

# Progress report on Target 8 of the Global Strategy for Plant Conservation in the United States



**“The functioning of the planet, and our survival, depends upon plants.”**

**Global Strategy for Plant Conservation,  
Convention on Biological Diversity**



**BGCI**

*Plants for the Planet*





*Cirsium pitcheri*; *Vulnerable* (NatureServe); in 4 U.S. collections (PlantSearch). (Chicago Botanic Garden)

## Conserving Botanical Diversity in the U.S.

The flora of the U.S. is composed of more than 25,000 native taxa, with roughly 1/3 now threatened with extinction due to habitat loss, invasive alien species, climate change, and overexploitation. Numerous approaches are being used to address these threats, including legislation and conservation activities carried out around the country. The United States is not unique in being confronted with these challenges. The loss of plant diversity is a global challenge, and to address it the United Nation’s Convention on Biological Diversity has adopted the Global Strategy for Plant Conservation (GSPC) ‘to halt the continuing loss of plant diversity’. The GSPC has 16 outcome-oriented targets for conservation with an updated deadline of 2020. Central to living botanical collections, Target 8 of the GSPC calls for ‘*At least 75% of threatened plant species in ex situ collections, preferably within the country of origin, and at least 20% available for recovery and restoration programmes*’.

## Living Botanical Collections and Conservation

Gardens and other living botanical collections (i.e., *ex situ* collections of seed banked or cryopreserved germplasm, as well as living plant collections) in the U.S. have the power to ensure that extinction isn’t an option by strategically building and using collections to support threatened species conservation. Many collections can *indirectly* support conservation by using threatened species to advance research, horticulture, and education. High quality, genetically diverse collections can also *directly* support conservation by providing seeds or plants needed to reintroduce extirpated or declining populations. Building collections to directly support reintroduction efforts requires a significant investment in time, expertise, and resources.

The potential conservation value of a collection will depend on multiple factors, including:

- The **type of plant material** curated (including seeds, explants, and living plants). In general, seed bank collections are best able to affordably secure genetically diverse material for direct conservation applications. However, seed banking is not possible for a number of species (including ‘exceptional species’), making explants and living plants the only viable option for high-value conservation collections.
- The **protocols used to acquire plant material**. For the greatest conservation impact, it is best to work with well-documented, first-generation, wild-collected material that has been sampled to capture broad genetic diversity. This includes maintaining a number of lineages and individuals per lineage, as well as backup collections in other locations.
- The **maintenance and accessibility of viable and genetically diverse plant material**. Without adequate curatorial and horticultural management, conservation value, and a collection itself, can be entirely lost. Information gathered in cultivation can also support conservation of a species. Making your data and collections accessible to the botanical, conservation, and research communities is also critical.

## Ex situ Plant Conservation Progress in the U.S

**APPROACH:** We utilized global threat ranks of U.S. native plants from NatureServe and collections data uploaded to BGCI’s PlantSearch database at the end of 2010 and 2013 to carry out this assessment. To provide a basic understanding of the potential conservation value of each collection, we grouped collections into two categories (Table 1): germplasm collections (seed bank, cryopreserved, and *in vitro* collections, assumed to have generally high direct conservation value), and living plant collections (with a wide range of conservation values possible).

Type of Collection	Number of Contributing Collections	
	2010	2013
U.S. Germplasm Collections	19	21 (11% ↑)
U.S. Living Plant Collections	156	220 (41% ↑)
U.S. Total	175	241 (38% ↑)

**Table 1: Number of U.S. collections uploaded to PlantSearch as of December 31, 2010 and November 19, 2013 by collection type (Germplasm Collections (seed bank, cryopreserved, and *in vitro* materials) and Living Plant Collections).**

*Arctostaphylos franciscana*; *Critically Imperiled* (NatureServe); in 1 U.S. living collection (PlantSearch). (David Kruse-Pickler, San Francisco Botanic Garden)



## RESULTS:

### More U.S. collections are uploading to PlantSearch more often

BGCI implemented an annual upload reminder email system in the U.S. in 2013, and a majority of collections included in this assessment have recently updated their plant lists to PlantSearch. PlantSearch also had a growth in the number of U.S. collections contributing data, rising 38% from 2010 to 2013 (Table 1). This means observed increases in threatened taxa held in collections may be due to a larger number of organizations reporting data, a larger number of organizations incorporating threatened taxa in their collections, or both.

### U.S. collections' incremental progress toward Target 8

In the three years since the 2010 Assessment, there has been a 2% increase (156 taxa) in the number of U.S. threatened plants known in U.S. collections (rising from 37% of known threatened plants held in 159 U.S. collections, to 39% in 216 collections; Table 2). Overall collections coverage is greatest for Critically Imperiled taxa (44% in 2010, 48% in 2013; Table 2).

### Conservation value of collections

We expect the direct conservation value (and genetic diversity) of each collection to be high for the 1,865 (9%; Table 2) threatened U.S. taxa known from germplasm collections in 2013. Many of these collections are held as seed banks, collected and curated as part of the USDA National Plant Germplasm System and the Center for Plant Conservation's National Collection of Endangered Plants. Collections made as part of these programs follow well-defined protocols to ensure they responsibly capture genetic diversity and are backed up at multiple locations to support long-term preservation and reintroduction uses.

The conservation value of the taxa known only from living collections (1,428 (17%; Table 2) threatened U.S. taxa) is less clear. Forty one percent (41%) of these are known only from one living collection (down slightly from 42% in 2010), suggesting that they have insufficient numbers and replication to capture genetic diversity. While some living collections are wild-collected and curated in sufficient numbers to support high genetic diversity, this is not likely the case for many living plant collections.

Type of Collection	Number Native 'Extinct' Taxa 202 total taxa		Number Native 'Critically Imperiled' Taxa 1,751 total taxa		Number Native 'Imperiled' Taxa 2,369 total taxa		Number Native 'Vulnerable' Taxa 4,127 total taxa		Total Threatened Native U.S. Taxa 8,449 total taxa	
	2010	2013	2010	2013	2010	2013	2010	2013	2010	2013
U.S. Germplasm Collections only	4% (4)	1% (4)	20% (18)	13% (18)	12% (18)	10% (19)	8% (18)	7% (20)	12% (18)	9% (20)
U.S. Living Plant Collections only	3% (54)	6% (71)	11% (94)	16% (128)	15% (118)	17% (156)	17% (139)	18% (184)	15% (141)	17% (196)
U.S. Germplasm and Living Collections	3%	5%	13%	19%	10%	12%	10%	11%	11%	13%
Total in all U.S. Collections	11% (58)	13% (75)	44% (113)	48% (146)	37% (136)	39% (175)	35% (157)	37% (204)	37% (159)	39% (216)

**Table 2: Percent of U.S. threatened native taxa held in U.S. collections (reported to PlantSearch in 2010 and 2013) per threat status (Extinct, Critically Imperiled, Imperiled, and Vulnerable, according to NatureServe 2010). Shown for taxa known in Germplasm Collections ONLY, Living Collections ONLY, Germplasm AND Living Collections, and ALL COLLECTIONS. Parentheses indicate the number of U.S. organizations reporting those taxa to PlantSearch.**

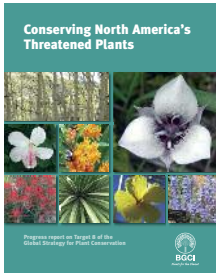


## Summary

Overall, the U.S. is still more than 3,000 taxa away from meeting the GSPC's Target 8 goal that 75% of threatened species will be conserved *ex situ* by 2020. In the past three years we observed an increase of only 156 threatened U.S. taxa (average of 52 taxa/year). In order to meet the 2020 goal, an average of 435 taxa EVERY YEAR for the next seven years must be added to *ex situ* collections. In addition to a focus on adding more taxa to collections, continued work is needed to ensure that genetically diverse and secure collections are in place for all taxa currently known from collections.

## Background

In 2010, BGCI US partnered with the United States Botanic Garden and the Arnold Arboretum of Harvard University to conduct the North American Collections Assessment to gauge progress toward the GSPC Target 8 for *ex situ* collections. This novel collections assessment found 39% of the nearly 10,000 threatened species in North America were present in 230 *ex situ* plant and seed collections in Canada, Mexico, and the United States in 2010 (See [www.bgci.org/usa/naca](http://www.bgci.org/usa/naca) for the full report).



This progress report was made possible by the United States Botanic Garden. We are also grateful to the 241 U.S. public gardens, seed banks, and other collections that contributed taxa lists to PlantSearch since 2010.

Assessments such as this would not be possible without the dedicated staff that support and share these collections.

*Hibiscus waimeae*; *Imperiled (NatureServe)*; in 9 U.S. living collections (*PlantSearch*). (*United States Botanic Garden*)



## Recommended Actions

- 1. Expand the capacity of living botanical collections to carry out integrated plant conservation.**  
Record your institution's conservation resources and expertise in BGCI's [GardenSearch database](#) and partner with other programs and collections to conserve threatened species.
- 2. Use existing networks to more effectively connect collections that are carrying out integrated plant conservation.**  
Connect with existing programs and networks that support integrated plant conservation such as the [Center for Plant Conservation](#) and the [National Plant Germplasm System](#).
- 3. Support development of living botanical collections to increase their direct conservation value.**  
Carefully build and curate your institution's collection to maximize the level of genetic diversity preserved while minimizing institutional costs (ex: the [Montgomery Botanical Center's collections stewardship guide](#)).
- 4. Share collections data to facilitate collaboration and conservation progress.**  
Tools like BGCI's [PlantSearch database](#) provide ways to prioritize and connect collections with the global botanical community, and support assessments of collective conservation progress.
- 5. Enhance data-sharing tools to facilitate collaboration and monitor progress.**  
Support and contribute to collaborative collections databases.
- 6. Improve information on the conservation status of threatened species.**  
Contribute to threatened species assessment by partnering on efforts to monitor and report on remaining wild populations.
- 7. Build genetically diverse, appropriate, secure, and viable collections.**  
Living plant collections are sometimes the only tool available for 'exceptional species' which cannot be seed banked. Use species-appropriate techniques to acquire, maintain, and curate collections with high, direct conservation value.
- 8. Ensure collections are able to advance research that supports integrated plant conservation.**  
Promote awareness and accessibility of *ex situ* collections across the botanical, conservation, and research communities.
- 9. Advance horticultural knowledge to support integrated plant conservation.**  
Collect and share knowledge about propagation and cultivation of threatened species (ex: the [Native Plant Network's Propagation Protocol Database](#)).
- 10. Fully utilize collections to support integrated plant conservation via education and outreach.**  
Provide information about the importance of plants, the need for their conservation, and the actions people can take to help preserve plant diversity. For example, the [Care for the Rare](#) program provides free threatened species interpretation resources and allows sharing of signs for any collection to use.

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Cover images: 1. *Castilleja levisecta* (Tom Kaye) 2. *Cirsium pitcheri* (Chicago Botanic Garden) 3. *Torreya taxifolia* (Michael Wenzel) 4. *Hibiscus waimeae* (United States Botanic Garden) 5. *Astragalus pycnostachyus* var. *lanosissimus* (Nicholas Jensen) 6. *Quercus georgiana* (Andrea Kramer) 7. *Arctostaphylos franciscana* (David Kruse-Pickler) 8. *Minuartia cumberlandensis* (Brian Jorg)