PRIORITIZING FLORA FOR SEED BANK COLLECTION IN THE MISSOURI OZARK HIGHLANDS

Lauren M. Merchant & Ginger R. H. Allington
Saint Louis University, Shaw Nature Reserve & the Missouri Botanical Garden
CURRENT CONSERVATION NEEDS
WHAT IS A SEED BANK?

- Exactly like what it sounds!
- Long-term preservation of seeds
- Stored at low temperatures (-18° C / 0° F)
Benefits of Seed Banking

- Conserve Species
- Conserve Space
- Long-term preservation of genomes to prevent genetic diversity loss
- Collaboration
- Source for future biological research
- Source for future conservation efforts
THE SHAW NATURE RESERVE SEED BANK
A SHORT HISTORY OF MISSOURI

- Glacial refuge
- Sea Levels
- Some areas never exposed to either
- Many endemic species
Ozark Highlands: The Fist Phase of Collection

Most Diverse Region of Missouri
QUESTION...

What species should take priority when deciding where and when to collect seeds?

(> 2,000 Native Flowering Plants in Missouri)
• Full list of Missouri’s native flowering plants
• Species distribution information
  • Weighed on a scale from 0 – 10 (19 = 10)
Updated Coefficients of Conservatism

- Estimated based on:
  - Tolerance to disturbance
  - Frequency
  - Amplitude
  - Fidelity

- Assigned an integer from 0 – 10
  (10 = highly conservative species)

- Weighed on a scale from 0 – 10
Conservation Status

- State Rankings
  - Weighed on a scale from 1 – 10
  - SH = 10, S1 = 8, S2 = 6, ...

- Global Rankings
  - Weighed on a scale from 1 – 10
  - G5 = 0, G4 = 2, G3 = 4
  - Note: G1 and G2 species removed
All data merged into one spreadsheet using Microsoft Excel

Topicos Database used to resolve taxonomic conflicts.

The Missouri Department of Conservation’s Species of Concern Checklist (Jan 2013 issue) used to fill in missing data.
## Snapshot of the Spreadsheet

### Sample Spreadsheet of 2,008 Species

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>CC</th>
<th>Weight</th>
<th>Total Cty of 9</th>
<th>Weight</th>
<th>Scaled Weight</th>
<th>S-rank</th>
<th>GL</th>
<th>Weight</th>
<th>Total Weight</th>
<th>Priority Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Callirhoe triangulata</td>
<td>Clustered Poppy-mallow</td>
<td>10</td>
<td>10</td>
<td>1</td>
<td>19</td>
<td>10</td>
<td>SH</td>
<td>10</td>
<td>G3</td>
<td>4</td>
<td>34</td>
</tr>
<tr>
<td>Caleopegan oklahomensis</td>
<td>Oklahoma pink Orchid</td>
<td>10</td>
<td>10</td>
<td>1</td>
<td>19</td>
<td>10</td>
<td>SH</td>
<td>10</td>
<td>G3</td>
<td>4</td>
<td>34</td>
</tr>
<tr>
<td>Eleocharis equisetoides</td>
<td>Horsetail Spikerush</td>
<td>10</td>
<td>10</td>
<td>1</td>
<td>19</td>
<td>10</td>
<td>SH</td>
<td>10</td>
<td>G4</td>
<td>2</td>
<td>32</td>
</tr>
<tr>
<td>Zizania palustris var. interior</td>
<td>Interior Wild Rice</td>
<td>10</td>
<td>10</td>
<td>1</td>
<td>19</td>
<td>10</td>
<td>SH</td>
<td>10</td>
<td>G4G5</td>
<td>1</td>
<td>31</td>
</tr>
<tr>
<td>Echinodorus tenellus</td>
<td>Dwarf Burhead</td>
<td>9</td>
<td>9</td>
<td>1</td>
<td>19</td>
<td>10</td>
<td>S1</td>
<td>8</td>
<td>G3</td>
<td>4</td>
<td>31</td>
</tr>
<tr>
<td>Schoenoplectus tuberculatus</td>
<td>Canby's Bulrush</td>
<td>10</td>
<td>10</td>
<td>1</td>
<td>19</td>
<td>10</td>
<td>S1</td>
<td>8</td>
<td>G3G4</td>
<td>3</td>
<td>31</td>
</tr>
<tr>
<td>Juncus brachyphyllus</td>
<td>Shortleaf Rush</td>
<td>10</td>
<td>10</td>
<td>1</td>
<td>19</td>
<td>10</td>
<td>SH</td>
<td>10</td>
<td>G5</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>Lyonia mariana</td>
<td>Staggerbush</td>
<td>10</td>
<td>10</td>
<td>1</td>
<td>19</td>
<td>10</td>
<td>SH</td>
<td>10</td>
<td>G5</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>Mimulus glabratius</td>
<td>Roundleaf Monkey Flower</td>
<td>10</td>
<td>10</td>
<td>1</td>
<td>19</td>
<td>10</td>
<td>SH</td>
<td>10</td>
<td>G5</td>
<td>0</td>
<td>30</td>
</tr>
</tbody>
</table>
*Note: “Other” state rankings removed
WHAT WE NOW HAVE:

- Methodology for prioritizing within the remaining eco-regions
- A resource that encourages collaboration
- A more focused project
FUTURE OF THE SHAW NATURE RESERVE SEED BANK

- Identification of the first county for collection

- Collection, processing, storage and curating!

Ginger needs more interns!! ;)
**Final Considerations**

- **Ethics:**
  - Seed collection proportionate to population
  - Seed usage must be well researched and planned before use

- **Challenges:**
  - Avoiding a “bottle neck” effect
  - Proper preparation for storage

- **Key elements of successful Ex Situ program:**
  - Collection from different populations and micro-habitats
  - Detailed collection notes
  - Proper storage, planning, and precautions.
  - Viability assessed at regular intervals
ACKNOWLEDGEMENTS

- Doug Ladd
- Dr. David Bogler
- Justin Zweck
- Rebecca Landewe
- My fellow REU students!
LITERATURE CITED AND CONTACT INFORMATION


Ginger R. H. Allington
Missouri Botanical Gardens
ginger.allington@mobot.org

Lauren M. Merchant
Saint Louis University
lmerchan@slu.edu