Botanic Gardens Conservation International

The world's largest plant conservation network

BGCI

Gap Analysis to Support Ex situ Collections Development

Abby Meyer, BGCI-US Executive Director

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A global network

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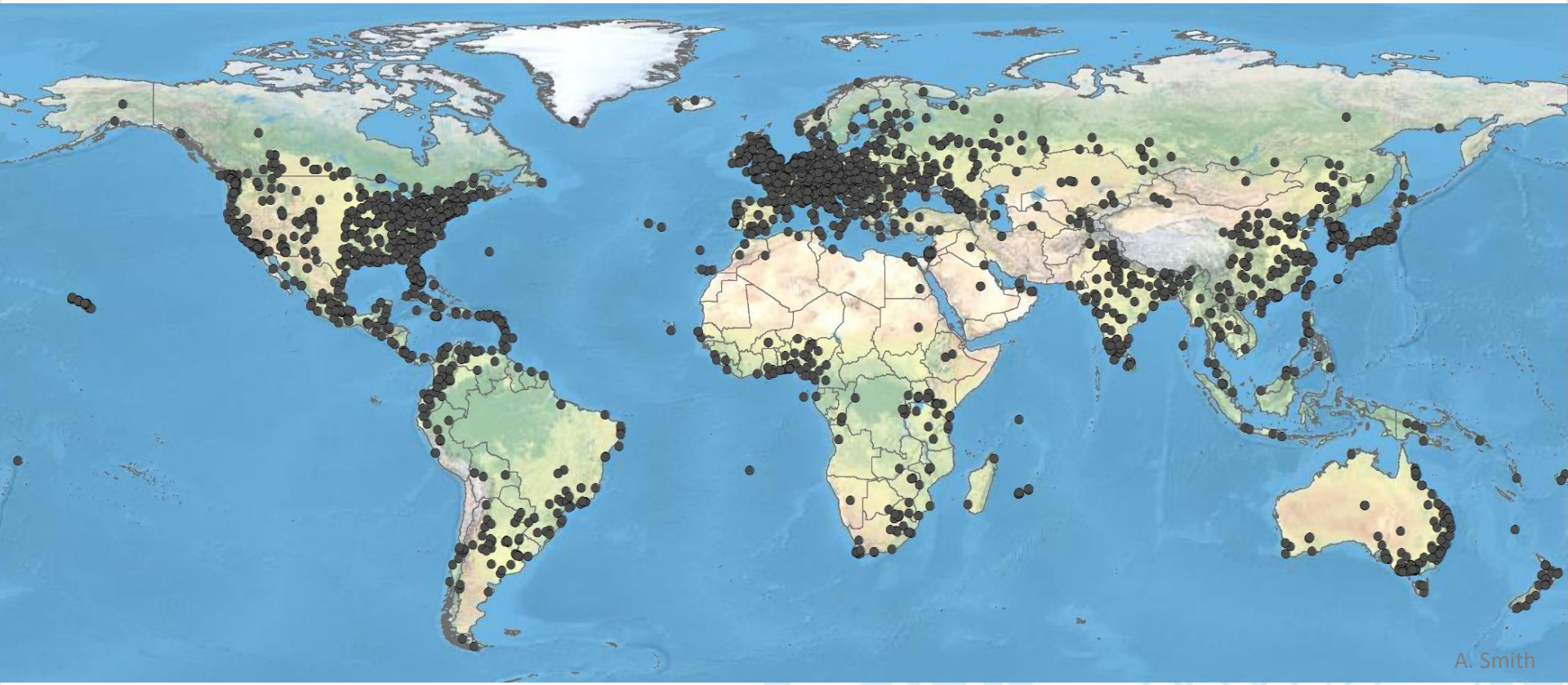

Living Collections

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Quarryhill Botanical Garden

Glen Ellen, CA

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Mercer Botanic Gardens

Humble, TX

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Naples Botanical Garden

Naples, FL

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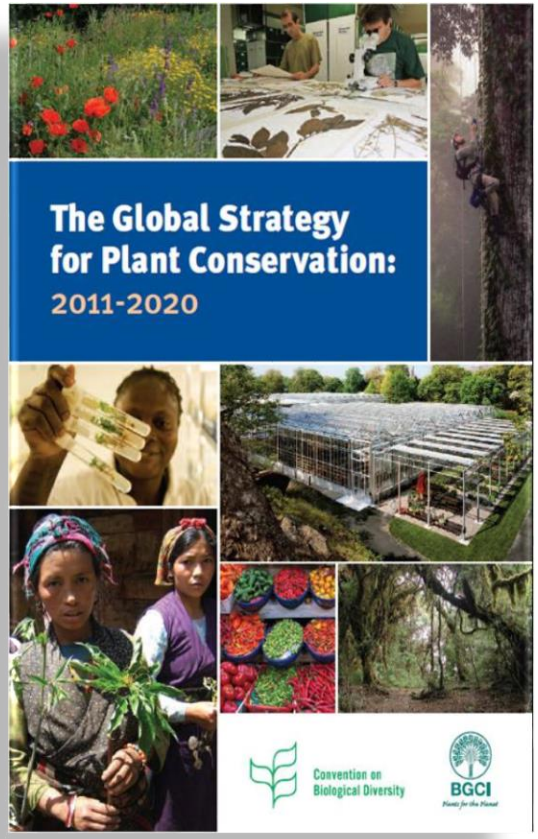
Plant Conservation Strategies

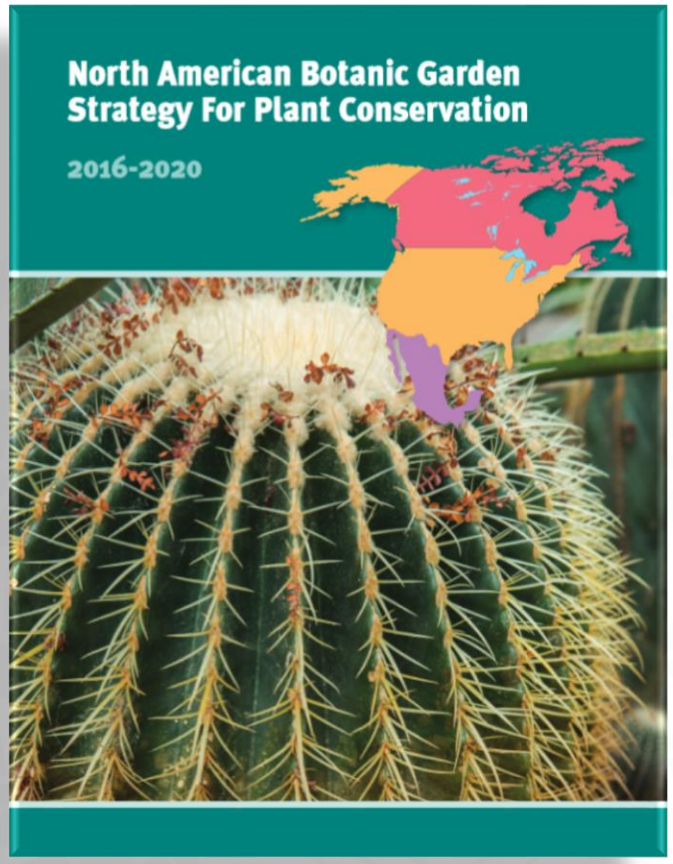
Target 8

At least 75 percent of threatened plant species in ex situ collections, preferably in the country of origin, and at least 20 per cent available for recovery and restoration programmes.



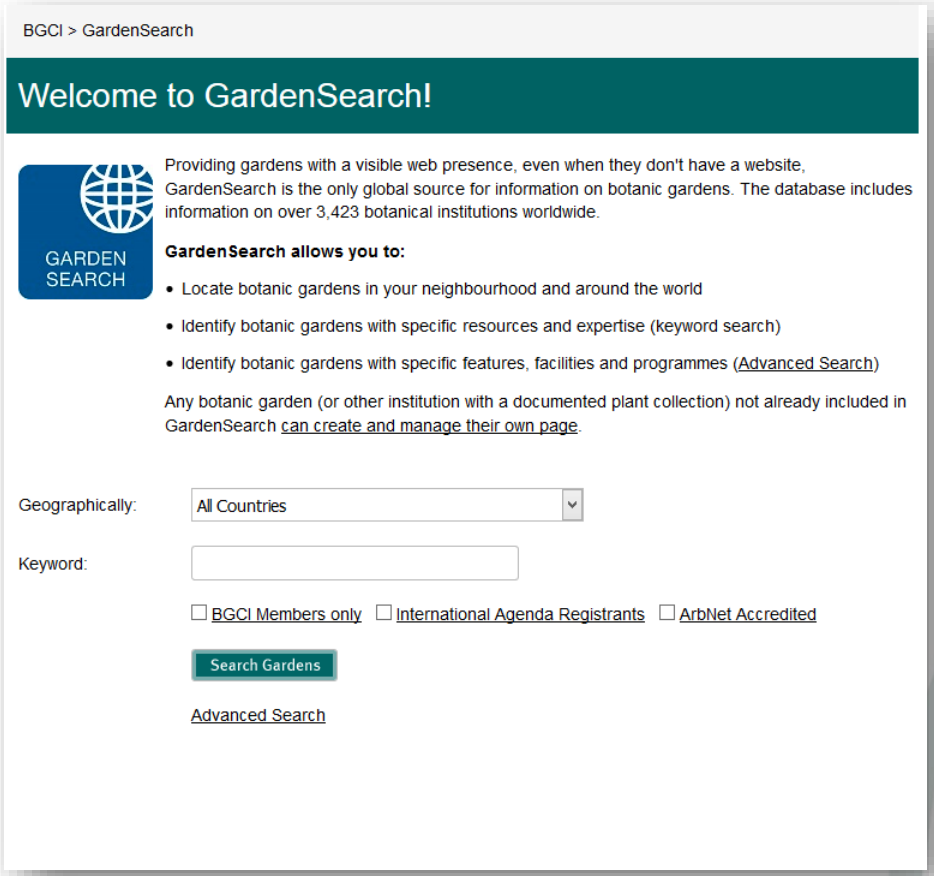
Sub-target B2

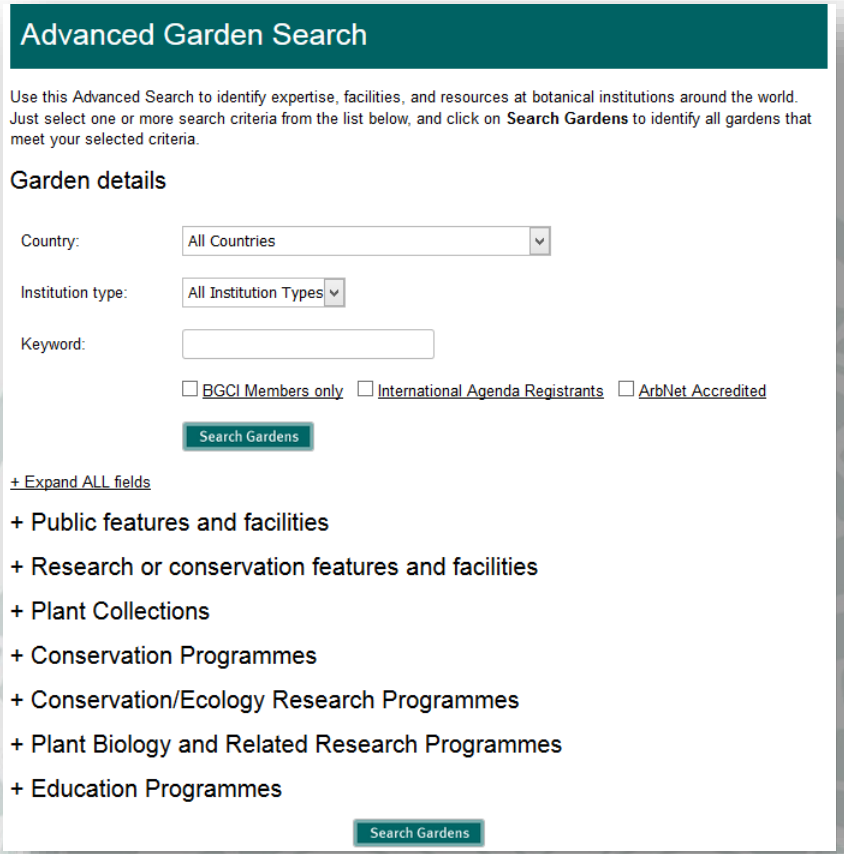
Botanic gardens will expand ex situ conservation efforts and partnerships.



Botanic gardens collectively protect over 40% of known threatened species

GardenSearch





New England Wild Flower Society - Garden in the Woods

United States of America - Massachusetts - Framingham

Edit Garden | Search Again

Garden Information | Restoration Projects

Institution Code: NEWF

International Agenda Registration: Yes

BGCI Member: Yes

About the New England Wild Flower Society - Garden in the Woods

New England Wild Flower Society's Garden in the Woods is New England's premier wildflower showcase and is accredited by the American Association of Museums. Begun in 1931, the Garden has grown through the years and now encompasses a collection of more than 1500 native species and cultivars of which 150 are rare and endangered. Located 20 miles west of Boston, from April and May's spring ephemerals to summer's blooming meadow through October's fiery foliage, the Garden displays an ever-changing tapestry of flowers and foliage.

Founded in 1900, New England Wild Flower Society is the oldest plant conservation organization in the United States. Through our leadership, the Society protects native plants and their habitats with the goal of ensuring that they will exist in vigorous populations within healthy, evolving ecosystems and of engaging a broad range of people to actively promote and protect them in the wild and in their gardens.

Main Address:
New England Wild Flower Society - Garden in the Woods
180 Hemenway Road
Framingham
Massachusetts 01701-2699 United States of America

Telephone: (508) 877-7630
Fax: (508) 877-3658
URL: www.newenglandwild.org
Primary Email: information@newenglandwild.org

About the Garden

Institution Type: Botanic Garden

Status

Status: Private: Yes
Status: Educational: Yes
Date founded: 1931

Physical Data

Natural Vegetation Area: Yes
Natural vegetation area: Size: 10 Hectares
Landscaped Area: Yes
Landscaped Area: Size: 8 Hectares
Total Area: 18 Hectares
Latitude: 42.3409959
Longitude: -71.4275150
Altitude: 0.00 Metres

Features and Facilities

Herbarium: Yes
Arboretum: No
Micropropagation/ Tissue Culture Facilities: No
Seed Bank: Yes
Published Plant Catalogue: No
Computer Plant Record System: Yes
Open to public: Yes
Friends society: Yes
Retail Outlet: Shop: Yes
Retail Outlet: Plant Sales: Yes
Disabled access: Yes
Number of Visitors: 20000
Number of Volunteers: 230

Plant Collections

Accession Number: 4807
Cultivation Taxa Num: 1569

Conservation Programmes

Conservation Programme: Yes
Medicinal Plant Programme: Yes
Ex Situ Conservation Programme: Yes
Reintroduction Programme: Yes

Research Programmes

Education Programmes

Locations of gardens with seed banks

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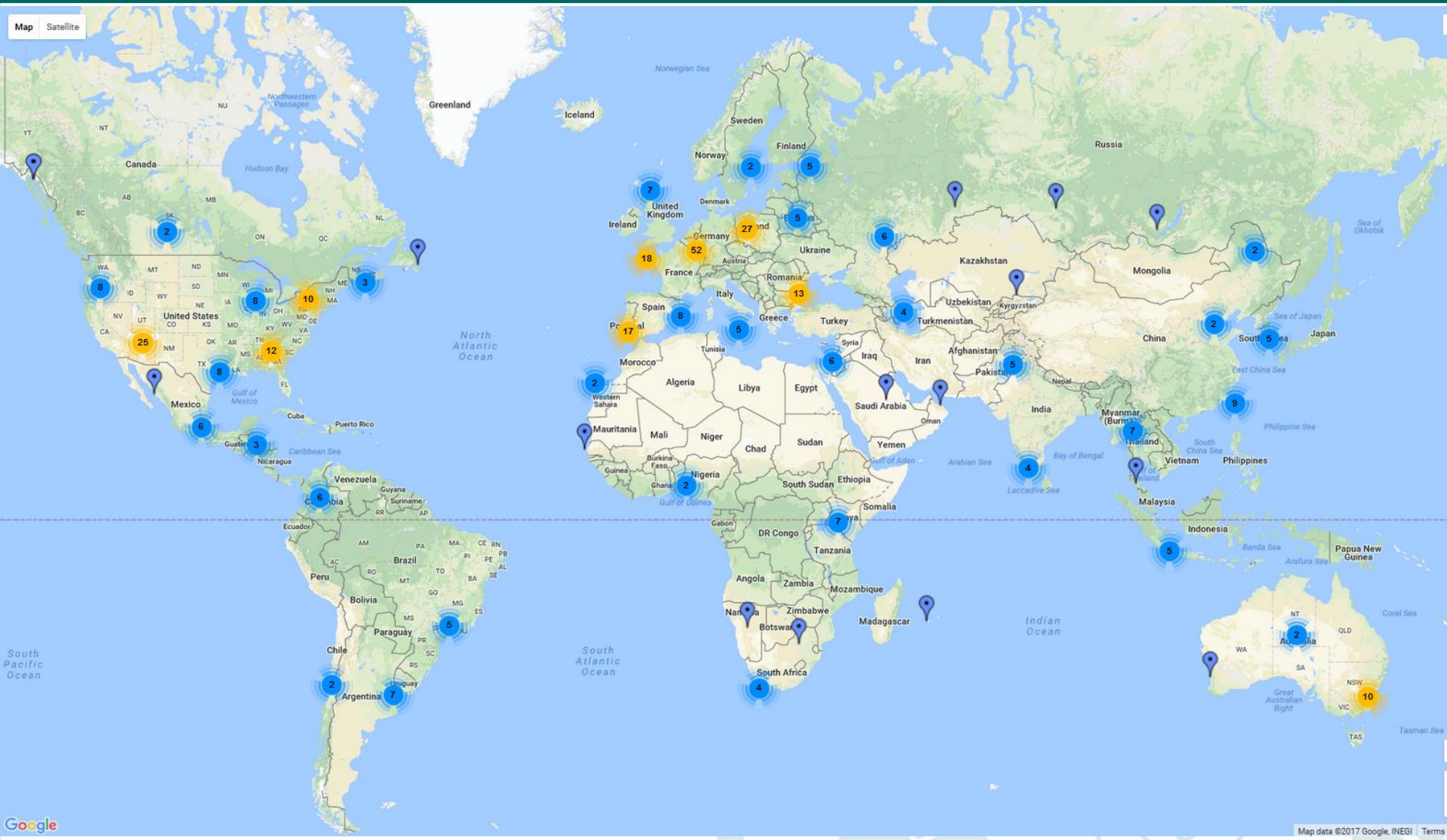

PlantSearch

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Welcome to PlantSearch!

English (EN) | En Español (ES) | 日本語で (JA)

PLANT SEARCH

The only global database of living plant, seed and tissue collections:

- Search 1,321,861 collection records, representing 533,991 taxa, at 1,087 contributing institutions
- Locate threatened, rare, medicinal and other plant species in living collections
- Connect with living collections to aid your conservation, education and research efforts

Enter search criteria below (all fields optional)

Scientific name: Genus | Species | Infraspecific Epithet ☐ Exclude cultivar names

Conservation Status:

IUCN Red List -- Please Select --

IUCN Red List 1997 -- Please Select --

☐ CITES listed species

☐ Threatened Global Trees Campaign species

Additional Status:

Crop Wild Relative -- Please Select --

☐ Medicinal plant species

Which IUCN list should I choose?

Search Plants

#	Plant Name	Name Status	IUCN Red List	IUCN Red List 1997	CITES Appendix	Invasive Species Compendium fact sheet	CWR	No. of ex situ sites worldwide	Contact ex situ sites
1	Abies alba	-	Least Concern	-	-	Look Up	-	128	Send Request
2	Abies amabilis	-	Least Concern	-	-	Look Up	-	49	Send Request
3	Abies balsamea	Accepted	Least Concern	-	-	Look Up	-	115	Send Request
4	Abies balsamea var. balsamea	Synonym	Least Concern	-	-	Look Up	-	6	Send Request
5	Abies balsamea var. phanerolepis	-		-	-	-	-	1	Send Request
6	Abies beshanzuensis	Accepted	Critically Endangered	-	-	-	-	1	Send Request
7	Abies bracteata	Accepted	Near Threatened	Rare	-	Look Up	-	27	Send Request
8	Abies cephalonica	Accepted	Least Concern	-	-	Look Up	-	103	Send Request
9	Abies h cephalonica		Lower Risk: Near Threatened	-	-	-	-	0	Send Request
10	Abies chensiensis	Accepted	Least Concern	-	-	-	-	31	Send Request
11	Abies chensiensis ssp. chensiensis	Synonym	Least Concern	-	-	-	-	0	Send Request
12	Abies chensiensis subsp. salouenensis	Accepted		-	-	-	-	9	Send Request
13	Abies chensiensis ssp. yulongxueshanensis	Accepted	Least Concern	-	-	-	-	0	Send Request

PlantSearch requests

Request information on plant species

INTENDED USE: This service is designed to facilitate communication between plant collection holders, researchers, educators, and other plant conservation professionals. Its primary use is to request or share information or plant material for research, education or conservation purposes.

To send a request about the plant you selected to all gardens that report maintaining it in their collections, please complete the form below as thoroughly as possible.

Please note that BGCI is not responsible for the accuracy of the information contained here, nor is it directly involved with or responsible for the response of individual gardens to your inquiry.

Information requested for plant: **Abies alba**

Your Name:

Email:

Job Title:

Institution:

My institution is a member of BGCI☐

Please indicate the purpose for your request (check all that apply):

☐Plant tissue for DNA analysis or other research purpose

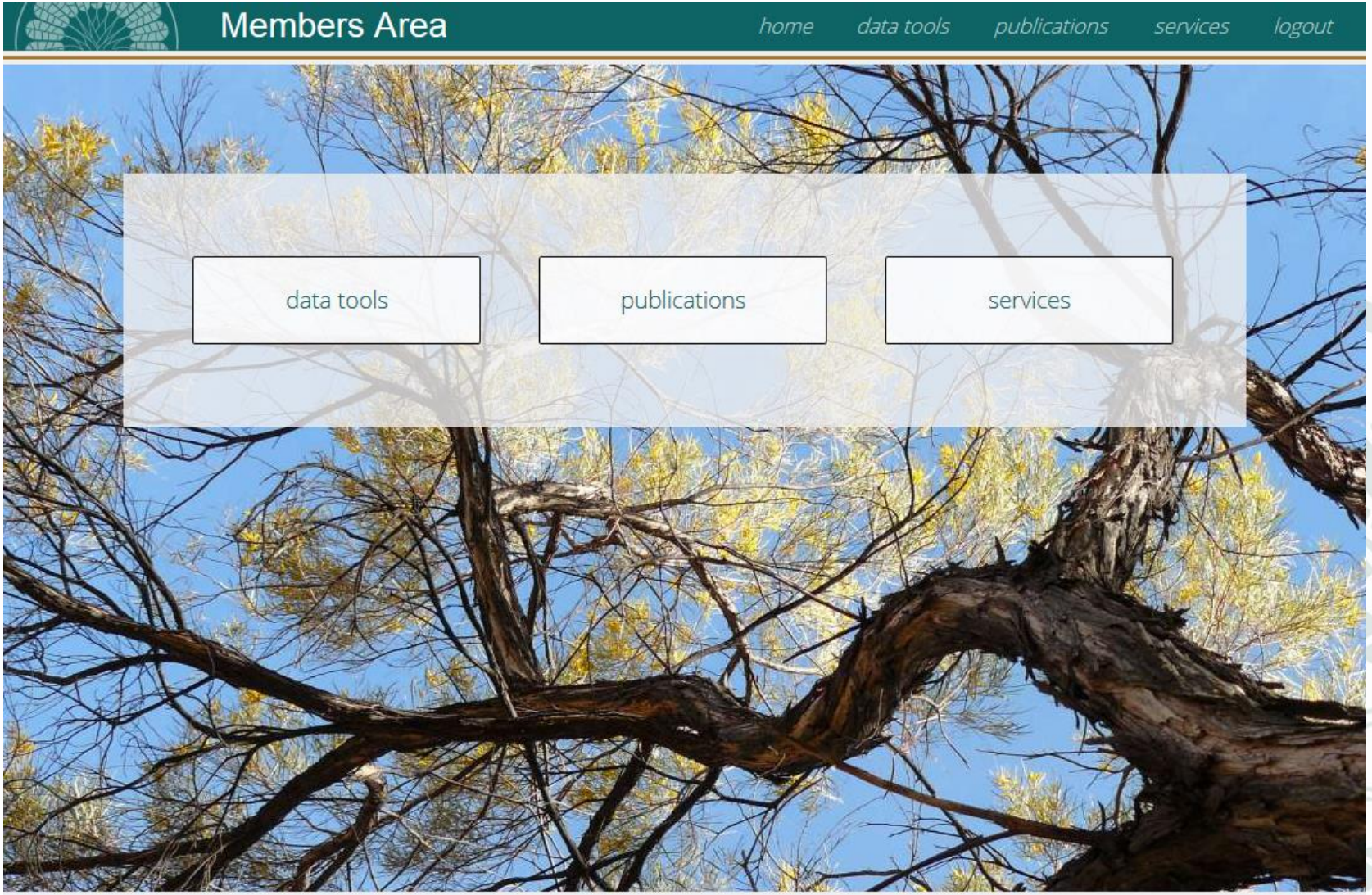
☐Seeds or other living material for conservation, education, or research purposes

☐Propagation or cultivation information for conservation, education, or research purposes

☐Other (please provide additional details in the Comments box below)

Comments/Additional Information:

Members Area



PlantSearch *Advanced Search*

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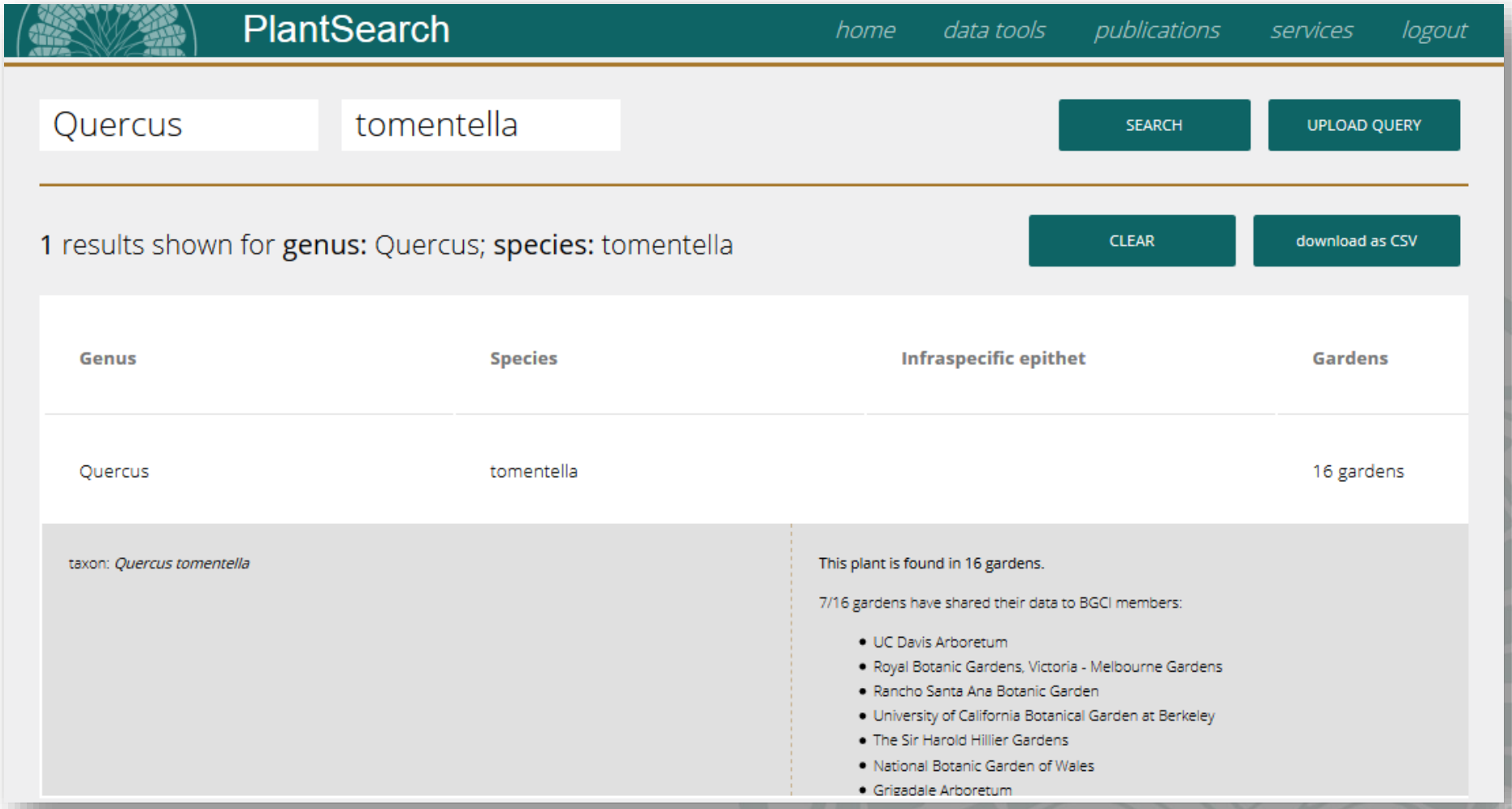
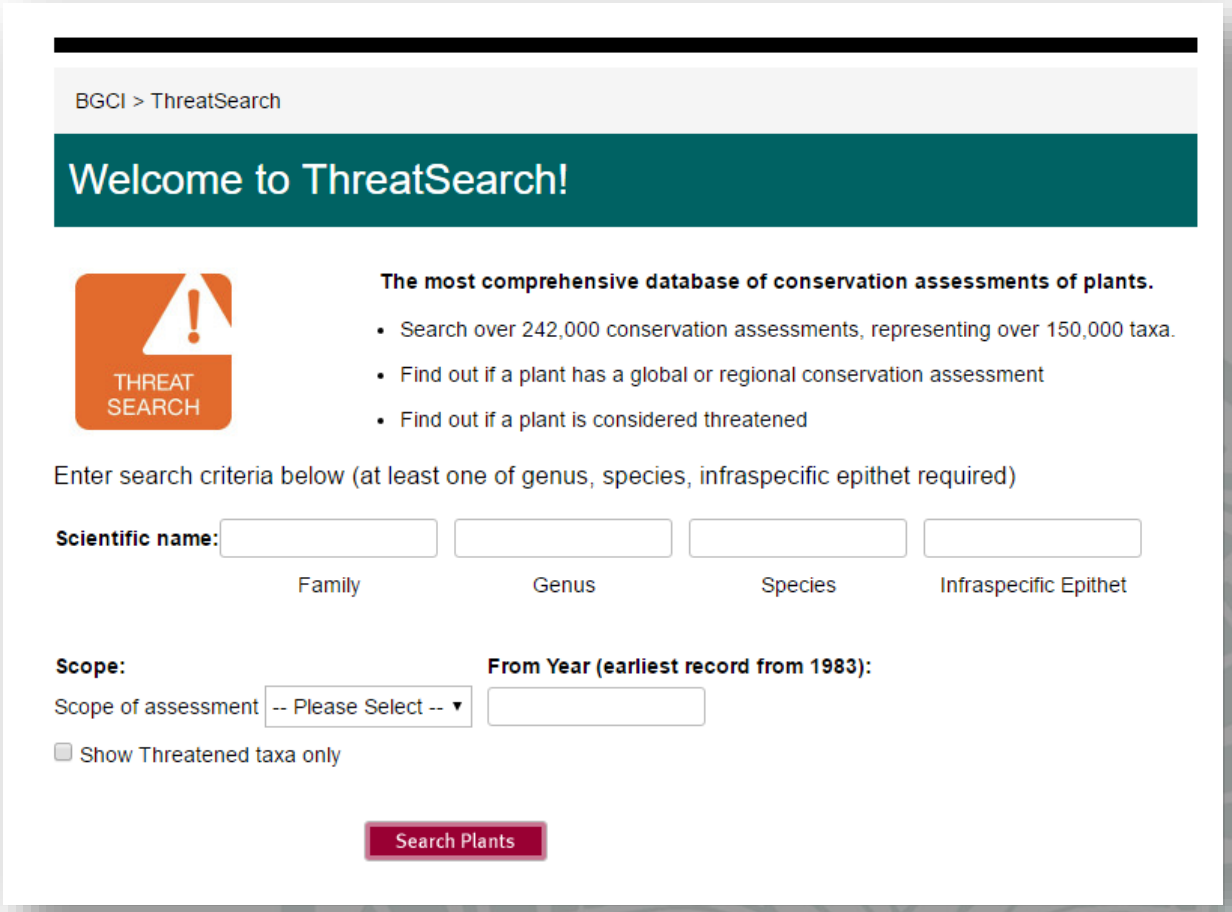


ThreatSearch



www.bgci.org/threat_search.php

GlobalTreeSearch

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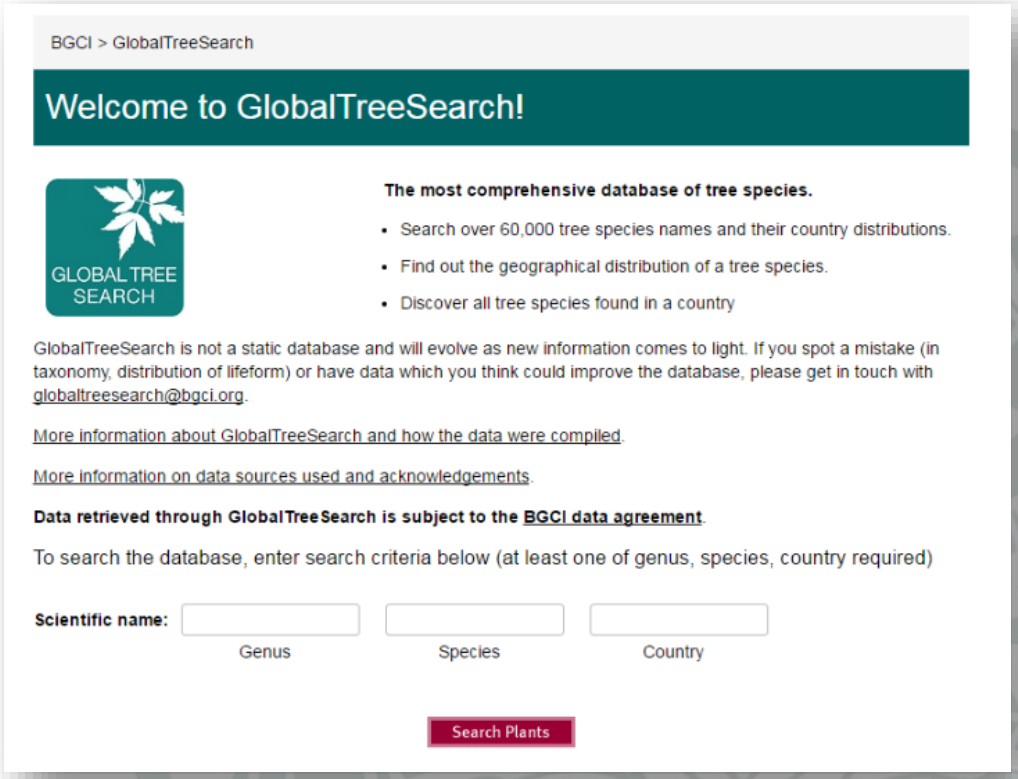
GLOBAL TREE SEARCH

A comprehensive list of the world's tree species and their country level distributions

60,065 tree species



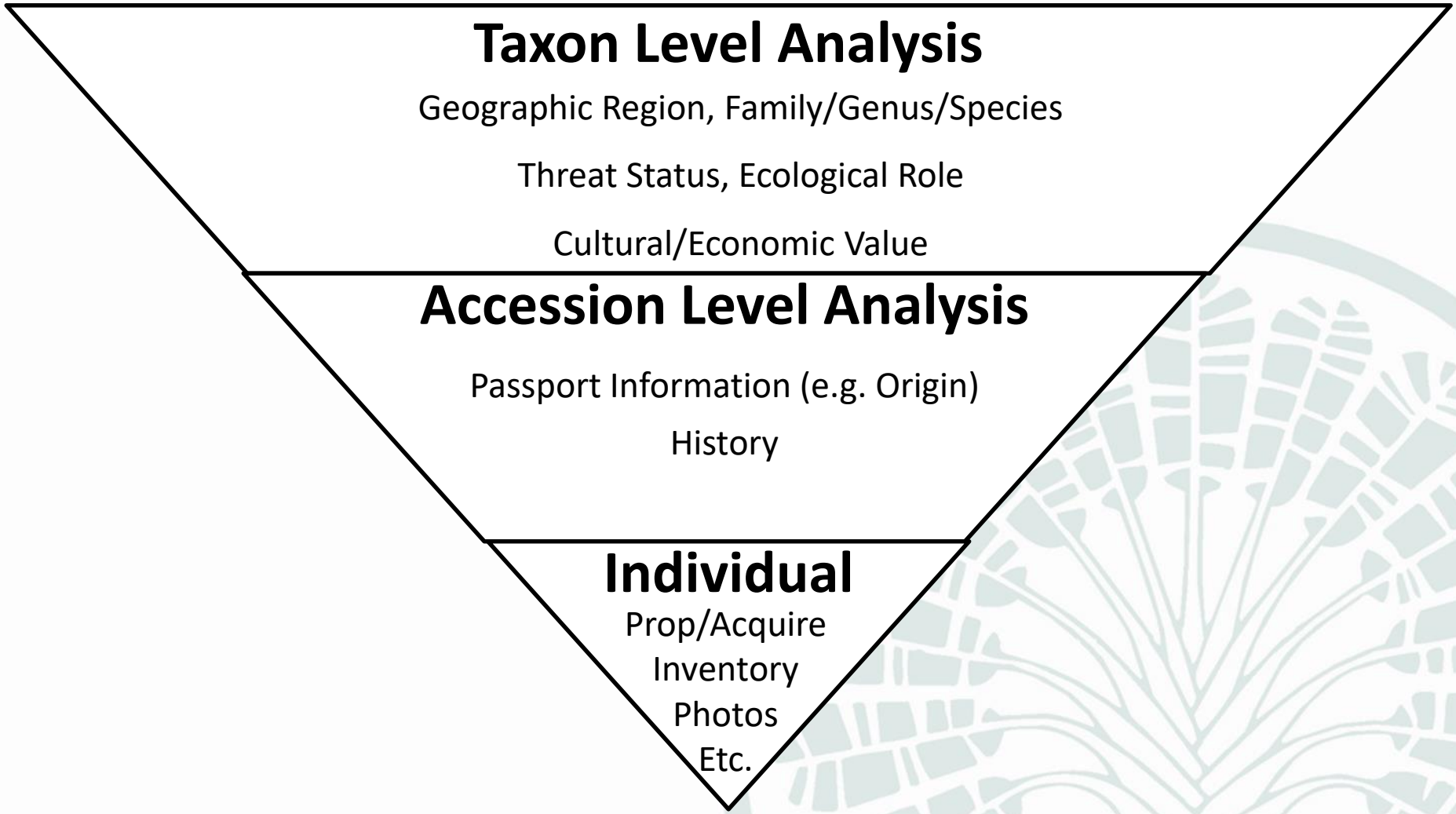
bgci.org/global_tree_search.php

Gap Analysis

Identify the species with the greatest need of conservation action and the botanic gardens that can be mobilized to protect them

(or any plant group)

Assessment Layers



North American Threatened Species Ex Situ Assessment

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7,662 Globally Threatened Species

- GX, GH, G1-G3 (NatureServe)
- NOM-059 (Mexico Red List)
- EW, CR, EN, VU (IUCN)

Top 10 Genera	Threatened taxa per genus
Astragalus	347
Eriogonum	267
Penstemon	196
Lupinus	154
Erigeron	121
Phacelia	110
Draba	95
Cyanea	94
Carex	89
Rubus	83

Based on data provided by NatureServe and ThreatSearch, October 2017

North American threatened plant ex situ representation

3,598 of 7,662 (47%) species reported ex situ

Collections Locations	Threatened Species Reported Ex situ	Seed Banks	Plant Collections	Both
North America	3399	917	1406	1076
Non-North America	1616	191	1212	213
Total	**3598**	883	1517	1198

Top 15 Institutions

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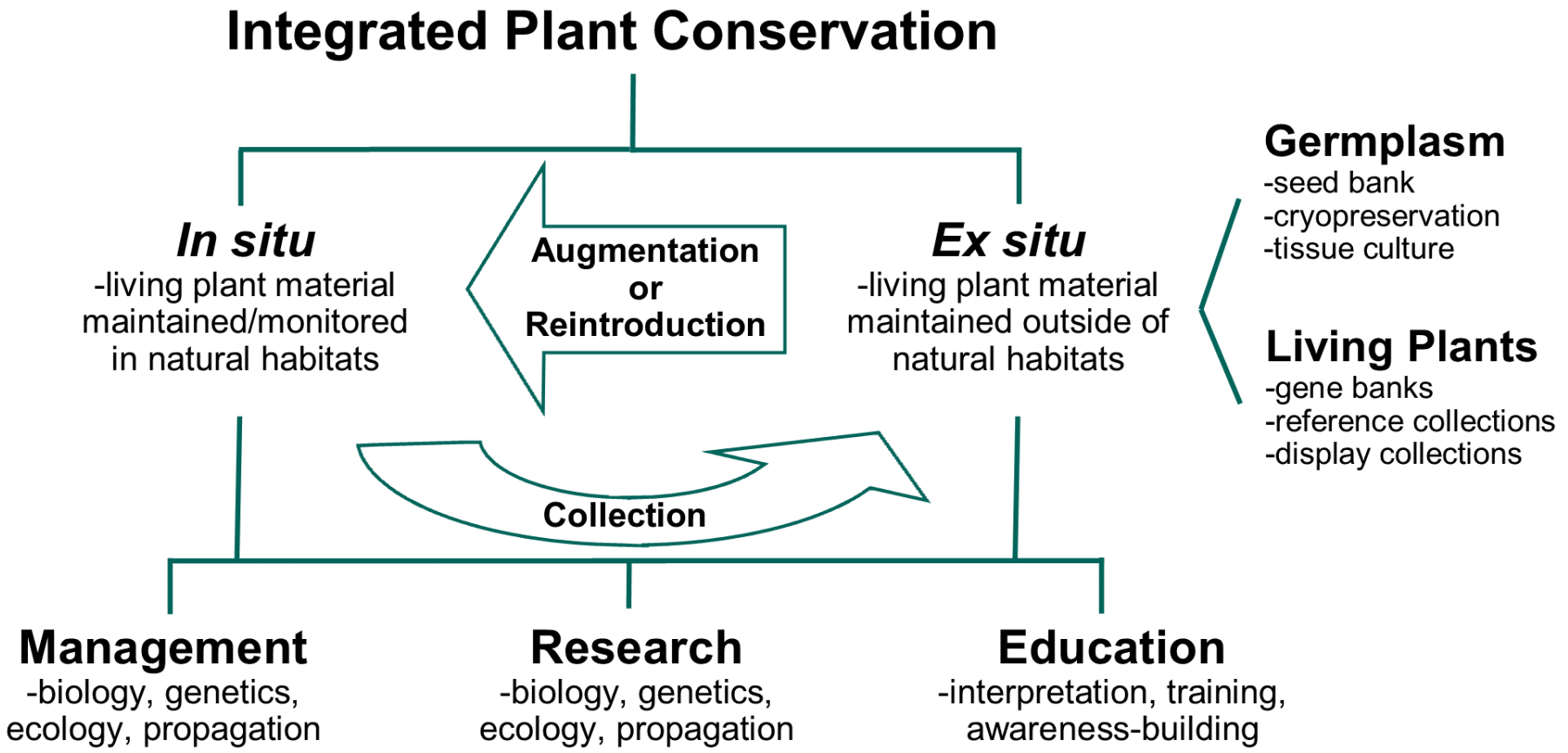
North American Threatened Species	Institution	Country
563	University of California Botanical Garden at Berkeley	United States
491	Royal Botanic Gardens, Kew	United Kingdom
402	Millennium Seed Bank	United Kingdom
387	Rancho Santa Ana Botanic Garden - Seed Bank	United States
305	Harold L. Lyon Arboretum - Seed Conservation Lab	United States
298	Denver Botanic Gardens	United States
288	New York Botanical Garden	United States
283	National Tropical Botanical Garden	United States
281	Botanischer Garten der Ruhr-Universität Bochum	Germany
276	Botanic Garden Meise	Belgium
276	Real Jardín Botánico Juan Carlos I	Spain
264	Santa Barbara Botanic Garden	United States
250	Atlanta Botanical Garden	United States
242	Huntington Botanical Gardens	United States
236	Desert Botanical Garden	United States

Closing the Loop for Conservation



Parameters of *Ex situ* Collections

Conservation value/application determined by:

1. The type of plant material held
2. The protocols used to acquire plant material
3. The long-term maintenance of viable and genetically diverse plant material

Collections Priorities

- Collection assessments
- Data sharing
- Under-represented species
- Most-threatened species
- Genetic diversity

Echinacea tennesseensis

Ex situ Collections Data sharing

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PlantSearch Upload Results

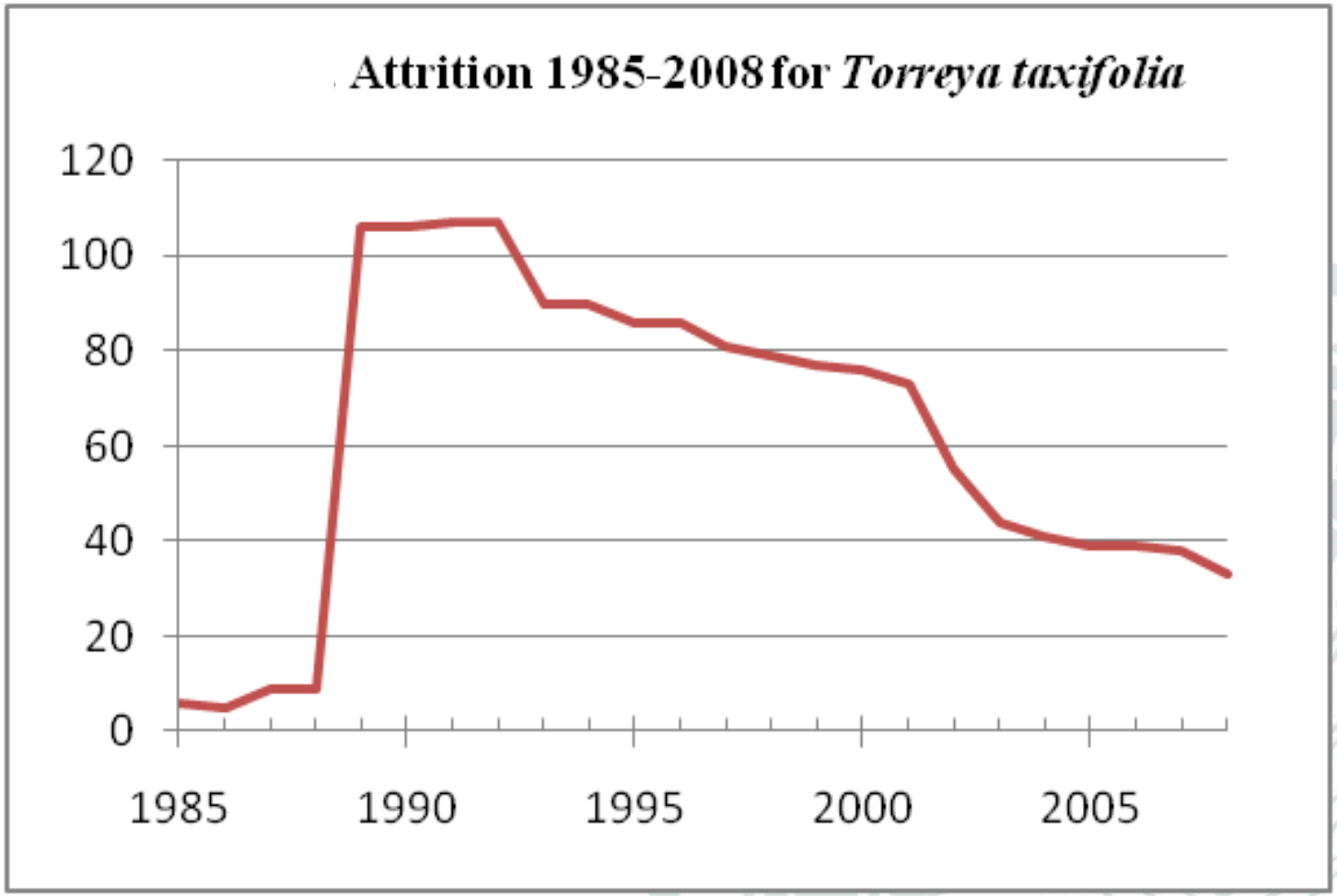
- Garden in the Woods, August 2017

A	B	C	D	E	F	
Genus	**Species**	**Infraspecific Rank**	**Infraspecific Epithet**	**No. Locations**	**IUCN Red List**	**NatureSe**
Ammophila	champlainensis			1		G2G3Q
Anemone	oregana	var.	oregana	1		G4T4
ANEMONE	transylvanica			1		
ANTENNARIA	virginica	var.	argillicola	1		
BAPTISIA	tinctoria	var.	crebra	1		
BRACHYTHECIUM	sp.			1		
Carex	castanea			1		G5
Ceratophyllum	echinatum			1		G4?
CLINTONIA	borealis	F	albicarpa	1		
CORYPHANTHA	vivipara	var.	kaibabensis	1		
Dodecatheon	frenchii			1		G3

Under-represented Species

	Threatened Species Reported by 1 Ex situ Site		
	Total Collections	Seed Banks	Plant Collections
North America	963	525	438
Non-North America	136	18	118
Total	**1100**	544	556

Trollius laxus spp. laxus


Attrition 1985-2008 for Torreya taxifolia
120
100
80
60
40
20
0
1985
1990
1995
2000
2005

Austrotraxus spicata

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Most-threatened taxa

99 North American species on the brink of extinction (EX/EW)

- 10 reported ex situ
- 5 reported in only one collection

TaxonName	Threat Status	Number of ex situ collections
Zamia monticola	CR (IUCN)	1
Hibiscadelphus woodii	EX (IUCN)	1
Argyroxiphium virescens	EX (IUCN)	1
Cyanea superba	EW (IUCN)	1
Delissea subcordata	EX (IUCN)	1

Assess Conservation Value

Conservation Collections

To orient readers to this conservation collections assessment, we offer a brief overview of plant collection components (Figure 1). Living botanical collections are typically composed of living plant material (plants, seeds, etc.), accessions, and taxa (species, varieties, cultivars, hybrids, etc.): individual plant specimens finer scale, taxa at a coarser scale, and accessions which connect and describe plants and taxa within collection. It is helpful to consider these levels of a collection when assessing potential value and applic

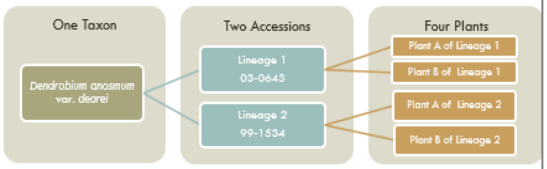


Figure 1. Example of the taxa-accessions-plants hierarchy within living plant collections. Example based on USBG plant record

This assessment is also based upon global conservation status of four main data sources (Table 1). "Threatened" taxa are flagged if they were assigned any rank considered to be of conservation conc ranks in Table 1). Throughout this assessment, these threatened taxa are used to identify associated liv plants and accessions for closer analysis. "Critically threatened" taxa are also highlighted as potential priorities for conservation activities, defined by the authors as taxa assigned CITES Appendix I; 1997 Red List EX, EX/E, or E status; 2015 IUCN Red List EX or CR status; or NatureServe G-rank GX, GH, or status.

IUCN Red List (2015)	IUCN Red List (1997)	NatureServe G-rank	CITES Appendix
EX (Extinct)	EX (Extinct)	GX (Extinct)	I
EW (Extinct in the Wild)	EX/E (Extinct/Endangered)	GH (Possibly Extinct)	
CR (Critically	E/V (Endangered/Vulnerable)	G1 (Critically Imperiled)	
EN (Endangered)	V (Vulnerable)	G2 (Imperiled)	
VU (Vulnerable)	R (Rare)	G3 (Vulnerable)	
NT (Near Threatened)	O (Out of Danger)	G4 (Apparently Secure)	II, III
LC (Least Concern)	NT (Not Threatened)	G5 (Secure)	
DD (Data Deficient)	I (Indeterminate)	GU (Unrankable)	
NE (Not Evaluated)	K (Insufficiently Known)	GNR (Unranked)	
	Q (No Information)	GNA (Not Applicable)	

Table 1. The conservation status lists and threat ranks used to identify "threatened" taxa for this assessment (blue text indicates "threatened" status). Threat ranks based on conservation data maintained in BGCI's PlantSearch database, provided by the 2015 IUCN Red List of Threatened Species (www.iucnredlist.org), the 1997 IUCN Red List of Threatened Plants (https://portals.iucn.org/library/node/7377), the 2015 NatureServe Conservation Status G-ranks (http://explorer.natureserve.ofg/ranking.htm) and the CITES Appendices (www.cites.org).

Provenance is an important factor for assessing the direct conservation potential of a living collection. Wild origin accessions hold greater conservation value than accessions of garden or unknown origin for a variety of reasons; and the more specific the wild origin data is, the better. For example, population- or geographic-based relationships can be investigated with documented wild origin plant material. Overall, 17% (1,176 accessions) of USBG's living collection are composed of wild (or indirect wild) origin accessions (Table 2). This falls between collections averages of 12% (Aplin, 2014) and 25% (Licht, 2010) wild origin accessions per collection. Of USBG's collections of conservation concern, only 223 accessions are of wild origin (Table 8; Figure 2). This represents only 3% of all USBG living accessions and 21% of all USBG accessions of threatened taxa.

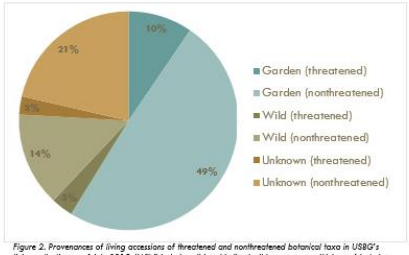


Figure 2. Provenances of living accessions of threatened and nonthreatened botanical taxa in USBG's living collection as of July 2015. "Wild" includes wild and indirect wild provenances. "Unknown" includes uncertain and unavailable provenances.

Appendices

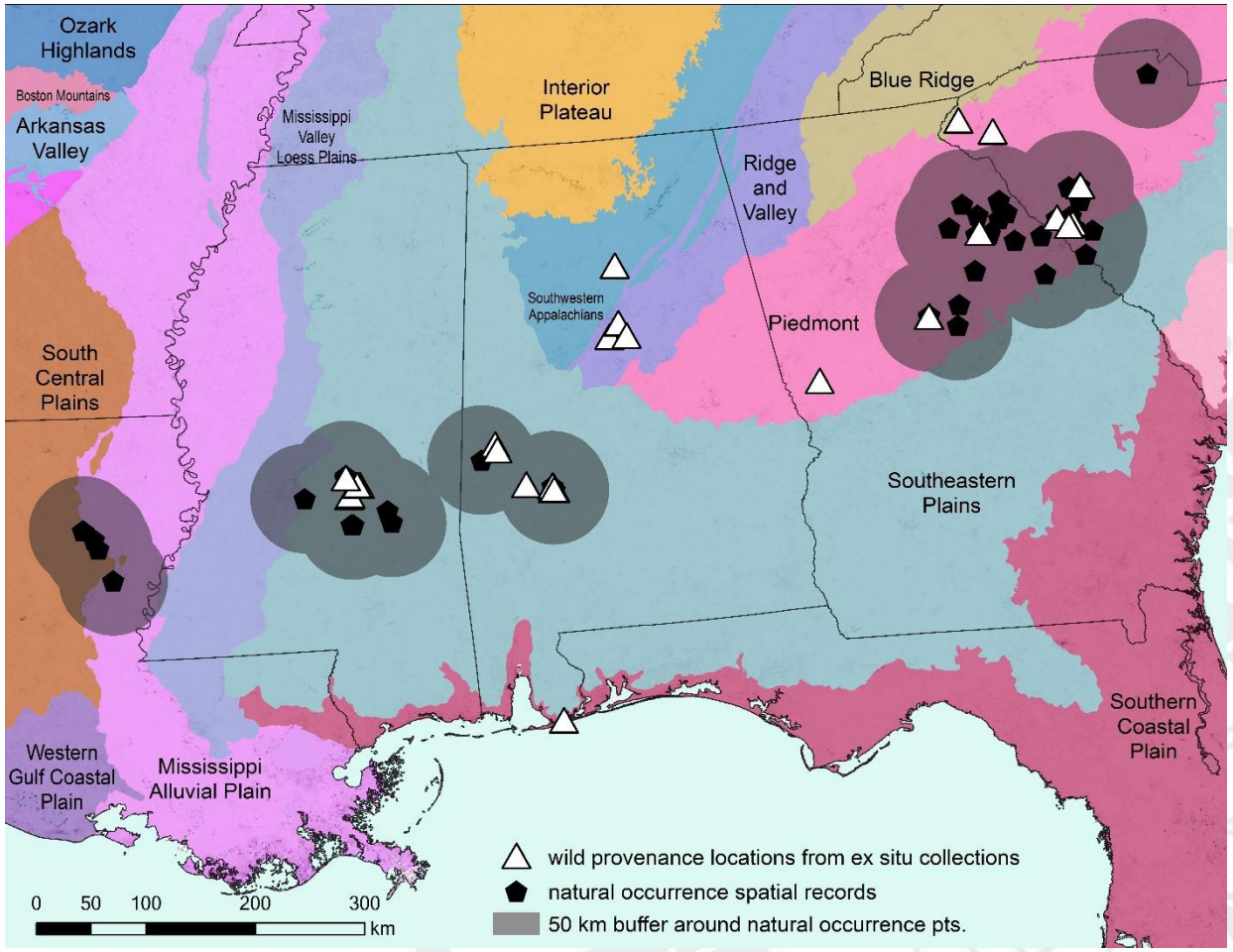
Appendix 1. Globally threatened taxa (484) in the United States Botanic Garden's living collection with associated data from PlantSearch and the United States Botanic Garden, with global threat status. Critical threat statuses and other notable characteristics in blue.

Threat ranks based on CITES Appendices, the 1997 IUCN Red List of Threatened Plants, the 2015 IUCN Red List of d the 2015 NatureServe Conservation Status G-ranks provided by BGCI's PlantSearch database. Locations' provided by BGCI's PlantSearch database as of September 2015. Taxonomic and on plant records data provided by USBG as of July 2015.

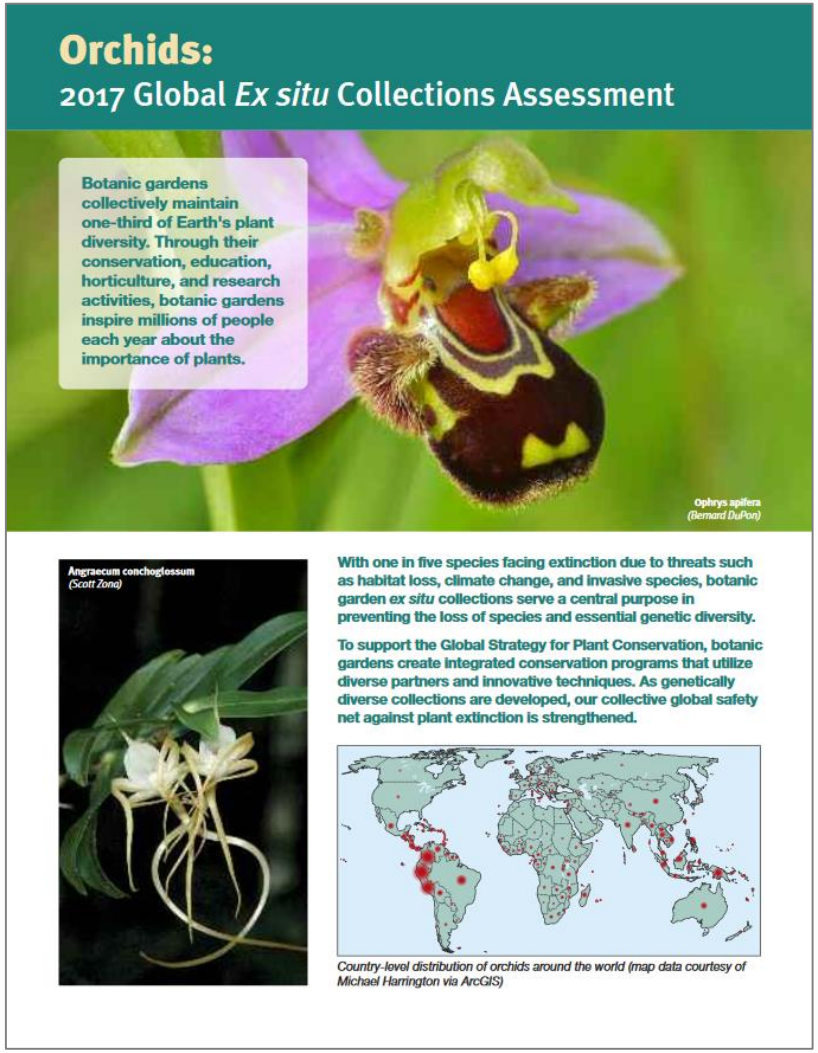
	Family	# PlantSearch Locations	CITES Appendix	1997 IUCN Red List	2015 IUCN Red List	NatureServe G-Rank	# Living Accessions	# Accessions of Wild Origin	# Living Plants
	OLEACEAE	116		Endangered			2		2
	MALVACEAE	18		Endangered	Critically Endangered	G1	1		1
	AMARANTHACEAE	3		Vulnerable	Vulnerable	G2	1		1
	ARECACEAE	15		Rare			3		3
	CRASSULACEAE	113		Rare			1		1
	CRASSULACEAE	57		Vulnerable			2		2
	ARAUCARIACEAE	23			Vulnerable		1		1
	ASPARAGACEAE	76		Vulnerable			1		1
	ASPARAGACEAE	67		Rare			1		1
	ASPARAGACEAE	31				G3	1		1
izpina	ASPARAGACEAE	23		Vulnerable		G3	1		1
	ASPARAGACEAE	142	II	Endangered			4		4
	ARECACEAE	30		Vulnerable			4		4
	DIDIEREACEAE	40	II	Rare			3		3
	ARACEAE	11			Critically Endangered		1		1
	XANTHORRHOEACEAE	29	I	Endangered			1		1
	XANTHORRHOEACEAE	14	II	Vulnerable			1		1
	XANTHORRHOEACEAE	69	I	Rare			1		1
	XANTHORRHOEACEAE	60	I	Endangered			1		1
	XANTHORRHOEACEAE	38	II		Critically Endangered		1		1
	XANTHORRHOEACEAE	22	II	Vulnerable			2		2
	XANTHORRHOEACEAE	26	II	Rare			1		1
	XANTHORRHOEACEAE	35	I	Endangered			1		1
	XANTHORRHOEACEAE	56	I	Endangered			2		2
	XANTHORRHOEACEAE	65	I	Rare			2		2
	XANTHORRHOEACEAE	25	II	Vulnerable			1		1
	XANTHORRHOEACEAE	46	I	Endangered	Critically Endangered		1		1
	AIZOACEAE	7		Rare			1		1
	ARACEAE	66		Vulnerable			12		12
	BIGNONIACEAE	7		Endangered			1		1
	APOCYNACEAE	65		Rare		G3	2		2
	APOCYNACEAE	8		Rare		G3	1		1
	APOCYNACEAE	11		Vulnerable			1		1
papyrasco	ANACAMPSEROTACEAE	1	II	Rare			2		2
	ORCHIDACEAE	52	II		Vulnerable		2		2
	ARACEAE	16		Vulnerable			2		2
	ARACEAE	3			Critically Endangered		19		19
	ARAUCARIACEAE	155		Vulnerable	Vulnerable		9		9
	PAPAVERACEAE	4				G2	2		2
	CACTACEAE	40	I	Endangered	Endangered		1		1
	CACTACEAE	44	I				1		1
	ARACEAE	70		Rare			1		1
	ASTERACEAE	6				G3	1	1	1
	ASTERACEAE	6		Vulnerable		G2	4		4
	ARISTOLOCHIACEAE	23			Vulnerable		1		1

Ex situ Genetic Diversity

U.S. Oak Conservation Gap Analysis



Global Orchid *Ex situ* Assessment



- **35% (272) orchid genera absent**
- **Highest diversity in U.S. and European collections**
- **36% of threatened orchids reported by *ex situ* collections**

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Institution	Country	Number of orchid species
Atlanta Botanical Garden	United States	1600+
Royal Botanic Gardens, Kew	United Kingdom	1300+
Smithsonian Gardens - Orchid Collection	United States	1050+
Marie Selby Botanical Gardens	United States	1000+
Gothenburg Botanical Garden	Sweden	900+
Jardin Botanique de Montréal	Canada	890+
Botanischer Garten der Philipps-Universität Marburg	Germany	880+
Hortus botanicus Leiden	Netherlands	870+
Glasgow Botanic Gardens	United Kingdom	750+
Huntington Botanical Gardens	United States	740+
Main Botanical Garden, Russian Academy of Sciences	Russia	610+
United States Botanic Garden	United States	600+
Wheeler Orchid Collection and Species Bank	United States	590+
Denver Botanic Gardens	United States	540+
Singapore Botanic Gardens	Singapore	500+
Botanic Garden Meise	Belgium	470+
Longwood Gardens	United States	470+
Jardin Botanique de la Ville de Lyon	France	450+
San Diego Zoo Botanical Gardens	United States	440+
Jardin des Plantes de Paris et Arboretum de Chevreloup	France	410+
University of California Botanical Garden at Berkeley	United States	390+

Top 20 most species-diverse orchid collections recorded in PlantSearch

**based on Govaerts, et al. (2016) orchid checklist and BGCI's PlantSearch database*

Discussion

- Who has assessed their collections?
- What groups/lenses did you use?
- What actions have resulted?

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BGCI

United States Botanic Garden

Connecting People • Sharing Knowledge • Saving Plants

Our Mission is to mobilise botanic gardens and engage partners in securing plant diversity for the well-being of people and the planet

BGCI-US headquarters at Chicago Botanic Gardens, Glencoe, Illinois
Staff also hosted at Huntington Library & Gardens, San Marino, California
www.bgci.org/usa

Plant Conservation and Biodiversity Benchmarking

American Public Gardens Association

BGCI
Plants for the Planet

Welcome: Abby Meyer | **Garden:** Association Member Garden

Click on the sections in each area below to enter garden data.

NOTE: All entries should be in US Dollars or US Measurements.

Download survey questions here | Download Getting Started Guide here | Watch Welcome Video here

Garden Overview

- ✓ Profile

Leadership & Governance

- ◌ Governance
- ✓ Financial
- ◌ Staffing

Ex situ Conservation Capacity

- ✓ Policy and Practices
- ✓ Genetic Diversity

In situ Conservation Capacity

- ◌ Policy and Practices

Research & Plant Conservation Expertise

- ◌ Research
- ◌ Expertise

Education & Communication

- ✓ School-Based Participation
- ✓ Non-School Participation
- ✓ Educational Content
- ✓ Communications

CARE FOR THE RARE

www.bgci.org/usa/CareForTheRare

- Free interpretation resources
- Create new signs using templates
- Use any of the 100+ species signs in the Sign Library

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CARE FOR THE RARE