Developing a user-friendly gap analysis tool to build more complete ex situ collections

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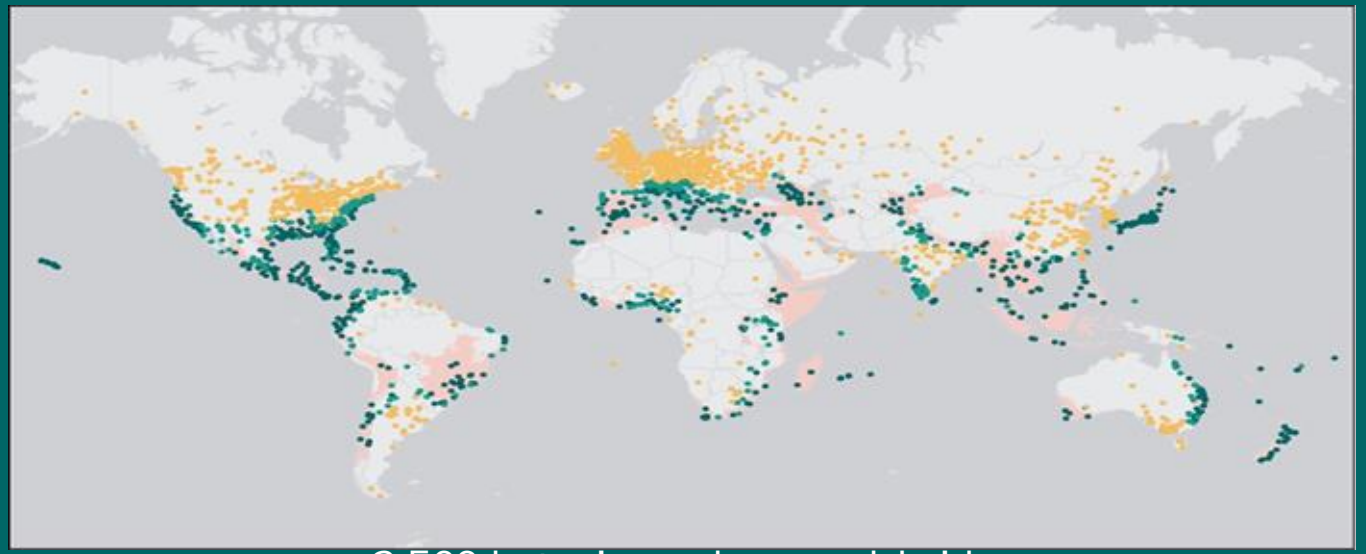
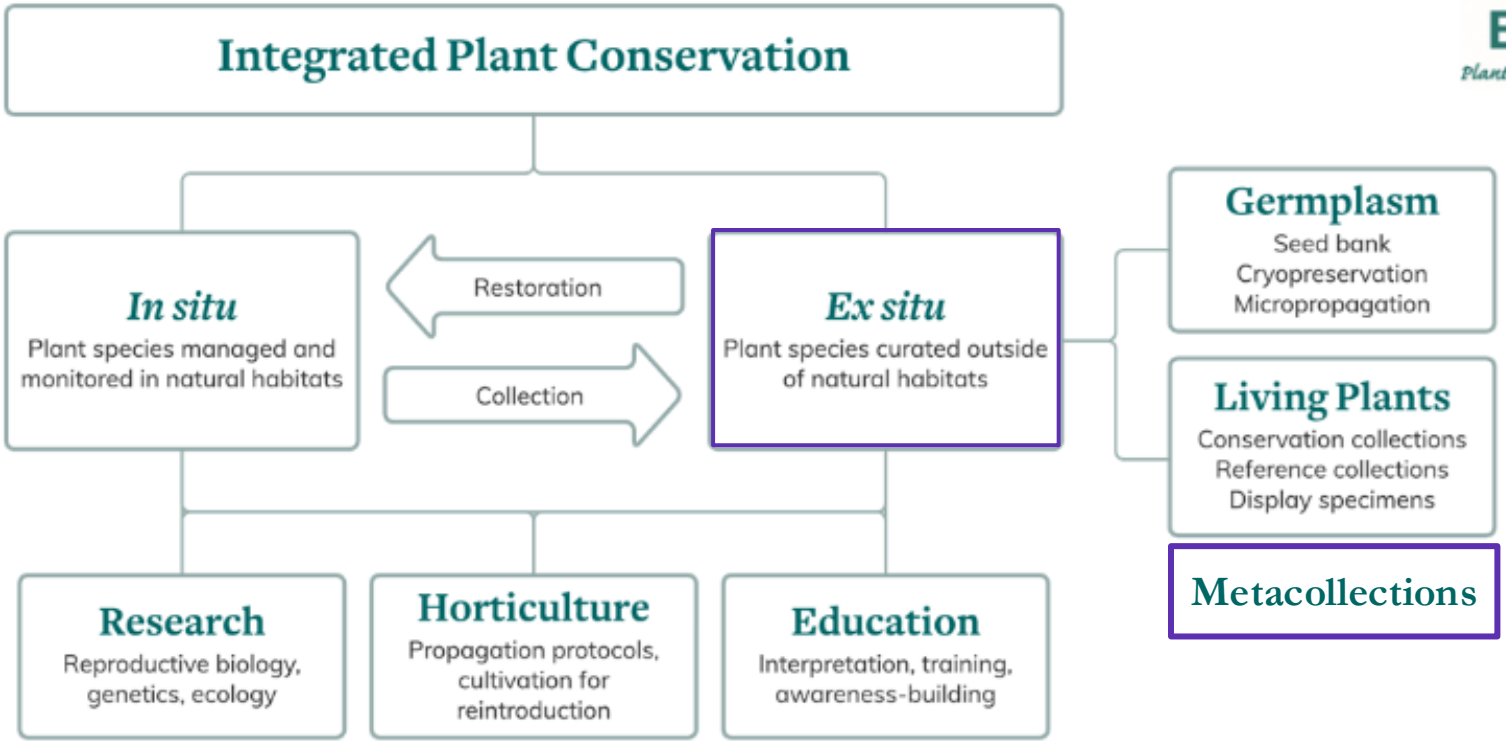
Botanical Gardens Conservation International

BGCI's mission is to mobilize botanic gardens and engage partners in securing plant diversity for the well-being of people and the planet



3,500 botanic gardens worldwide
60,000 botanical experts
1 billion visitors

Botanic Gardens Contribute to Plant Conservation



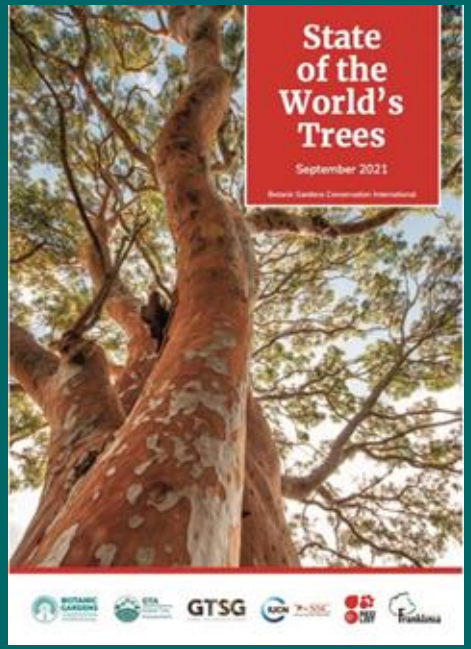
BGCI
Plants for the Planet

Setting the scene:
Global Tree Assessment
Global Trees Campaign

- Cataloguing the world's trees
- Prioritising tree species for conservation action
- Taking direct conservation action working with local partners
- **Zero** tree species extinctions

Global Conservation Consortia (GCC)

- One in three tree species are threatened with extinction
- Scale-up tree conservation via GCC's
- Utilizing specialist knowledge of target taxa
- Conserve trees where the need is greatest
- *In situ* and *ex situ* work focused in centres of diversity
- To be led by institutions based in centres of diversity
- Initial focus on trees is expanding to non-tree taxa



…to mobilise a coordinated network of institutions and experts to collaboratively develop and implement comprehensive conservation strategies for priority threatened plant groups

Taxonomic groups selected for GCC meet several of the following criteria:

- **Highly threatened** groups
- **Technically challenging to grow**
- **Technically challenging to manage** (e.g. exceptional species that cannot be seed banked)
- Plant groups with diversity centres of **low capacity** → opportunity to build capacity
- Plant groups with a **distribution that spans many regions** → requires coordination
- **Plant groups overlooked by other sectors**
- Plant groups **already prioritised in the botanic garden sector** → leverage momentum
- Plant groups that are **keystone species** in biodiversity hotspots

Current Consortia

GCC Objectives

- Establish and foster a **network of experts**
- **Identify, prioritize** species of greatest conservation concern
- Develop coordinated ***ex situ* collections** of **conservation value**
- Undertake and facilitate applied **research**
- Ensure that threatened species are conserved ***in situ***
- **Build capacity** of in-country partners **in diversity centres**
- Increase **public awareness** and engagement
- Raise **funding** to scale-up conservation action

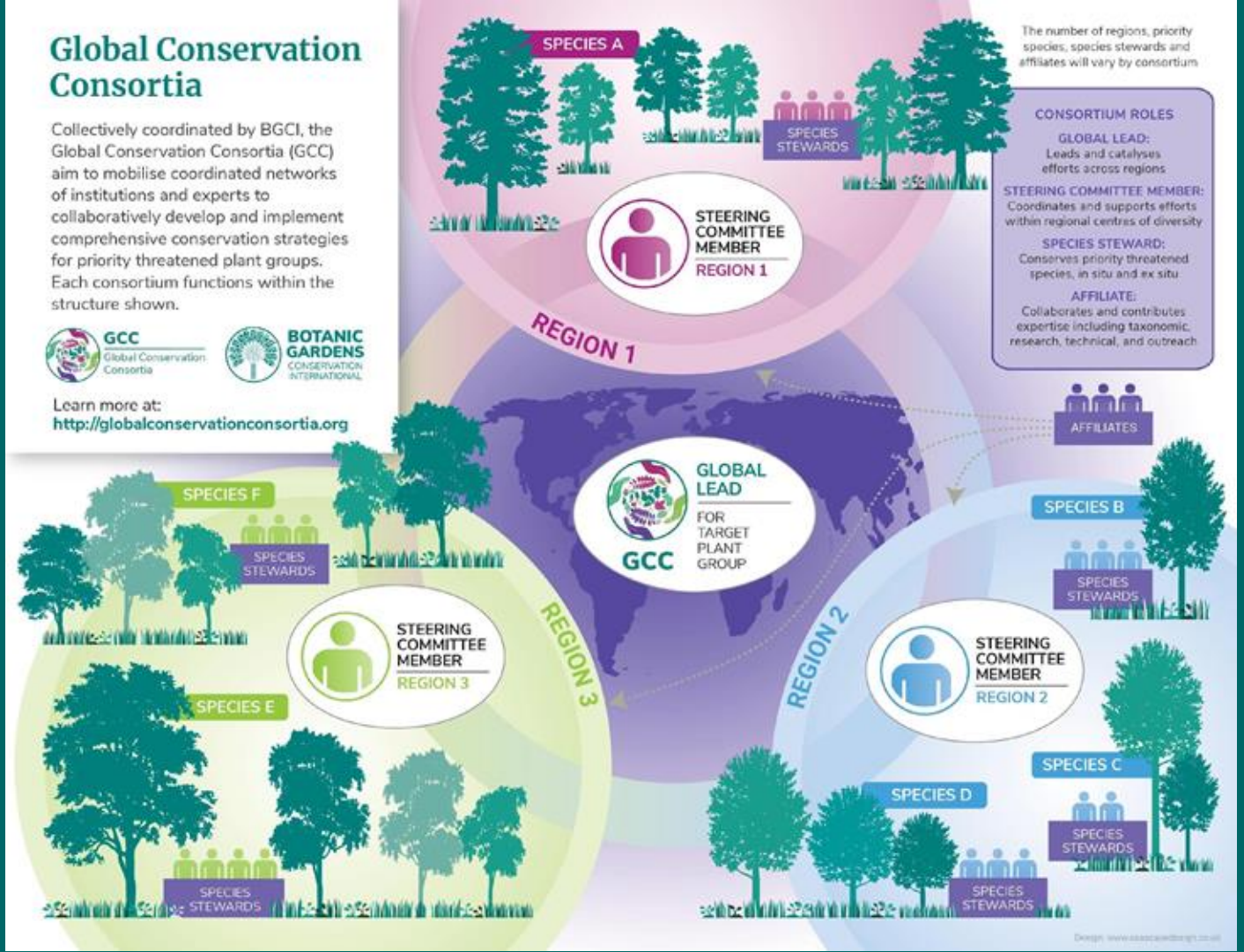
Global Conservation Consortia

Collectively coordinated by BGCI, the Global Conservation Consortia (GCC) aim to mobilise coordinated networks of institutions and experts to collaboratively develop and implement comprehensive conservation strategies for priority threatened plant groups. Each consortium functions within the structure shown.

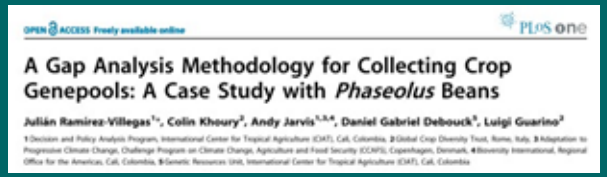
GCC Global Conservation Consortia

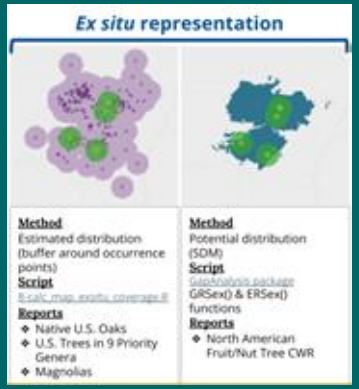
BOTANIC GARDENS CONSERVATION INTERNATIONAL

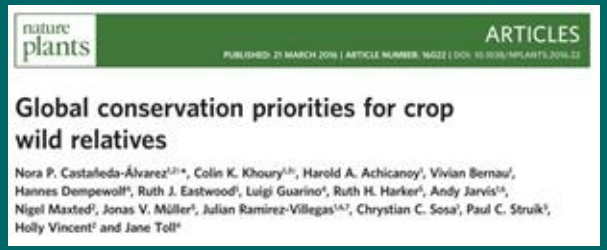
Learn more at:
http://globalconservationconsortia.org

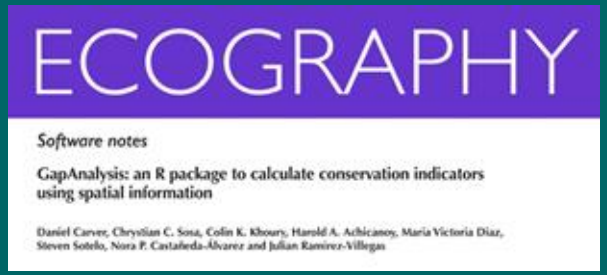


Conservation Gap Analysis – a growing practice









Accession level data

- Develop coordinated ***ex situ*** **collections** of **conservation value**
- Accession level data gathering
- Gap Analysis

	C	D	F	G	I	J	K	W
1	submission_year	species_name_acc	prov_type	gps_det	lat_dd	long_dd	all_locality	num_indiv
4	2019	Magnolia fraseri	W	L	35.434649	-82.237985	Hickory Nut Gorge; Bat Ca	1
5	2019	Magnolia fraseri	W	C	35.672215	-82.067684	Crabtree Meadows; on the	2
6	2019	Magnolia fraseri	W	G	36.65997778	-81.54455833	Mt. Rodgers; Jefferson Na	2
7	2020	Magnolia fraseri	W	C	34.868083	-83.426229	| | Rabun | Georgia | Unite	2
8	2019	Magnolia fraseri	W	G	34.775215	-83.623161	Chattahoochee National F	1
9	2019	Magnolia fraseri	W	G	34.775215	-83.623161	Chattahoochee National F	1
10	2019	Magnolia fraseri	W	G	34.775215	-83.623161	Chattahoochee National F	1

Working towards comprehensive species diversity in garden collections

→ *ex situ* gap analysis

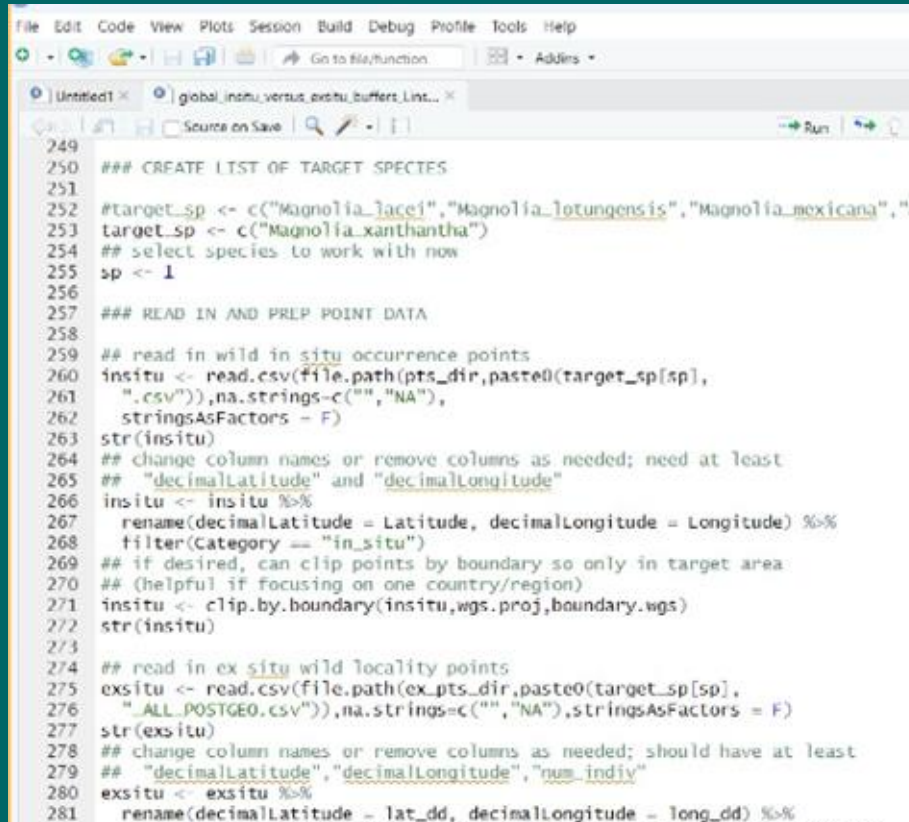
- The ***gap*** is wild genetic diversity not currently represented in the collection
- Close gaps by adding missing genetic diversity to the collection

Using gap analysis to determine the status of a collection

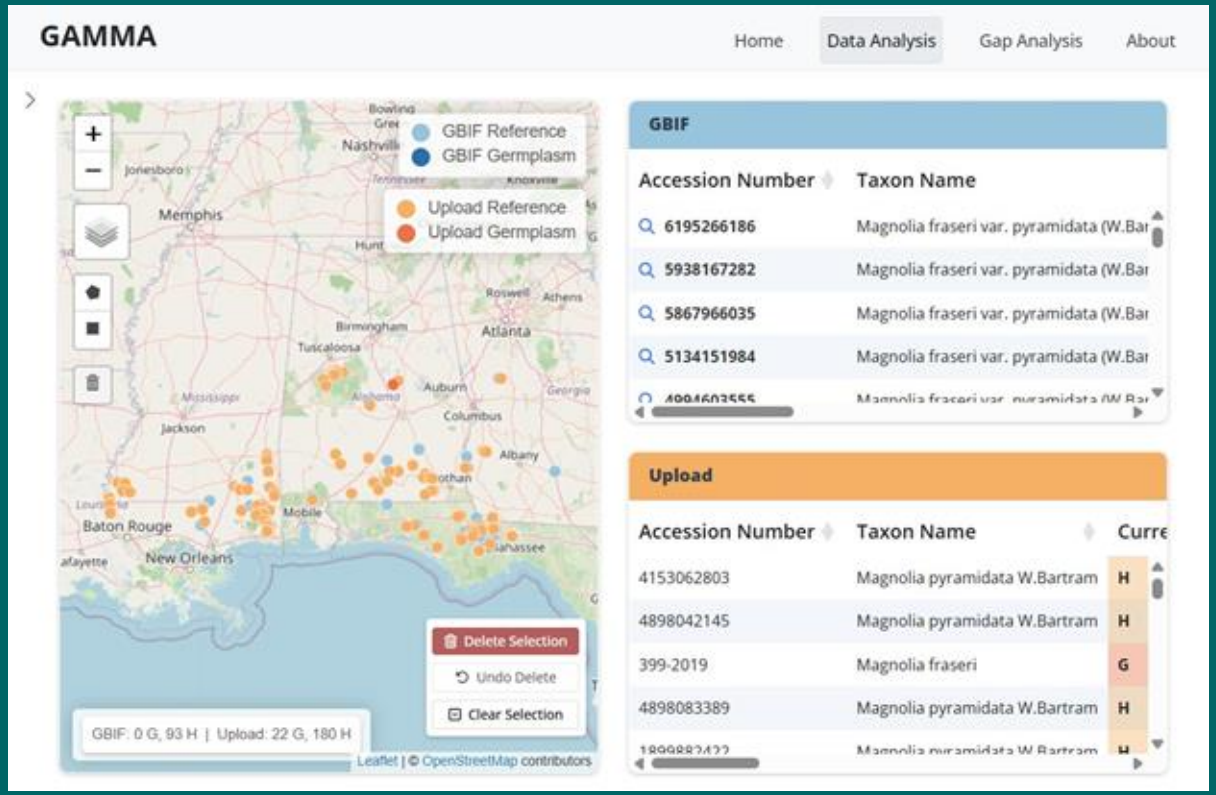
- How genetically complete is the collection?
- What diversity is currently in the collection and what is not in the collection?
- Are any plants redundant?
- Should new plants be brought into the collection?

Gap analysis: expanding the practice

- Gap analysis conducted in R
- Capacity gaps remain- time, expertise, patience…



Gap Analysis & Metacollection Management tool



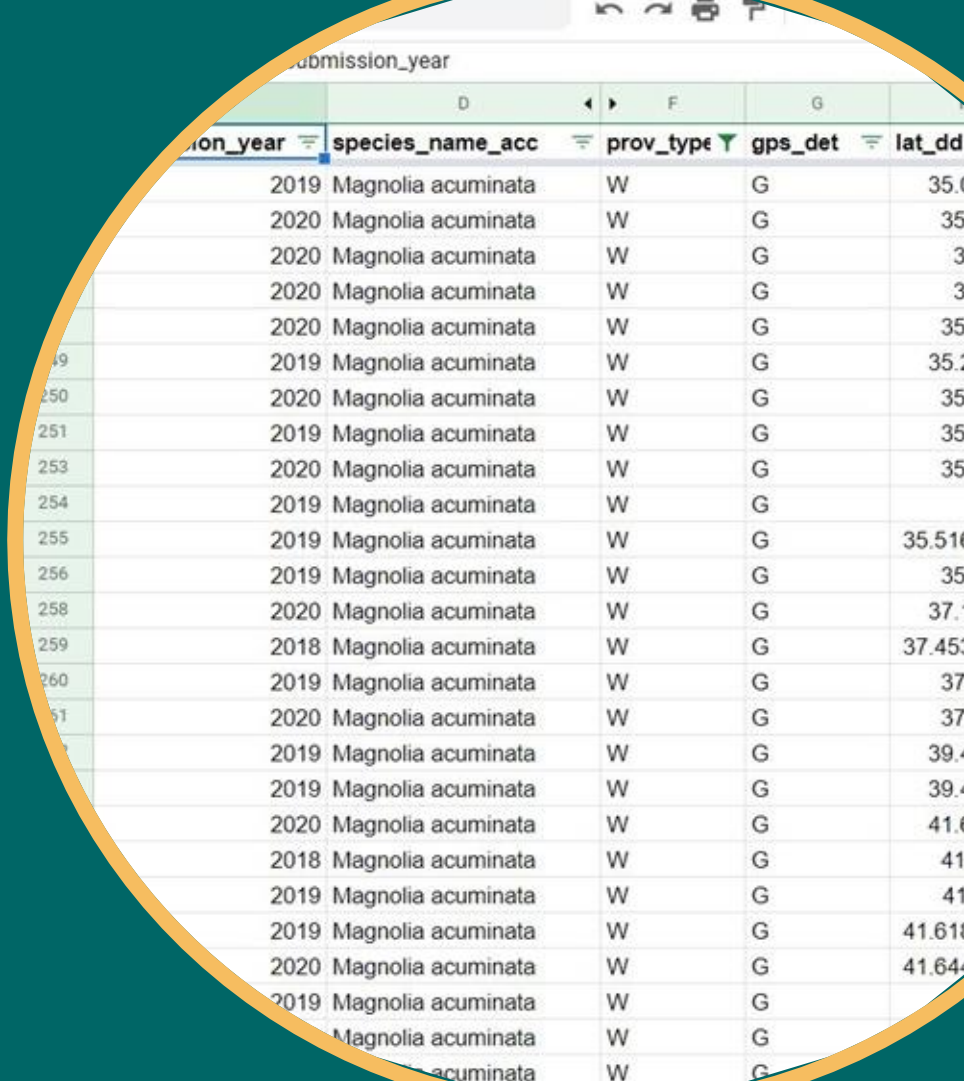
Use GAMMa to

- Visualize
- Quantify
- Assess

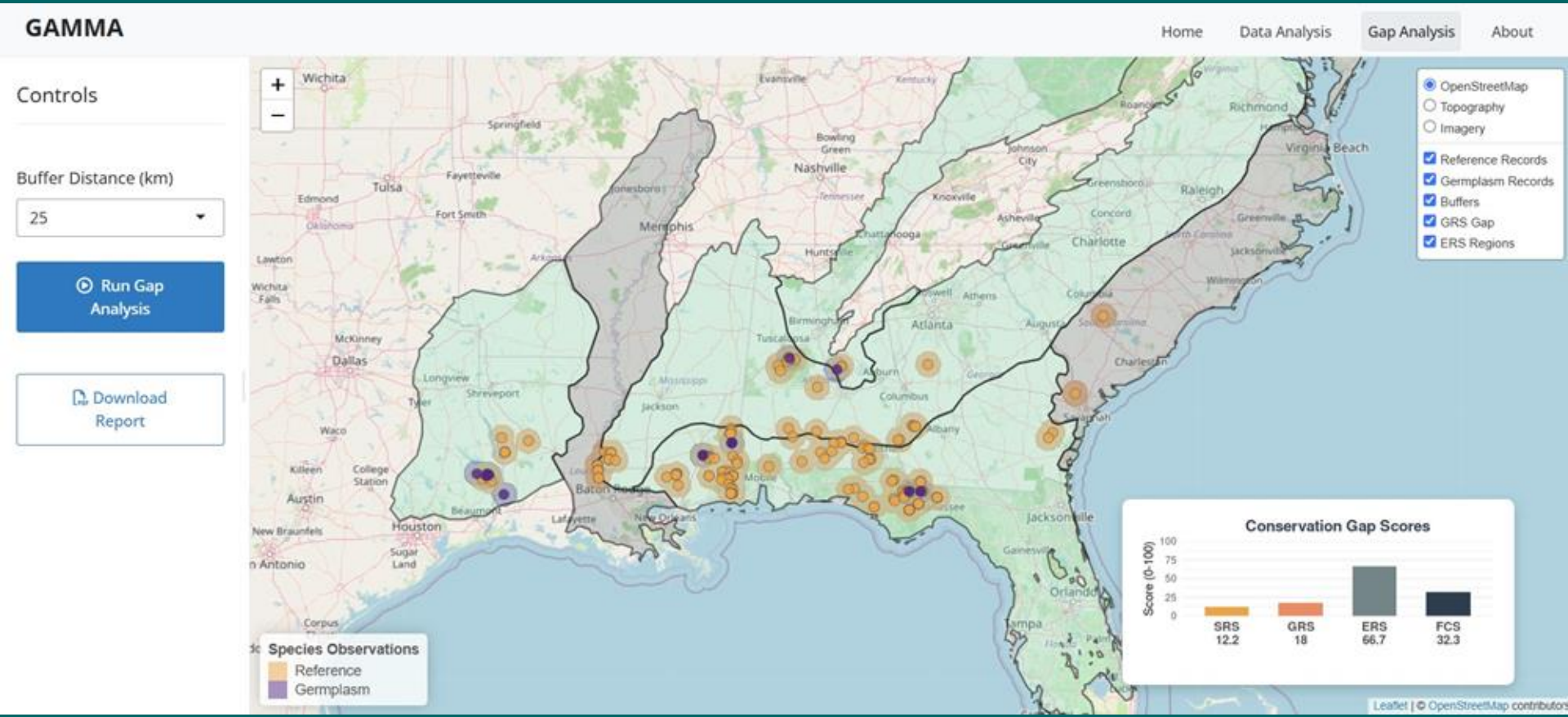
the geographical and ecological coverage (and gaps) of their collections

Data types for *ex situ* gap analysis

- ***Ex situ* collections records** (with information about where living material in a gene bank or garden came from)
- **Wild occurrence point data** (where does the species occur in the wild)



Output and Results of GAMMa



Output and Results

Three metrics are aggregated into a Final Conservation Score (FCS) ranging from 0 to 100.

- *Sampling Representativeness Score (SRS)*
- *Geographic Representativeness Score (GRS)*
- *Ecological Representativeness Score (ERS)*

Project Team















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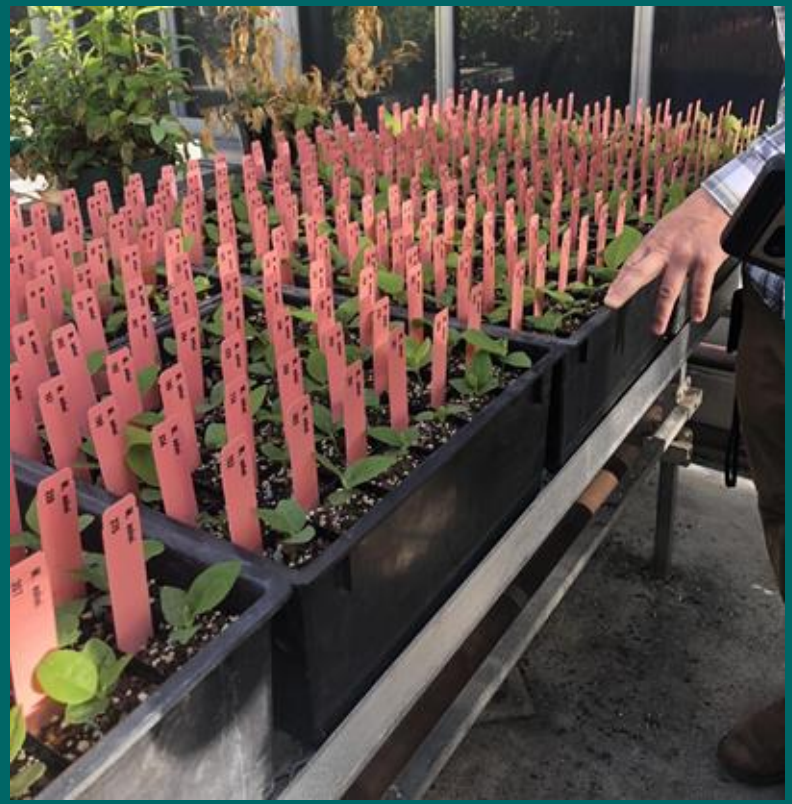
GAMMa Use case: *Magnolia pyramidata*

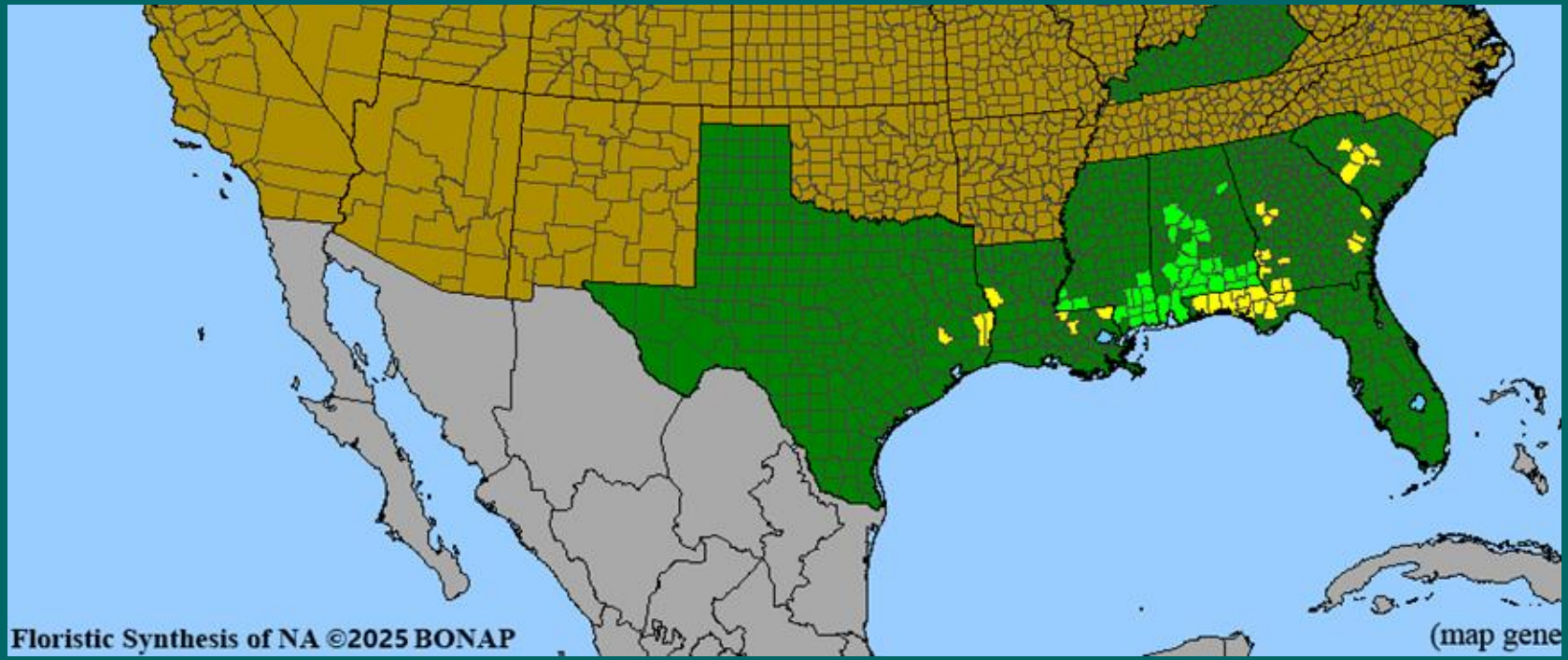
Establish, expand and manage ex situ collections of high conservation value

- Understanding current status of collections of focal species
- Identifying ways to expand collections
- Collective management of metacollections

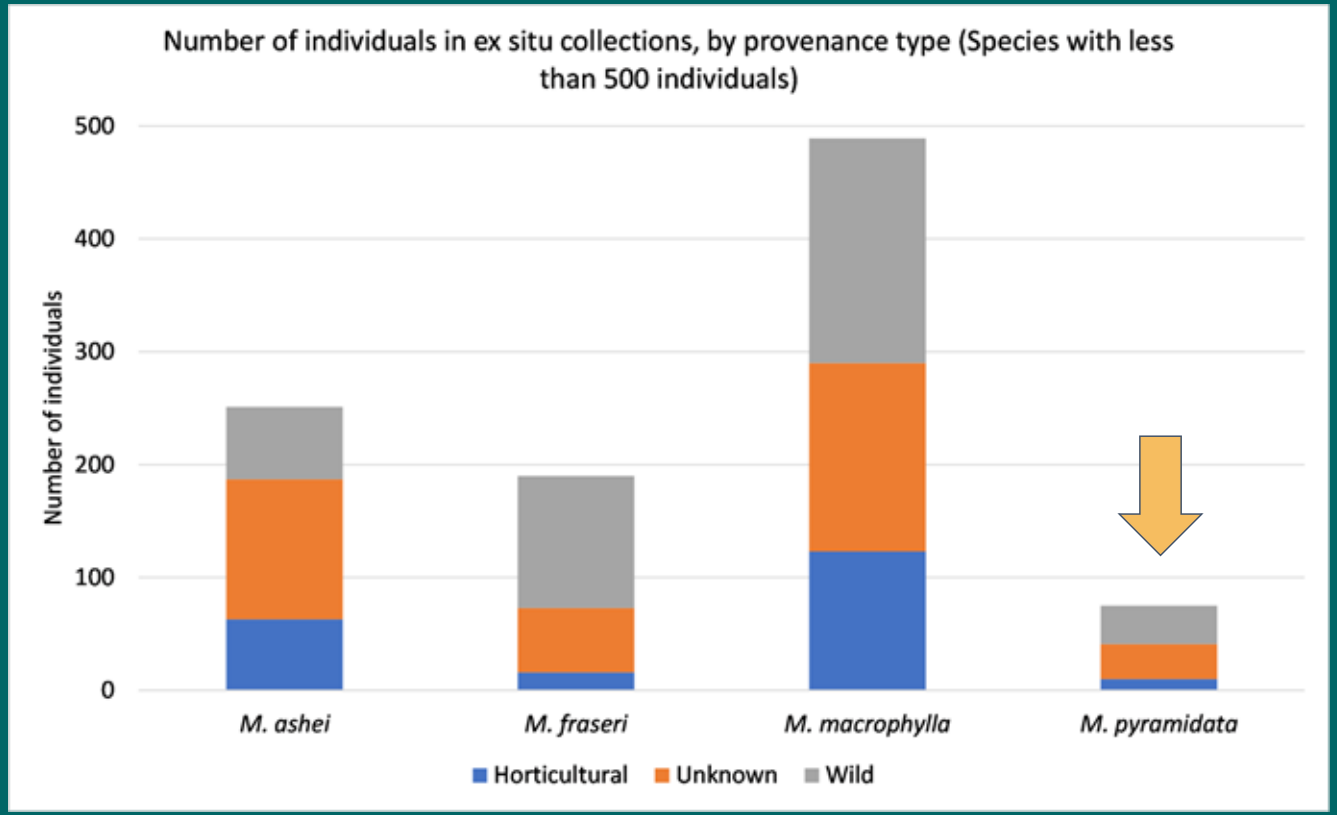


Pyramid magnolia (*Magnolia pyramidata*)

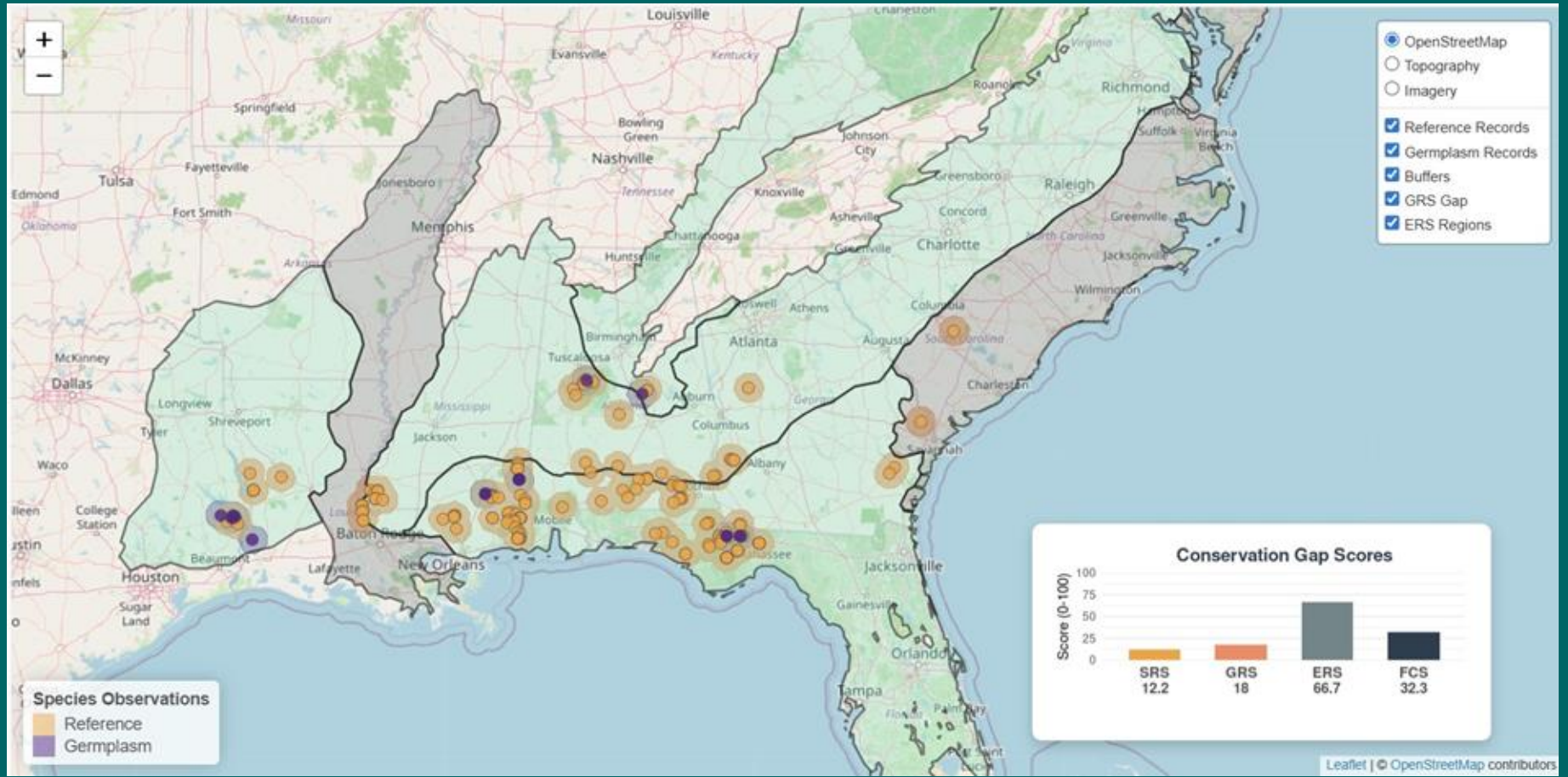
Pyramid Magnolia
(*Magnolia pyramidata*)



Results: *Ex situ*

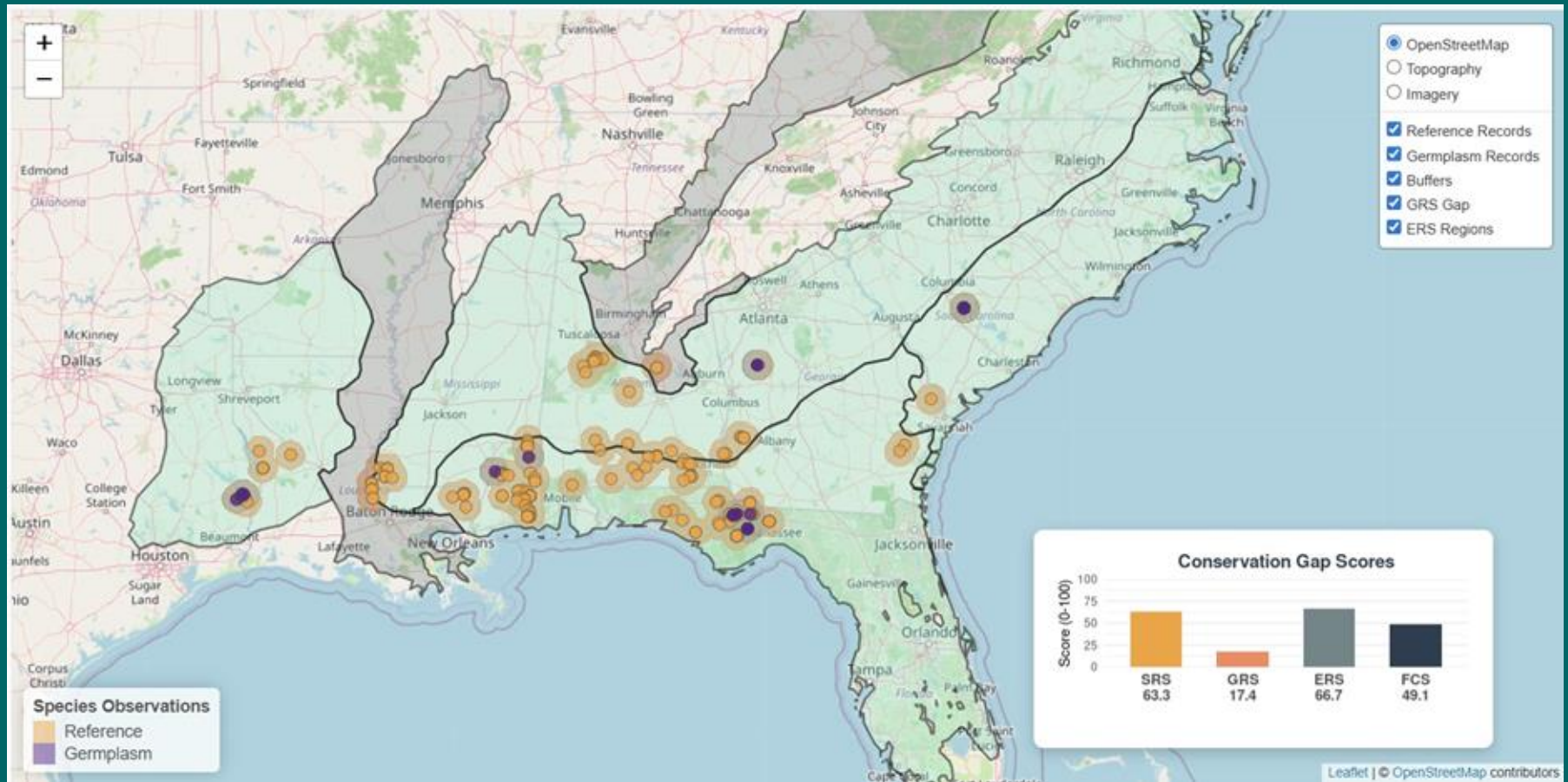


Ex Situ Gap Analysis of *Magnolia pyramidata* (2020)



Collecting (2024) & resurveying gardens (2025)

Output and Results (2026)



Thank you!

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