



The Botanical Gardens of
The Highlands Biological Station

Living Collections Policy

2020

This collections policy was approved by the responsible administrator,
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on 26 March, 2020

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Background

The Highlands Botanical Garden was established at the Highlands Biological Station (HBS) in 1962 as a refuge and natural habitat garden for the diverse flora of the Southern Appalachians and its unique communities. “From the beginning the philosophy was to showcase native plants in their natural habitat: the garden was to be a naturalist garden, developed within and among the natural assets of the site. And what natural assets: from the Old Growth acid cove forest of the Coker trail to lake edge, wetland, riparian areas, and upland woods, the 10+ acres of the garden site were teeming with native flora and fauna.”¹ The plant collection includes nearly 500 species of native mosses, ferns, wildflowers, shrubs, and trees. The Highlands Botanical Garden was designed to support the mission of the HBS to foster “research and education focused on the rich natural heritage of the Highlands Plateau, while preserving and celebrating the integrity of this biological crown of the southern Appalachian Mountains”.² The Highlands Botanical Garden has grown over the years to include native plant demonstration gardens of various themes located throughout the HBS campus, suggesting that the grounds now be referred to as the Botanical Gardens of the Highlands Biological Station (HBG). The plants exhibited within the HBG constitute a living collection that is managed and cared for through the efforts of HBS staff and garden volunteers, with support from the Highlands Biological Foundation (HBF).

Mission

The HBG features native plants presented in natural habitat gardens as a resource for public education and research. These gardens also serve as ecological preserves of native flora of the Highlands Plateau and the Southern Appalachian Mountains. The HBG also features numerous native plant demonstration gardens for the education and pleasure of visitors.

The Native Plant Natural Habitat Gardens center around the historic Botanical Garden as established circa 1962. They include the Wetland/Lake zone with a Fern Trail, Lower Lake Trail, and Upper Lake Trail; the Old Growth Forest zone with the Coker Rhododendron Trail; and the Woodland zone with the Foreman Trail, Falls Trail, Mary’s Garden, Lower Woodland Trail, and Upper Woodland

The Native Plant Demonstration Gardens include planting beds among the buildings and special gardens on a range of themes found throughout the “developed” part of the HBS campus.¹ Garden areas outside of the Native Plant Natural Habitat Gardens are considered part of the Native Plant Demonstration Gardens for the purposes of this policy. These include but are not limited to the gardens around the Nature Center, Duplexes, Cottages, Administration Building, Coker Laboratory, and Weyman Building; the Rock Outcrop, Plants of the Cherokee, Moss, Butterfly, and Illges Overlook garden; and the Azalea, Amphitheater and Woodland Way gardens.

Purpose of Policy

The purpose of the Living Collections Policy (Policy) is to guide the acquisition and curation of plants of the HBG. It ensures that the plant collections remain relevant to the mission of HBS and the intent of the HBG. The Policy enumerates priorities for the collections in order to guide decisions about the acquisition, accessioning, recordkeeping, deaccessioning, and management of living plant materials.

The Policy provides a thoughtful and deliberate rationale for increasing the overall value of the plant collections and maintaining the health of each individual specimen. The Policy also provides transparency about how accessioning and deaccessioning decisions are made. It is recognized that a policy is key to realizing the full potential of the HBG in furthering the mission of the HBS related to research, education, and conservation.

Policy Goals

- To define the realm of the Highlands Plateau and peripheral areas for the purpose of describing the environmental and geographical context for the HBG.
- To protect the inherent value and significance of the HBG plant collection and do no harm.
- To maintain a plant collection that is representative of the diverse flora and communities of the Highlands Plateau and includes as many of the species found naturally on the Plateau as possible given the conditions present at HBS.
- To present specimens in the plant collection in natural, creative, and sustainably managed settings.
- To regularly evaluate the HBG plant collection to determine if it meets the mission, and to identify additional needs and deficiencies.
- To maintain an up-to-date plant records system comprised of an inventory and map database of the plant collections.
- To regularly evaluate the health and viability of the plant collection.

Acquisition of Plants

Plants shall be acquired for the HBG under the guidance of the HBS Director, Horticulturist, and HBF Botanical Garden Committee through purchases, permitted collecting, exchanges with other botanical gardens and conservation organizations, and gifts using the following criteria and considerations (see also Appendix A):

Criteria

1. Specimens acquired for the Native Plant Natural Habitat Gardens should be plants native to the southern Blue Ridge Physiographic Province.³ The focus will be on plants native to elevation zones above 3000 feet.
2. Specimens acquired for the Native Plant Demonstration Gardens should be plants native to the regions of the United States east of the Mississippi River.
3. Plants acquired for the HBG must be compatible with HBS in terms of cultural care and space requirements, and staff capacity and capability.

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4. Plants should not be acquired or accepted if the species cannot be identified, significance of placement and use cannot be designated, proper collecting technique cannot be assured, and future care cannot be maintained without undue challenges to staff.

Endemics of the Highlands Plateau

The HBG places a strong emphasis on species considered naturally occurring in the immediate geographical area of the Highlands Plateau. However, there are also several species that are considered “endemic” or unique to the Highlands Plateau. One of the goals for the HBG is to feature as many of the plants considered endemic to the Highlands Plateau as possible in the Living Collection. The Highlands Plateau endemics (some of which we have*) include:

- Single-sorus spleenwort (*Asplenium monanthes*)
- Stiff sedge (*Carex biltmoreana*)
- Appalachian avens (*Geum radiatum*)
- Mountain heartleaf (*Hexastylis contracta*)
- North Fork heartleaf (*Hexastylis rhombiformis*)
- Roan Mountain bluet (*Houstonia montana*)
- Buckley’s St. John’s wort (*Hypericum buckleyi*)*
- Piedmont ragwort (*Packera millefolia*)
- Hartwig’s locust (*Robinia hartwigii*)*
- Rugel’s Indian plantain (*Rugelia nudicaulis*)
- Purple veined Montana pitcher plant (*Sarracenia purpurea* ssp. *montana*)
- White irisette (*Sisyrinchium dichotomum*)
- Clustered goldendrod (*Solidago glomerata*)*
- Blue Ridge goldenrod (*Solidago spithamaea*)
- Mountain Sweet or Jones’ pitcher plant (*Sarracenia jonesii*)*
- Pale trillium (*Trillium discolor*)*
- Persistent wakerobin (*Trillium persistens*)
- Carolina rhododendron (*Rhododendron carolinianum*)*
- Silverleaf hydrangea (*Hydrangea radiata*)*
- Hill cane (*Arundinaria appalachiana*)
- Appalachian violet (*Viola appalachiensis*)
- Pink-shell Azalea (*Rhododendron vaseyi*)*

Rare and Endangered Species

HBS is committed to observing all Federal and State laws and regulations regarding rare and protected plant species. HBS will not knowingly purchase or accept any plant material the origin of which is in doubt or is of concern. Rare and endangered plants may be considered for acquisition when written legal permission has been granted by the appropriate authority.

Currently, there are several rare and endangered plant species located within the Highlands Botanical Gardens.⁴ These include, but are not limited to:

- Pirate-bush (*Buckleya distichophylla*)
- Cuthbert’s Turtlehead (*Chelone cuthbertii*)

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- Bleeding-heart (*Dicentra eximia*)
 - Queen-of-the-Prairie (*Filipendula rubra*)
 - Large witch-alder (*Fothergilla major*)
 - Swamp pink (*Helonias bullata*)
 - Goldenseal (*Hydrastis canadensis*)
 - Twinleaf (*Jeffersonia diphylla*)
 - Sheep-laurel (*Kalmia angustifolia*)
 - Gray's lily (*Lilium grayi*)
 - Fraser's Loosestrife (*Lysimachia fraseri*)
 - Alleghany Spurge (*Pachysandra procumbens*)
 - Jacob's-ladder (*Polemonium reptans*)
 - Shooting-star (*Primula meadia*)
 - Cumberland Azalea (*Rhododendron cumberlandense*)
 - Oconee bells (*Shortia galacifolia*)
 - Northern cup-plant (*Silphium perfoliatum*)
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- Pink-root (*Spigelia marilandica*)
 - Virginia spiraea (*Spiraea virginiana*)
 - Mountain- camellia (*Stewartia ovata*)
 - Cranberry (*Vaccinium macrocarpon*)

Nursery Acquisition

Native plants will be acquired only from sources known to use nursery propagation techniques and that can guarantee proper species identification. Plants acquired from nurseries should be inspected before purchase for health and to confirm species identification as far as possible.

Cultivars

Nurseries sell a wide range of plants that have been selected from the wild or horticulturally modified for special qualities or characteristics such as a better flower color, habit, foliage color, etc. These variations of native plant species are referred to as cultivars (a botanically accepted term, or more recently by some researchers – though not universally or officially accepted - as “nativars”). Cultivars may be very different from what is normally seen in the wild and may not support wildlife or interact with naturally-occurring species in habitats as the native species might. Cultivars are not suitable for the Native Plant Natural Habitat Gardens. Cultivars that are relatively little changed from the wild that may have been propagated for one or two desirable traits, such as improved flower color, dwarf habit, or disease resistance, may be considered suitable for the Native Plant Demonstration Gardens. Examples of cultivars that would behave and interact with other species in a way that is similar to wild specimens of the same species include *Phlox* 'Jeana,' *Monarda* 'Jacob Cline,' *Echinacea tennesseensis* 'Rocky Top,' *Wisteria* 'Amethyst Falls,' to name just a very few.

Hybrids

Hybrids are plants resulting from crosses between two (or more) species. There are many wild hybrids. Many, many hybrids are man-made involving wild material, some going back 200 years.

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Sometimes hybrids can be attractive and useful in the garden (e.g. wild cross between *Monarda didyma* and *M. clinpodia*, called *Monarda xhybrida*; wild cross between *Sarracenia jonesii* and *S. purpurea*). Other common and useful garden hybrids include native azaleas and rhododendrons. In general, man-made hybrids would rarely have a place in the HBG.

Gifts

Gifts to the HBG plant collections will be accepted if they are consistent with this Policy. Decisions to accept gifts are made at the discretion of the HBS Director and Horticulturist.

Accessioning

Accessioning is the formal process by which a plant becomes a part of the permanent collection and included in formal HBG plant records system. Currently the records system is merely an informal inventory, with no special numbering or reference to herbarium voucher material.

Criteria

1. Plants in the Native Plant Natural Habitat Gardens should be accessioned soon after acquisition and inclusion in the permanent collection. All plants in the Native Plant Natural Habitat Gardens should be accessioned.
2. Plants in the Native Plant Demonstration Gardens should not be accessioned and should not be considered part of the permanent collection. Documentation of these plants is desirable through the preparation and maintenance of garden area base maps and plant lists and inventory.

Deaccessioning

The process of deaccessioning documents the loss or removal of individual specimens from the permanent collection and plant records system.

Criteria

Plants may be deaccessioned if they meet one or more of the following criteria:

1. When plants are dead, or are dying, in poor health, or damaged beyond reasonable recovery and recommended for removal;
2. When plants are no longer appropriate to the scope of the collection;
3. When plants are found to be missing from the HBG due to theft or other loss and cannot be replaced;
4. When plants have become aggressive or invasive or otherwise threaten the collection or surrounding landscape or local area;
5. When plants harbors a disease or pathogen that is likely to spread to other accessions in the collection and should be destroyed;
6. When plants pose a threat or are potentially hazardous to persons on the property;
7. When the plant is determined not to be true to name and the correct identity cannot be determined;

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8. When plants are in surplus (i.e. there are at least two other healthy plants of the same species found in the collection and the specimen in question would be best replaced);
9. When plantings become crowded or encroach upon landscape design elements such as open spaces or vistas.

Endangered species can be deaccessioned only if they are stolen, have died, or have been safely established at a similar facility.

Dedicated Specimens

Dedicated specimens are those plants that honor a person, group, or event. Any dedicated specimen that is deaccessioned before the end of its natural life span should be replaced with an appropriate new planting, or the dedication reassigned to a plant in another location.

Disposal of Deaccessioned Plant Material

The means of disposal of living deaccessioned plant material, i.e. surplus plants, should be approved by the HBS Director and Horticulturist. Whenever possible, disposition of healthy deaccessioned plants should be directed to appropriate recipients, such as the following (in priority order):

1. Partner botanical and conservation institutions
2. Garden supporters [volunteers, donors, and other friends of the HBS]
3. HBS staff
4. Fund raising endeavors

Plant Records

The HBS is committed to keeping up-to-date, well-maintained, and relevant plant records. The HBS Horticulturist is responsible for overseeing the maintenance of accurate plants records, involving volunteers and interns as needed in the process.

Accession Records

The following information shall be kept in perpetuity on all accessions within the permanent collection:

- Botanical names (genus and species, etc.)
- Accession number
- Date of accession
- Size of colony or group
- Location in HBG
- Source or provenance
- Any information related to status as a dedicated specimen
- Herbarium voucher

Deaccession Records

The following information shall be kept in perpetuity on all deaccession from the permanent collection:

- Date of deaccession
- Reason for deaccessioning
- Method of disposal

Plant Identification

All plants need to be correctly named in the plant records and labeled as accurately as possible for visitor edification and HBG staff and volunteer information. It should not be assumed that accessioned plants in the collection, and those acquired for the collection in the future, will be correctly named or identified at any given time. Scientific names as well as common names can change as nomenclature is regularly being updated based on ongoing plant taxonomic studies. Verification of specimen identity can be one of the most important functions of the staff engaged in managing a botanical garden. Outside taxonomists, botanists, and other specialists should be consulted as necessary to ensure proper plant identification and records. Perhaps periodically, say every 10 years, a specialist should be engaged to “verify the collection,” and prepare a report; that is, to check the specimens, at least critical ones, for accuracy of identification and labelling, independent of the HBS staff.

As of 2020, the standard taxonomic reference for plant nomenclature to be used in the HBG is Weakly, Alan S. *Flora of the Carolinas, Virginia, and Georgia and Surrounding Areas*. Chapel Hill, North Carolina: UNC Herbarium, North Carolina Botanical Garden, University of North Carolina at Chapel Hill, May 2015. Available on-line at <http://www.herbarium.unc.edu/flora.htm>

Labels

Plants in both the Native Plant Natural Habitat Gardens and the Native Plant Demonstration Gardens should be labeled for the benefit of the public with consideration paid to avoiding a preponderance of signs. The plant labels should be modest in size and low to the ground to avoid overshadowing the plants.

Plant labels should at least include:

- Common name
- Scientific name
- Family name

Rare plants, however, should be carefully sited to prevent theft or damage, and only labelled after careful consideration. Otherwise, rare and other special plants should be marked with modest, inconspicuously placed, indelible labels for staff reference. Options for these labels include pencil-written virgin vinyl plant tags in the ground and/or metal tags attached to a small metal stake.

Herbarium Specimens

Plants in the permanent collection should also be represented in the herbarium. Inclusion in the herbarium serves various purposes, including association with botanical verification of species identification, location and relocation of specimens in the garden, and future research opportunities. Herbarium labels should include locational data where the specimen was planted in the gardens. This can be an onerous task for any staff person with many tasks of daily maintenance to perform. It has obviously not been done historically at HBS with any degree of consistency. Actual degree of compliance with this aspect of the policy will need to be considered.

Collections Evaluation and Inventory

Horticultural evaluations provide for the continual review of the permanent collection and its relevance to the HBS mission. Collections inventory involves plant record and map location updating. Collections evaluation and inventory updating of the permanent collection should be conducted at regular intervals and are the responsibility of the HBS Horticulturist. Botanical experts should be consulted as necessary.

Collections Evaluation

Field evaluations of the permanent collections should also be conducted at regular intervals. Field evaluations can be used to determine the relevance of a plant or plant collection to the HBG mission and to ascertain the performance of the plant material. In addition, recommendations can be made during an evaluation regarding maintenance, plant acquisition, and deaccessioning. The collections [ideally each important plant] should be evaluated at intervals not exceeding three years.

A collections evaluation may explore one or more of the following questions:

- Is the plant properly identified and is the correct public label associated with it?
- Is the plant/plant collection relevant to the mission of the HBG?
- Is the plant an outstanding specimen?
- Is the plant rare, endangered, unusual, or otherwise notable?
- Is the plant/plant collection of historical value?
- Can the plant/plant collection be properly maintained with the current staff and resources?
- Is the plant/plant collection in good health and representative of its natural state or part of the habitat being represented?
- Does the plant need specific treatment or maintenance?
- Is it located in the proper location within the HBG with regard to specific growing conditions?
- Is there sufficient space to allow for appropriate maintenance in the future?

Collections Inventory

Because living collections do change over time, with undocumented additions and deletions, deaths, voluntary spreading of new seedlings, hybrids appearing, aggressive species

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encroaching, collections should be verified regularly – this means the inventory list should be compared to the actual specimens in the living collection.

A collections inventory should address the following questions:

- Are the records concerning the plant collection in proper order?
- Is the plant labeled properly?
- Is the specimen in its proper GPS location?

Appendix A - Additional Considerations for Acquisition of Plants

General conditions

1) The Highlands Plateau (HP) has a unique climate: a high average elevation of 4118 feet above mean sea level with high rainfall and cool night temperatures [straddles hardiness Zones 5 (-20 deg. F) and 6 (-10 deg. F)] making it possible to grow northern or high mountain species in the South, *a unique opportunity not found at another southern botanical garden.*

2) The HP has a range of soils, varying from acidic soil supporting ericaceous species to circumneutral soils (pH 6.5-6.8) found in rich cove hardwoods. There is also a diversity of terrain with variable elevations and aspects.

3) The HP also has a mild climate, tempered by warm Gulf air making it possible to grow some species from the deep south.

4) Consideration should be paid to the fact that southern species can be moved northward and generally develop cold hardiness, while northern plants cannot generally be moved southwards as they rarely develop heat tolerance.

5) Consideration should also be paid to the role of plants that do not exhibit showiness. While HBG features many showy species that can be valuable as garden specimens, less showy species should still be grown for their botanical interest.

6) Many native species, even those that are found on the HP, can be aggressive or “invasive” in certain conditions. Examples include hay-scented fern, aquatic sedges, gamma grass, cup plant, horse nettle, Canada goldenrod, and bush St. Johnswort. Keeping these aggressive natives in bounds will remain a maintenance challenge, and every effort should be made to carefully monitor all species introduced to the HBG for aggressiveness. Some species may defy eradication and simply be tolerated and kept under control by periodic pruning. In the wild, species are either clumpers or creepers, and are usually in competition with other species to arrive at a balance. In a garden most of the pressures of nature are limited and plants often over-react. Species planted in the gardens need to be evaluated in terms of growth patterns and behavior so that they can be properly managed.

Specific criteria

7) The HBG might include plants that are typically found in disparate regions of North America due to the unusual nature of the HP in terms of elevation and rainfall. Some plants have been included in the gardens for experimental reasons, such as the far northern dwarf cornel or bunchberry (*Cornus canadensis*) because of its popularity and relationship to other members of dogwood genus found on the HP. Bunchberry does not otherwise survive in the south. Other examples of plants that can be grown in the gardens but are generally not found in the region include bearberry (*Arctostaphylos uva-ursi*), ostrich fern (*Matteuccia struthiopteris*), and rhodora (*Rhododendron canadense*).

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8) The HBG might include species that are rare, common, or widespread on the HP but also might be found more commonly throughout a much wider region. Examples include large fothergilla (*Fothergilla major*) and yellowwood (*Cladrastis kentuckeya*).

9) The HBG might include species found outside of the HP but that are related to a characteristic HP species. These could be grown for comparison. Examples include sessile-flowered trilliums from the deep south, such as *Trillium maculatum*, which is related to *T. cuneatum*.

10) The HBG might include species not found on the HP that would be useful for teaching purposes. Examples include the various forms of goldenrod, painted buckeye (*Aesculus sylvatica*), red buckeye (*Aesculus pavia*), and swamp sunflower (*Helianthus angustifolius*).

11) The HBG might include species of ancient distribution now extinct in the HP region, but that could grow well in HP and would be a worthwhile ornamental and botanical species. Examples include Florida torreya (*Torreya taxifolia*), California redwood (*Sequoia sempervirens*), and northern larch (*Larix laricina*).

12) The HBG might include species not found on the HP but are related to HP species, and could be useful non-invasive ornamental specimens for the high elevation garden. Examples might include pond cypress (*Taxodium ascendens*), balsam fir (*Abies balsamea*), Alabama croton (*Croton alabamensis*), Alabama snow wreath (*Neviusia alabamensis*), Southern wood fern (*Dryopteris ludoviciana*), and other northern *Dryopteris* ferns, Large-flowered evening primrose (*Oenothera grandiflora*), and many more.

14) The HBG might include species not found on the HP but are characteristic of a habitat and are established and used as an example of an adaptation to that habitat. Examples include bog species such as bog rosemary (*Rhododendron polifolia*), Labrador-tea (*R. groenlandicum*), outcrop onion (*Allium keeverae*) from the Piedmont of North Carolina, the yellow pitcher plant (*Sarracenia flava*) from Statesville bogs mostly now extinct, rock outcrop species, or pollinator garden candidates.

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