lobo 2010, Guisan & Rahbek 2011, Pottier et al. 2012

# CONTRIBUTIONS OF SMALL COLLECTIONS

## Percent of Total Herbaria



## Percent Specimens Housed



# NANSH SMALL COLLECTIONS CONTRIBUTION PROJECT

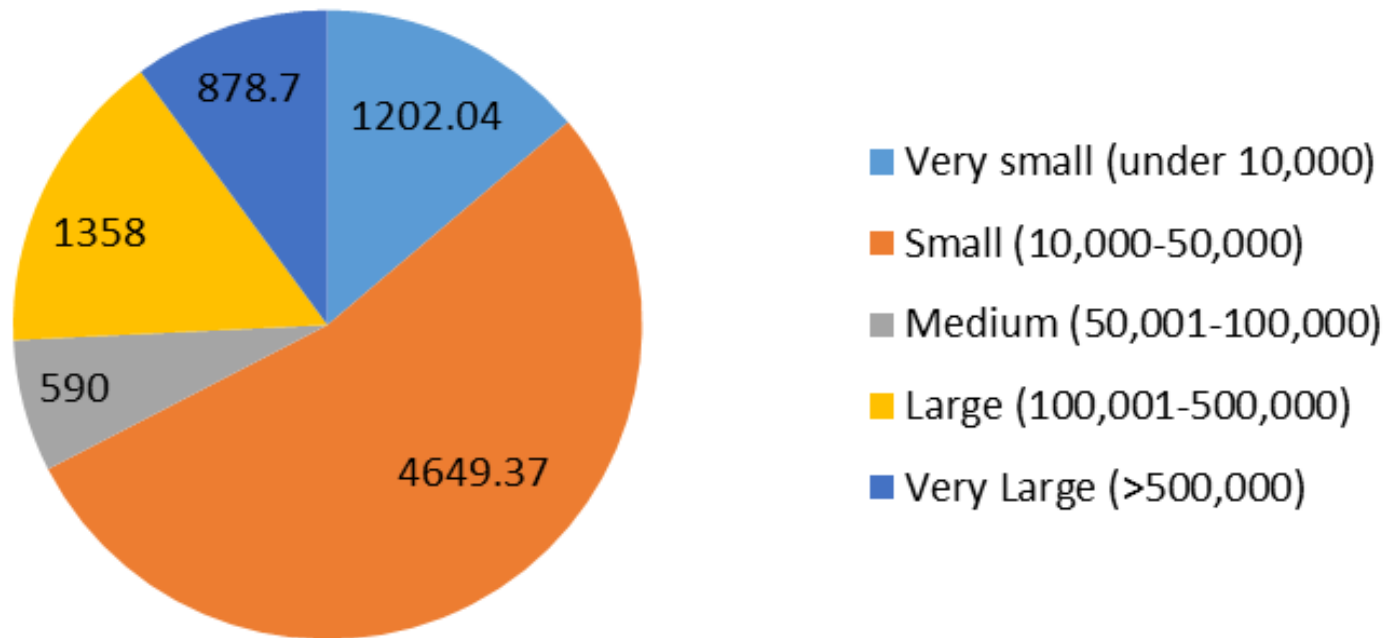
- 8 states participating (AR, CA, CO, FL, GA, MI, TN, WV)
  - Randomly selecting 10 S1, 10 S2, 10 common native, and 10 non-native invasive plants per state
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## UNIQUE COUNTY/LOCALITY DATA

- In California, small collections contribute between 0 and 50% of unique county-level occurrence (mean = 0.05%)
  - In Michigan, between 0 and 50% of unique county-level occurrence (mean = 7%)
  - In Michigan, between 0 and 67% of unique locality-level occurrence (mean = 17%)
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# CONTRIBUTIONS OF SMALL COLLECTIONS

## Estimated No. of Students Trained



# ACKNOWLEDGEMENTS

- NANSH Working Group: Gil Nelson, Anna Monfils, Jeremy Caron, Richard Carter, Dwayne Estes, Emily Gillespie, Kari Harris, Erica Krimmel, Ross McCauley, Ashley Morris
  - iDigBio
  - Michael Palmer (OSU), Floras of North America Project
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QUESTIONS?



# DOCUMENTED USES FOR HERBARIUM COLLECTIONS DATA

- Invasive species mapping and record of expansion (Crawford and Hoagland 2009; Fuentes et al. 2013)
- Evolution of introduced species (Buswell et al. 2010; Marsico et al. 2010)