Plant Collections Policy
Connecticut College Arboretum

Mary Villa, Curator/Information Resource Manager
Glenn Dreyer, Director

Table of Contents

Introduction

Purpose of Policy

This Policy serves to guide and limit what plant material the Connecticut College Arboretum collects and displays. It insures that the plant collections are supportive, meaningful and relevant to the Arboretum mission. This document is designed to provide direction to those responsible for the planning, development, management and maintenance of the plant collections.

This Collections Policy addresses the following issues: the Mission Statement, the purpose of the plant collections, plant acquisition, plant records, accessioning, collections evaluation, collections inventory, maintenance of collections, deaccessioning and disposal of plant material.

Implementation and Review of Policy

Recommendations for revision and timely review of this Collections Policy shall be the responsibility of the Director of the Arboretum. The Director shall be responsible for the administration of the Policy and the implementation of the Policy will be the responsibility of the staff. Any revisions to the Collections Policy shall be presented to and approved by the Plant Collections Committee.

CONNECTICUT COLLLEGE ARBORETUM MISSION STATEMENT

The Connecticut College Arboretum is owned by Connecticut College and operated for the benefit of the College and the community. The Arboretum functions in support of the College's mission by helping to prepare men and women for a lifetime of learning about and interacting with the natural world. The mission of the Connecticut College Arboretum is:

TEACHING—To provide an outdoor laboratory for use by faculty and students in Botany, Biology, Environmental Studies and other departments. In both teaching and research the Arboretum is a unique and valuable academic resource and support facility.

RESEARCH—To support and conduct research in a broad range of subjects including ecology, field biology, conservation and natural history. Arboretum research emphasizes long-term studies.

CONSERVATION—To provide stewardship of College lands by protecting, sustaining and enhancing biological diversity of large tracts of open-space. The Arboretum also provides leadership statewide and beyond in conservation matters.

COLLECTIONS—To maintain, develop and interpret well-documented plant collections for teaching, research, public education and enjoyment.

RECREATION—To provide a place where people from the College and the community may enjoy passive recreation and where they may come to learn, reflect and renew themselves through contact with the natural world. The Arboretum enhances the quality of life both for the College and the citizens of Southeastern Connecticut.

PUBLIC EDUCATION—To provide programs and publications about conservation, horticulture, gardening, botany and natural history which enhance people's understanding of the natural world and foster an understanding of the Arboretum's mission.

Endorsed by the Executive Committee, Connecticut College Board of Trustees in January, 1990.

Purpose and Scope of the Plant Collections at Connecticut College

An important aspect of the Arboretum's Mission is to maintain, develop and interpret its plant collections for college teaching and research, as well as public education and enjoyment. In accordance with the Mission, the primary purpose of the plant collections is to provide a setting for people to learn about plants and their associated biological communities. Other specific purposes are related to the particular collections of the Arboretum which include: the Caroline Black Garden, the Campus Landscape and the Native Plant Collection.

The plant collections contain approximately 6,167 scientifically documented trees and shrubs of over 750 taxa from around the world. Information about the collections is disseminated through publication in paper and digital form, as well as labeling, tours, lectures, and seminars.

The Caroline Black Garden

The purpose of this plant collection is to assemble and display, in a pleasantly designed setting, select woody species and cultivars from around the world which are desirable and suitable for landscaping in southern New England. In addition, it provides examples of mature landscape plants and suggests possible arrangements of plants for a designed landscape. It is located east of Mohegan Avenue between Emily Abby House and Vinal Cottage.

The Campus Landscape

Although lands designated as Arboretum originally surrounded, but did not include the main campus, since 1996 all Connecticut College property has been considered part of the Arboretum. The Campus Landscape, for the purpose of this policy, is the area of Connecticut College bounded by Williams St., Benham Ave., Mohegan Ave., and the Lyman Allen Museum. This area contains the college's best examples of trees, many of which are mature and in excellent condition.

There are no restrictions on taxa which may be grown and displayed on campus. However, the appropriate choice of plants and how they are used in landscape design are of great importance. Due to the purpose and use of the campus, there are limitations with regard to plantings which need to be considered, such as: vehicular and pedestrian flow, parking, safety, and its academic, athletic, and recreational uses.

Because of the amount of available space and the need for renovation of aging plantings, the Campus Landscape has potential for the development of endowed

gardens. Special collections could be created based on plant taxa (e.g. Maples, Birches, etc.) or geographical regions (Asian Collection, "Near East", etc.).

The Native Plant Collection

The Native Plant Collection is devoted to native woody plants of Eastern North America, and it is a source for training students, and for the enjoyment of the general public. This collection is displayed in approximately 25 acres west of Williams Street and south of Gallows Lane. The focus of this collection is to assemble only those trees, shrubs, and woody vines that are native to eastern North America which can be grown successfully in southeastern Connecticut. Herbaceous plants are of secondary importance and are not accessioned.

The Native Plant Collection is an educational tool which serves to:

- provide an outdoor, living laboratory for teaching and research
- highlight the beauty and diversity of our native flora
- provide examples of ways to landscape with native plants
- promote environmentally sound landscape management
- acquaint people with native plant identification
- promote the conservation and protection of our native flora

Non-collection Arboretum Lands

Natural Areas. The Arboretum landscape contains several natural areas representative of New England vegetation. The goal in designated Natural Areas is to minimize human influence on natural processes, and to promote observational research and passive recreation. Generally, these areas are maintained through natural regeneration of the present vegetation; however intervention may occur under certain circumstances (e.g., restoration following major disturbance; exotic species invasions).

Managed Areas. The Arboretum also provides stewardship of college lands that exist in an undeveloped, wild or lightly managed state, and are neither Natural Areas, nor Plant Collections. These areas are available for more manipulative types of research and demonstration projects including controlled burning, mowing, herbicide use and forestry practices.

Plants in Arboretum non-collection lands are not individually accessioned or inventoried and are therefore not subject to plant collection policies.

Authority over Collections

Planning for and authority over the Plant Collections are the responsibility of the Director in consultation with the Plant Collections Committee composed of the

Arboretum Curator, Arboretum Horticulturist and Campus Grounds Supervisor, as informed by the guidelines in this document. Review and update of the collections is a continual process. The Plant Collections Committee conducts reviews as necessary of the sections of the Arboretum, during which goals are set. The Curator, Campus Grounds Supervisor and the Horticulturist are responsible for implementing these goals. Priorities are informed by the Living Collections Policy.

Acquisition of Plants

Plants shall be acquired by Arboretum staff under the guidance of the Director through collecting activities in the field, on-site garden projects, exchanges with other institutions and individuals, and purchases. Acquisitions shall comply with the selection criteria described in the Purposes and Scope section of this Policy. Plants obtained shall be relevant to the specific collection for which the taxon is intended. A list of *desiderata,* prepared by the Plant Collections Committee to fill obvious deficiencies within present holdings while looking ahead 25-50 years to determine what is needed to preserve the future integrity of the collections, should be consulted.

Acquisition of Plant Material

Acquisition of plants for the Arboretum collections should comply with all of the following criteria:

1.) Plants should only be acquired if their maintenance and care can be assured with regard to space, staff time, water, etc

2.) Taxa should be able to grow under reasonable cultural practices. For practical reasons, this means that all specimens should be able to withstand occasional dry conditions and a temperature range between -15^0 F and 105^0 F.

3.) Specimens acquired for the Native Plant Collection must be indigenous to eastern North America, and should be of known wild origin whenever possible.

4.) Plant material may be acquired from botanical institutions, field collectors, reputable commercial sources, or as gifts.

5.) An acquisition shall have no known objectionable characteristics (e.g. invasiveness, smell, etc.) according to the judgment of the professional staff.

Cultivars

The Arboretum places a strong emphasis on species, especially for the Native Plant Collection. Some selected cultivars of native plants, which are of especial interest, have been, and may continue to be included in this collection. Moreover, well chosen and evaluated cultivars are appropriate for both the Caroline Black Garden and the Campus Landscape collections.

Rare and Endangered Taxa

The Connecticut College Arboretum is committed to observing all Federal and State laws and regulations regarding rare and protected taxa. The Arboretum will not knowingly purchase or accept any plant material in which its origin is in doubt, or is of concern.

Endangered or rare taxa may be considered for acquisition when written legal permission has been granted by an appropriate authority. Whenever possible, the Connecticut College Arboretum shall cooperate with government and private agencies to promote the protection and survival of rare and endangered taxa through educational programs, propagation, publications, field work, and plant exchange programs.

Gifts

Gifts are the unconditional transfer of ownership of plants between the Connecticut College Arboretum and other institutions or individuals. Gifts to the Arboretum's Plant Collections are accepted with the express intent of augmenting the collection and must be consistent with this Policy. Decisions relating to accepting gifts are made at the discretion of the Arboretum Director.

Gifts of plant material or money for a collection must include a sufficient endowment to allow for general and curatorial maintenance. Endowed collections will be named in consultation with the donor. Endowments will also allow for replacement of plant material, proper labeling and interpretation and/or any needed restoration of a named collection.

The Connecticut College Arboretum reserves all rights to the control, display and ultimate disposition of gifts that it receives. Memorial gifts are subject to the College's Physical Memorials Policy.

Recommendations for and Approval of Acquisitions

Administrative personnel, staff, volunteers and other interested parties may initiate recommendations for acquisitions to the collections. Final approval of acquisitions is the responsibility of the Arboretum Director. Acquisition of herbaceous plants will be approved by the Arboretum Director and the Horticulturist responsible for their care.

Plant Records

The Connecticut College Arboretum is committed to up-to-date, well-maintained, and relevant plant records. Accessioning is the formal process by which a plant becomes a permanent part of the collections and, more specifically, a part of the records.

Accessioning Criteria

Woody plant material of all types shall be accessioned soon after acquisition. Normally, plants obtained for temporary educational use, research purposes, member dividends, or resale, as well as any herbaceous plants, shall not be accessioned. Any specimens existing in a collection that have not been previously accessioned, and which enrich the overall collections, shall be accessioned.

Minimum Information Required

The following information shall be kept on all accessions within the plant collections of the Arboretum:

Accession Records

- Botanical name (cite author and reference)
- Common name
- Date of acquisition
- Source of material
- Accession number
- Date of accession
- Size and condition of specimen
- Location / Purpose

Deaccession Records

- Date of deaccession
- Reason for deaccessioning
- Means of disposition

Mapping Records

Collection area maps are critical to the inventory and for location control of plants within the collections. The Connecticut College Arboretum has developed coordinate-based maps using a map-making software called Geographic Information System (GIS). These maps rely on fixed, real-world orientations associated with State and Federal authoritative mapping agencies. Aerial photographs and Global

Positioning System (GPS) technology are used to map the location of prominent features in the collections. These cartographic files are composed of hard-copy and electronic maps. An assessment of map accuracy will be an ongoing process and shall be performed by the Arboretum Curator.

Collection area maps and field inventory records shall be kept for all collections, as outlined in the Collections Inventory Protocol *(See Appendix II)*.

Additional Records (where appropriate)

- Evaluation records
- Propagation records
- Information on rare and endangered accessions
- Provenance information
- Label records
- Gift records

Other relevant information concerning a specific accession will be kept as is needed, or by request of the Arboretum Director.

Responsibility of Plant Record Maintenance

The Curator is responsible for the accuracy and timely updating of the plant record system with pertinent information regarding the plant collections, as outlined in this Policy. Administration and oversight of the plant records system is the responsibility of the Arboretum Director. Taxonomic questions should be addressed to the Arboretum Director, the Curator, or a knowledgeable member of the Botany Department.

Plant Identification and Verification

For reference and research purposes all plants need to be correctly named if they are to have any value beyond the collection in which they are grown. One should not assume that all plant material comes into the collection correctly named or that it is correctly identified even after it has been accessioned and studied.

A verification program assures that the nomenclature attached to our plants is as accurate as can possibly be determined. Verification is essential for the Connecticut College Arboretum to maintain credibility as a scientific and horticultural institution. Verification involves checking that a previous identification is correct or assigning a name to an unnamed accession. Checking the name involves two procedures:

- Identification, which is the determination of a plant as being identical with or similar to a particular taxon. This procedure uses taxonomic experts, taxonomic reference books such as floras and monographs and other scientific material such as accurately named herbarium specimens or living plants.
- Nomenclature, which is concerned with the determination of the correct scientific

name of a known plant. This naming is regulated by internationally accepted rules laid down by the "International Code of Botanical Nomenclature," published by the International Botanical Congress.

Collections Evaluation and Inventory

Horticultural evaluations provide for the continual review of a plant collection and its relevance to the Arboretum's Mission. A collections inventory involves plant record updating and map improvement.

Collections Evaluation

Periodic field evaluations of all plant collections should take place as needed and shall be the responsibility of the Arboretum Curator in consultation with the Director. The reasons for field evaluations of the collections are: 1.) to determine a plant/plant collections relevance to the Arboretum's Mission, and 2.) to ascertain a plant/plant collection's performance. In addition, recommendations can be made during an evaluation regarding maintenance, plant acquisition, and deaccessioning.

An evaluation may explore some of the following questions: Is the plant/plant collection relevant to the Mission of the Arboretum? Is it 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? Does the plant need specific treatment or maintenance? Is it located in the proper location within the Arboretum with regard to specific growing conditions? Is there sufficient space to allow for appropriate maintenance in the future?

Collections Inventory

Because plants continually change throughout their lifetime, it is necessary to inventory living collections on a timely basis. This allows for updated, accurate and meaningful records concerning the plant collections.

An inventory should help answer some of the following questions:

- Are the records concerning the plant collection in proper order?
- Is the plant labeled properly?

A field inventory of the Arboretum's plant collections should take place at least

every 5 years. All inventories shall be conducted according to the procedures outlined in the Collections Inventory Protocol (*See Appendix II*) and should be carried out by the Arboretum Curator.

An inventory of all nursery and seed material should be performed every year. This inventory will be carried out by the Arboretum Horticulturist. Inventories will be submitted to the Arboretum Director and the Curator upon completion.

Deaccessioning and Disposal of Plant Material

Deaccessioning of Plant Material

Accessions may be removed from the collections when they no longer fulfill any of the Arboretum's missions of education, research, outreach, and horticultural display. The process of deaccessioning documents the loss of individual specimens in the plant collections. Timely updating of plant records is necessary following removal of plant material. All records and data relating to deaccessioned material will be maintained in perpetuity. Deaccessioning is the responsibility of the Curator. In certain instances deaccessioning is conducted in consultation with the Arboretum Director or other staff with special interest in a particular collection.

Criteria for Deaccessioning Plant Material

Specific reasons for deaccessioning include (but may not be limited to):

- When plants are dead, dying or in poor health
- When plants are no longer appropriate to the scope of each collection
- When plants are damaged beyond reasonable recovery
- When plants are missing (lost, stolen, or destroyed)
- When a plant/plant collection is deteriorating and is no longer relevant to the objectives of the Arboretum collections
- When plants have become invasive or damaging to the collection or surrounding landscape
- When plants are overly aggressive and have the potential to escape and become pest plants in our local area
- When the accession harbors a disease or pathogen that is likely to spread to other accessions in the collection. These specimens will be destroyed.
- When the plant poses a threat or is potentially hazardous to persons on the property
- When the plant is determined not to be true to name and the correct identity can not be determined
- When a plant is surplus (i.e. there are at least two other healthy plants of the same

species found in the collection)
- When plantings become crowded or encroach upon landscape design elements such as open spaces or vistas

Disposal of Plant Material

The means of disposal of deaccessioned plant material shall be approved by the Arboretum Director. Whenever possible, disposition should be directed to other Arboretum programs, such as: education, plant sales, and exchange to other institutions.

Distribution

Accessions that are deemed to be surplus by the Curator, in consultation with the Arboretum Director will be available for distribution. Institutions and individuals to whom these plants may be made available include (in decreasing order of priority):
- Fellow botanical institutions
- Commercial nurseries and nurserymen
- Arboretum supporters, especially those who support plant exploration
- Arboretum staff
- Arboretum plant sale

Labeling

Labels, signs, and plaques are an important part of communicating information to the Arboretum visitor. Labels may be used to give directions, memorialize or honor donors, educate visitors and identify special gardens and plants in our collections.

Labeling is also an essential part of recordkeeping and interpretation of the Arboretum's collections. All permanently accessioned plants in the Native Plant Collection and the Caroline Black Garden are labeled with aluminum accession tags that contain the accession number and the scientific name. Significant accessioned plants throughout the Arboretum may have display labels containing the common name, the scientific name, the scientific family name, and the origin of the taxon. Plants in the nursery will be labeled with the scientific name and accession number, at minimum.

Access

The Arboretum encourages the use of its plant collections to the greatest extent possible. Physical access is unrestricted during normal hours of operation. Propagation material is available for qualified individuals and only with permission from the Curator. The Arboretum supports free and open access to its plant collections and information related to it.

Preservation

The Arboretum takes reasonable and necessary measures to prevent loss of or damage to the plant collections. The Arboretum safeguards its collections from vandalism, damage, or theft to the best of its ability. Collections shall be renovated as needed through ongoing evaluations in order to ensure their long-term viability, maximize visitor experience and enhance the collections' educational value.

Care and Maintenance

The Connecticut College Arboretum is committed to maintaining its plant collections in as aesthetically pleasing and as healthy a state as possible, given local growing conditions and budget limitations. In accordance with the conservation concerns of the Arboretum, conservation of irrigation water is important. Plants will be irrigated plentifully only during their establishment period. After this time, most plants should require little or no irrigation for their care. Methods designed to ameliorate cold temperature affects should be provided only in very special cases. Removal of exotic plants from the Native Plant Collection, and any invasive species from other collections, shall be an ongoing priority (see Invasive Plant Removal Policy Appendix III).

Public safety and liability are the highest priority for the maintenance of the collections. Maintenance is prioritized based on periodic reviews by the Director and Horticulturist or Grounds Supervisor in conjunction with the Curator.

The Arboretum will make the best efforts to use sustainable horticultural practices to support the health and vitality of its plant collections. Plants that need continual life support through chemical means will be considered for removal.

Minimum (Sustainable) Standards of Care

The Arboretum plans its collections, trains its staff, and organizes its maintenance program to ensure the best care of the collections in the most environmentally sound manner. Because of this commitment to reducing the level of pesticide use, it maintains an IPM (Integrated Pest Management) approach in its plant maintenance program. Key components for the success of this program include: plant selection, plant replacement, plant maintenance, collections monitoring, and careful selection of pest control methods. (See Sustainable Standards of Care APPENDIX IV).

A. Staff training: Staff expertise and current conservation practices are essential for the proper care of the collection. Staff is offered short courses on-site as appropriate, use of tools, communications, etc. Staff is also encouraged to attend seminars in their areas of specialty and offered tuition reimbursement for courses related to their work.

B. Assessment: The Arboretum Horticulturist and the Supervisor of Grounds are responsible for the year-round care and quality of their specific collections. Periodic

assessments, conducted by the Plant Collections Committee, are to provide an overview of design and establish large-scale corrective strategies where necessary.

C. Conservation measures: Where possible, the best plants shall make up the collection to reduce the need for special care. Good sanitation, weeding and other cultural practices shall be followed. Certain sub-areas within the collections may require higher maintenance.

Invasive Plant Removal Policy (See Appendix III)

Implementation of the Invasive Plant Removal Policy will be the primary responsibility of the Plant Collections Committee. This committee will conduct periodic evaluation of the collections to track the effectiveness of this policy. Determining which plants should be added or removed from the target list (*Table 1*) will also be the responsibility of the Plant Collections Committee.

Risk Management:
Trees are inspected routinely for signs of disease and damage. Those nearest to high value targets are monitored more frequently. Arboretum staff will always be alert to potential hazard trees on College property and will bring such trees to the attention of the Director or Supervisor of Grounds, depending on location.

References Consulted

Harvey, M.P. *Inventory of the Native Woody Plant Collection and Stewardship of the Connecticut College Arboretum's Plant Collections and Plant Records*. Honors Thesis, Botany Dept., Connecticut College, New London, Connecticut. 1994.

Hohn, Timothy C. *Curatorial Practices for Botanical Gardens.* AltaMira Press, Plymouth, U.K. 2008.

Leadlay, Etelka and Jane Greene, eds. *The Darwin Technical Manual for Botanic Gardens.* Botanic Gardens Conservation International, London, U.K. 1998.

Tolmach, L. et al. *Collections Policy: The Basics*. The Public Garden. Fall 1986.

In addition to the above works, we consulted and borrowed from Plant Collections Policies of several arboreta and public gardens including Arnold Arboretum of Harvard University, Holden Arboretum, Morton Arboretum, Morris Arboretum, Polly Hill Arboretum, Rancho Santa Ana Botanic Garden, and Smith College Botanic Garden.

APPENDIX I: Definition of Terms/Glossary

To avoid confusion with other uses of terms for collections at Connecticut College Arboretum, the following definitions are provided as they pertain to this document:

1. **Accession** -- the unit for a single collection. For the Plant Collection, this may represent a single plant clone, a subset of a population of plants that share the same collection method and date, a seed collection from a single plant, a seed collection from a population, etc. Under no circumstances are different materials combined in a single accession: seeds, cuttings, divisions, whole plants, etc. are always separate accessions.

2. **Accession Number** –the number assigned to a single accession. It is composed of the year the plant is entered into the system, followed by a sequential number for that year. In the case of accessions with more than one individual plant, a capital letter, called a qualifier is sequentially assigned to each plant. Example: 2013-11A.

3. **Cultivar** -- a plant under cultivation that differs from other members of the same species in one or more significant characteristics. A cultivar may be derived from an abnormal individual in the wild, be developed through hybridization or be selected under cultivation. It is maintained in cultivation primarily through vegetative propagation or by selection because of its unique characteristics. Cultivar names are capitalized and should be placed within single quotation marks or preceded by cv. (abbreviation for cultivar). They are not underlined.

4. **Curation --** the process of managing the a collection to ensure its preservation and perpetuation, guide its development, ensure its documentation, and facilitate its enhancement.

5. **Accessioning --** the process of adding specimens to the collection. This process includes assignment of a unique reference (accession) number and entering its collection information in BG-BASE(our computerized database). Accession information for all collections is maintained in perpetuity.

6. **Deaccessioning** -- the process of actively removing an accession (or a portion of an accession) from the Plant Collection. The data about these deaccessioned plants will be maintained in perpetuity.

7. **Seed** (or **Seeds)** is inclusive of all types of seeds, pollen, and spores.

8. A **taxon** (plural, taxa) -- a unit of any rank within the taxonomic hierarchy (e.g., family, genus, species, variety, cultivar).

9. **Plant Collection** is composed of all accessioned plants. These include: A) all wild documented collections of plants from Eastern North America; B) all cultivars of,

or involving, plant species native to Eastern North America; C) all other accessioned plants. All Plant Collection accessions should have voucher specimens on file in the Connecticut College Herbarium.

10. **Wild Documented Collections** are collected propagules (seeds, cuttings, divisions, spores, small plants, etc.) from wild populations of plants or from an individual plant for which information (documentation) has been recorded on a field record and herbarium voucher specimens have been collected.

Reference consulted

Much of this section (APPENDIX I) came from the Rancho Santa Ana Botanic Garden's Living Collection Policy.

APPENDIX II Collections Inventory Protocol

Introduction

This document outlines all procedures that shall be used to conduct inventories of the Arboretum's plant collections and nurseries in a successful, timely and efficient manner.

Purpose of a Collections Inventory

Plant accessions change dramatically throughout their existence, making living collections particularly dynamic. Therefore, it is necessary to inventory plant collections on a regular basis. Such inventory is a valuable tool because it allows for:

- updated, accurate and meaningful plant records
- the production of valuable plant data relating to growth rates, growth forms, hardiness, phenology, and insect problems
- pinpointing areas of concern, including:
    - plant record discrepancies
    - plant identification discrepancies
    - accuracy of collection maps
    - missing or stolen plants
    - missing or damaged accession and display labels
    - accessions that are in need of maintenance
    - specimens that should be deaccessioned
    - accessions that are in need of replacement
    - plants that should be acquired

Components of a Plant Collections Inventory

An inventory proceeds in six major steps:

- orientation and preparation
- field checks
- accession label production
- label mounting and follow up field checks
- updating/editing computer and accession records notebooks
- collection map updating

Orientation and Preparation

For those who are not familiar with the plant collections, the first step in an inventory is to become fully acquainted with all aspects of the collections that are to be inventoried. This includes all collection areas, sub-areas and their corresponding location codes.

The person whose duty it is to inventory the plant collections should become familiar with the use of BG-BASE. BG-BASE is a database application specifically designed to manage a wide variety of biological information. A BG-BASE user manual and

orientation sessions conducted by the Director of the Arboretum or another knowledgeable staff member will aid in this process.

One should become familiar with the format of the accession records notebooks and the accessions contained within them, as well as the card file system used until the early 1980s to document accessions. It is these records, along with the computerized plant records, that are used to verify questionable accession numbers and other plant record discrepancies.

Before the field checks are conducted, BG-BASE inventory reports should be prepared which group accessions by their current location. These lists represent all the specimens in a given area that need to be located during the inventory.

The following materials and equipment are available for field checks and mapping:

- Field equipment:
  - field maps and corresponding computer lists
  - clipboards
  - DBH measurement tape
  - cloth tape measure for measuring shrub width
  - hand-held computer (mobile device) with software for data entry and access to data that has been downloaded from BG-BASE
  - hand lens

- Taxonomic equipment for lab:
  - dissecting microscope and light
  - dissecting probes
  - appropriate taxonomic literature and keys

- Labeling equipment
  - laser engraving machine
  - anodized aluminum accession labels
  - supply of 2 - 2.5 inch stainless steel screws (for accession labels)
  - supply of 3 inch stainless steel screws (for display labels only)
  - large reel of pure copper wire (for accession labels)
  - hammer
  - crow-bar
  - wire cutters
  - pliers and/or nail pullers

- Mapping Equipment
  - GPS unit
  - computer with GIS mapping software

<u>Field Checks</u>

During an inventory, all specimens listed as 'alive' in the plant records must be located in the collection, and relevant accession information must be obtained for each accession. The accession information required for each specimen includes the following:

- location of accession
- condition of accession
- size
- accession label verification
- display label verification, when present
- comments and maintenance needs

Accession labels are usually located on the north side of each plant. If a pathway runs close to the north side of a specimen, then the accession label should be located on the side opposite the pathway.

A field check data sheet should be created to record and organize accession information. In addition, the date of a field check and the area where it was conducted should also be recorded on this data sheet.

The following code system should be used to rate the condition of each specimen during field checks:

E = excellent
G = good
F = fair
I = Indistinguishable
P = poor
R = removed
U = unable to locate
Q = questionable
A = alive
D = dead

Measurements

For trees, diameter at breast height (4.5' above ground level) is measured using a DBH tape. Currently, centimeters are the units of DBH for all the collections. If a tree is multi-stemmed, record the DBH of the individual stems. For shrubs, record the height and spread using meters as units. Some accessions may be clumps or clones containing several stems In this situation, record the number of stems, as well as the height and the spread of the clone or clump. If a plant has had one of its main stems or trunks removed, be sure to record this information onto the data sheet.

Mapping

While inventorying a given area, the accuracy of the field maps should be evaluated. Eventually, all field maps generated from an inventory will be used to update the GIS collection area maps. Are the accessions and other landmarks mapped properly? If a specimen is dead, or removed, is its accession number crossed off the field map? Are there any significant landmarks which are not mapped?

To map an accession, place a small 'x' on the map to designate where the specimen is located, and clearly write its accession number near the 'x'. Be sure to record an accession's position on a map in relation to the plants around it.

For mass plantings, outline the perimeter of the mass planting with a neat dashed line. Next, within this dashed area, use each specimens' accession number qualifier (a letter given to an individual plant of an accession) to designate where each plant is located. Then, place the accession number for the planting within or near the dashed line. For denoting the spread of large clones and spreading plants, use complete lines.

Consistency is best achieved when field checks are conducted sequentially. Only when inventorying has been completed in one area should the field work advance to a new location.

Misidentified plants

There may be an accession which is misidentified in a collection area. If so, the specimen's true name must be determined. On the field data sheet, note that a new accession label will have to be made. If the plant's identity cannot be arrived at through inspection, collect plant material to be used to key the specimen to its accurate name. Once the identification is complete, update, with the correct name, the accession record notebooks, BG-BASE, and GIS.

If the identity of the plant cannot be determined, record on the field data sheet that this accession needs to be identified. Indicate this in the accession record notebooks. Also, document any characteristics of the collected plant material which may aid in keying this plant in the future. At a later date, the names for those accessions which were misidentified need to be changed to their correct ones in the Names Table of BG-BASE. For those plants whose identities remain unknown, their specific epithet needs to be changed to 'sp.'

Plants with missing, girdling, or damaged accession labels

A label may be missing on a plant, girdling a specimen, or in need of replacement. Record this information on the field check data sheet.

If the accession label wire is girdling the stem of an accession, remove the wire and re-apply the accession label onto another stem. Make sure the loop formed by the accession wire is large enough to prevent girdling in the future.

If the accession label is missing, refer to the collections area map to verify the plant's accession number.

Accessions which are not mapped

If an accession is not found on the location area map, check the accession label on the plant and verify if the specimen is listed on the inventory list. Also verify that the label is on the correct plant. If it is, map the specimen.

If a specimen is found in the field that has an accession label, but is not on the computer list, nor is it indicated on the collections area map, map the accession number as indicated on the label, record the accession number and name of the plant on the data sheet and document this problem on the field data sheet.

Using the accession number of this plant, search for the corresponding entry in the accession records notebook. If a corresponding record cannot be found, and the plant does not exist in BG-BASE, then the accession history of this plant will never be known. In this case, use the number found on the accession label to create a record for the specimen in the accession records notebook. Then enter this plant record into BG-BASE.

If a record is found, verify whether the accession information stated in the record corresponds to that of the specimen in the field. For instance, do the name, location and relative size of the plant correspond to the information stated in the accession records notebook? If the record matches, enter it into BG-BASE and record on the field data sheet that the status of this accession has been verified.

At times, a record may be found that matches the plant in the field in all respects, except for the location. This can occur, for instance, if an accession was moved, and then subsequent amendments documenting this change did not take place in the plant records. In this situation, one usually needs to amend the record by simply recording the present location of the specimen. However, the previous location referred to in the record should be visited to verify whether or not two or more specimens having the same accession number exist in the plant collection.

If this is the case, then the two accessions were most likely given the same accession number qualifier (the letter given to individual plants within an accession) when they were accessioned. To correct this problem, arbitrarily set the accession number qualifier of the original plant being inventoried to the next available qualifier within that accession (e.g. if both are *'A'*, assign to one of them the next unused letter).Then be sure to seek approval for this change from the Arboretum Curator and record the change in both the accession records notebook and in BG-BASE.

Plants with a questionable status

During a field check, a plant may be found that has no accession label, is not mapped

and is not present on the BG-BASE Inventory Report. This presents a difficult situation. It is possible that this plant has been accessioned in the past. In order to keep track of the plant during the inventory, the specimen must be identified and given a temporary accession number. The next available accession number for that year is an acceptable temporary number. Record this information on the field data sheet and record the temporary accession number on the field map. In addition, clearly describe this situation on the field data sheet.

Because the plant does not exist in the computer records, one must rely on the accession records notebook to trace its history. Ask the Arboretum Director, Curator, or Horticulturist about the plant. They may know about its history and/or when it was planted. This could narrow the search in the accession records notebook.

Search for an entry that has a description which matches that of the plant in question. Because the accession number and the history of this specimen is being sought, it is important that the "accession information required" on the field data sheet correspond to the information in the accession records notebook. It should be noted that the size and age of the specimen must be consistent (i.e. probably not smaller in size) with the description in the accession records notebook. If a match can be made with complete certainty, then enter the record into BG-BASE and record on the field data sheet that the history of the plant is no longer in question.

If no match can be found, then the history of this plant cannot be determined with any accuracy. The temporary accession number then becomes permanent. Be sure to document this situation in the accession records notebook in case new information becomes available in the future.

Accessions in Groupings

At times, multiple individuals of an accession are grouped together, particularly ground-covers like: *Zanthorhiza simplicissima*, and *Arctostaphylos uva-ursi*. With time, the individual plants of these larger accessions may become indistinguishable from one another, and therefore impossible to inventory as single plants. If individual plants become indistinguishable, eliminate the use of the accession number qualifiers, and regard the grouping as an accession containing many plants. Be sure to make the appropriate changes in both the accession records notebook and in BG-BASE.

APPENDIX III. Connecticut College Arboretum Invasive Plant Removal Policy

Adopted Dec. 2005
Plant Collections Committee

Invasive plants are defined as those plants that escape from cultivation, or their original location, and spread relatively rapidly without human assistance. Spread may be by vegetative or sexual reproduction. These plants are usually exotic, non-native species, although this depends on the definition of native.

It is the intention of the Arboretum to manage invasive plant populations with the goal of complete eradication when possible and practical, and of maintaining low, controlled levels of invasives if eradication is not practical.

Implementation of the policy is based on the following considerations:

1. Location of the infestation – removal from cultivated landscape settings is a higher priority than minimally managed or wild locations.
2. Invasiveness of the species – Plants known to be extremely invasive are a higher priority.
3. Resources available – Invasive removal is often very labor intensive and the limitations of staff numbers and budget levels must be considered.

An Integrated Pest Management approach will be used in invasive plant management. IPM plans will be based on an understanding of species biology and ecology, and mechanical and "organic" methods will be evaluated before herbicides are used.

Herbicides will be used in strict conformity with state and federal law. Only the most selective herbicide application technique that is deemed effective, and the lowest effective concentration of chemical, will be used.

Policy in Natural Areas – under consideration

TABLE I: Plant Lists

Plants to be Targeted for Removal

The following species should not be distributed from the Arboretum and should be considered for removal from some or all areas of the Connecticut College Arboretum because of their demonstrated invasive qualities. These lists should also assist in determining species that should not be offered for sale or distribution, however, these lists are by no means complete or sufficient for that purpose. Additional species may be added as needed. Monitoring the collections and determining which plants should be

added or removed from the following lists will be conducted by the Plant Collections Committee.

Acer ginnala
Acer platanoides
Acer pseudoplatanus
Ailanthus altissima
Amorpha fruticosa
Ampelopsis brevipedunculata
Berberis thunbergii
Berberis vulgaris
Celastrus orbiculatus
Eleagnus umbellata
Euonymus alatus
Ligustrum vulgare
Ligustrum obtusifolium
Ligustrum ovalifolium
Lonicera x *bella*
Lonicera japonica
Lonicera maackii
Lonicera morrowii
Lonicera tatarica
Lonicera xylosteum
Morus alba
Paulownia tomentosa
Populus alba
Pueraria montana
Rhamnus cathartica
Rhamnus frangula
Robinia pseudo-acacia
Rosa multiflora
Rosa rugosa
Rubus phoenicolasius
Sassafras albidum

Species that should be watched for invasive tendencies:
Acer pensylvanicum
Eleagnus angustifolia
Halesia carolina (syn. *H. tetraptera*)
Ilex opaca
Taxus cuspidate

APPENDIX IV: Sustainable Standards of Care

Reduce the need for supplemental watering.
- Water is a finite resource that will only become more valuable as time goes on.
- Emphasize plants that require little or no supplemental water to survive after establishment.
- Group together plants with similar water needs.
- Zone plants according to natural moisture requirements.
- Practice tough love: be willing to let plants die if they can't survive in the moisture zone where you've placed them.
- Use drip and other low-output irrigation systems in place of high-volume spray heads.
- Keep turf-irrigation to a bare minimum and avoid permanent in-ground sprinkler systems.
- During droughts raise the cutting level of lawnmowers to between 2 and 3 inches. This causes less stress and encourages deep root growth.
- Practice soil and water conservation. Stabilize slopes with natural plantings, mulch around plants, and install drought-tolerant species.

Reduce reliance on fertilizers, herbicides and pesticides.
- Nitrates in streams and groundwater are often traced to misuse of fertilizers.
- A vast palette of plants are available that require no supplemental fertilizing.
- Use native plants. Since they have adapted to local conditions, they are more resistant to pest problems.
- Organic-based and green fertilizers are wise alternatives.
- Many common pesticides do more harm than good. Reduce the use of pesticides and practice integrated pest management instead.
- Insects and pathogens are a natural part of the ecosystem and should be tolerated as much as possible.
- The vast majority of insects and pathogens are benign to most healthy plants and landscapes.
- A wide variety of organic pesticides are available and should be favored over chemical pesticides.

Eliminate the negative consequences of turf-grass maintenance.
- Mower and trimmer damage, excessive irrigation and misuse of pesticides in relation to lawn care are widespread and common problems in the landscape.
- Reduce use of turf. Where possible, replace high-maintenance turf with lower-maintenance alternatives or landscape plantings.
- Where lawns are needed, follow best management practices to reduce harmful impacts and use composting mowers.
- Most turf grass species do not grow naturally under trees - especially where shade is heavy. Mulch it, or plant shade tolerant perennials and ground covers. The trees will be much healthier.

Maintenance Recommendations

1. Keep the mowers and string trimmers away from trees and shrubs. Mower blight causes more harm to young trees than most insects and diseases.
2. Mulching is beneficial when done properly. Trees and shrubs should be mulched with a layer of organic material (wood chips typically) three to four inches deep and in a five to six foot diameter circle around the trunk (or to the drip line). Avoid burying the base of the trunk in a deep pile of mulch. Trees and shrubs in groups should be mulched together in one large bed. Mulching should be considered a yearly and ongoing activity.
3. Use only organic materials for mulch. Avoid the use of rock mulch as it reradiates heat back onto the plants.
4. Compost and mulch on site. Generate free mulch: a soil additive that can replace the need for most fertilizers.
5. Plastic weed barriers and edging are often unnecessary and can cause more problems than they solve. Never use plastic sheeting as a weed barrier since it prevents the exchange of important gasses in the root zone.
6. Don't over-prune. There is no law that says all trees must be single-stemmed or pruned to eight feet above the ground. The natural growth habit of trees and shrubs should be considered when pruning. Leave lower branches on evergreens unless there are visual/safety issues that need be addressed. Leave lower branches on young deciduous trees until they are well established in the landscape.

Reference Consulted:
STANDARDS & GUIDELINES, PRELIMINARY REPORT. The Sustainable Sites Initiative, 1 Nov. 2007.

APPENDIX V: Physical Memorials Policy

Overview:

Connecticut College's long and rich history as an Arboretum campus holds significance and nostalgia among alumni/ae, parents, and friends. College staff are pleased to work with individuals who wish to establish a physical expression of those feelings in honor of or in memory of an individual or a group of individuals, or to commemorate an event, such as a reunion year. Commemorative and memorial gifts are a profoundly thoughtful and enduring way to recognize a student, parent, faculty or staff member, or a group of individuals, such as a class year or an academic department. Such gifts also enrich the College's campus aesthetic and beauty.

The following policies and procedures apply to naming opportunities associated with physical memorials.

Administration:

The director of donor relations is the initial contact for an individual who wishes to inquire about a physical memorial. As with all gifts to the College, the director works with the donor(s) to ensure proper crediting, an appropriate tribute, and donor satisfaction.

The director passes the request to the Arboretum Collections Committee (director of the arboretum, horticulturist, curator and the grounds supervisor) regarding the details of the request. The committee offers choices for the selection and placement of the commemorative item and wording for accompanying plaques. The director of donor relations then contacts the donor to inform him or her of the selection of trees (or bench) and possible locations and to determine the wording for a plaque, if appropriate. Once these details are finalized, the grounds supervisor or horticulturist oversees the installation and maintenance of the commemorative item and related plaques.

The director of donor relations also will inform the donor of the cost for the requested item. Pricing information is shared up front to ensure that the prospective donor understands the financial commitment. This approach is appropriate especially when the constituent expects to solicit funds for the named space with gifts from a group of donors whose level of financial commitment is unknown at the time the inquiry is made.

The Collections Committee maintains a listing of campus locations where memorial trees and benches are appropriate in keeping with the College's overall master plan. It is important that any memorial designations fit appropriately into the overall physical environment of the campus, are installed in sites free of underground utilities, and are placed in areas where future construction is not anticipated.

The College reserves the right to move physical memorials should the need arise. Every effort will be made to contact the donor or donors to discuss the need to change the location and to appropriately relocate the memorial.

Gift Criteria:

Commemorative or memorial gifts may be given in honor of alumni, students, faculty, staff, or friends of the College. The College does not accept memorials given in honor of pets, projects, issues, anniversaries or birthdays. Connecticut College cannot allow the spreading, burial or interment of any remains on campus.

Pricing Structure for Commemorative or Memorial Gifts:

The following costs include the price of the tree or bench, design fees, delivery, site preparation, installation, and perpetual maintenance.

Commemorative or Memorial Tree: $5,000

Trees are selected by the Arboretum Collections Committee, which suggests a few areas of the campus and the varieties of trees that are appropriate. The College will work closely with the donor(s) to select the most appropriate area on campus. The selection may be an existing tree on the campus or a new tree.

The tree is identified with a 4 x 5" recognition plaque affixed to a wooden mounting post. Language on plaques is kept simple and brief. The common and botanical tree names are included in all such plaques. The director of donor relations works with the wishes of the donor(s) to include a brief but meaningful inscription as well as with Arboretum Curator to ensure design consistency and continuity. The director sends the donor a mock-up of the exact wording for his or her approval.

Delivery and installation of the tree and associated plaque varies with the seasons. Normally trees may be planted during spring and fall.

Commemorative or Memorial Granite Bench: $10,000

The bench site and style are selected by the Collections Committee to ensure a consistent aesthetic on the grounds of the campus. A simple inscription is sandblasted on the bench.

Delivery, inscription and installation of the bench normally takes 2 months.

The College does not offer the option of a metal or wood bench, and does not accept donated benches.

Methods of Payment:

Payment by Check:

When making gifts by check, donors should indicate on the check the name of the person(s) who will honored or memorialized, and indicate that it is being made for a memorial tree, bench, etc. Checks may be made payable to Connecticut College at the following address:

Connecticut College
Office of College Advancement
270 Mohegan Avenue
New London, CT 06320

Credit Card or Online Payments:
For credit card gifts, donors may call 800-888-7549 or go online at annualfund@conncoll.edu. The donor should specify either to the staff member or in the online comment box the name of the person(s) who will be honored or memoralized, noting that it is for a **commemorative gift.**

Physical memorials require outright gifts paid either in full or pledged over one fiscal year. The minimum gift amounts ($5,000 for a tree, $10,000 for a bench) must be received by the College before the order for the item and any associated plaque may be ordered.

Donations are processed by the Advancement Services Office and are acknowledged for tax purposes with a written receipt.

Commemorative gifts may not be credited to the Connecticut College Annual Fund since they are by definition restricted rather than unrestricted gifts.

Stock Gifts:
Donors who wish to make gifts of stock should contact Constance Kristofik, Advancement Services Officer, at (860) 439-2420 or 1-800-888-7549, ext. 2420 for assistance. She will need to know the name of donor, kind of stock, the amount of shares, and the designation of the gift in order to process the stock gift correctly.

Gift Processing:

Physcial memorial gifts are credited to the College's Living Gift Program. The Gift Accounting Office splits each gift between two designations – 50% is credited to the current restricted living gift fund account ("BELIVNGGFT") and $50 is credited to the endowed living gift fund account ("EPLLIVING"). The money in the current restricted fund is used to purchase and plant the tree and to create a plaque, or to purchase and install the bench and carve the inscription. The money in the endowed fund generates annual (spend rule) income, which is used to care for the upkeep and maintenance of existing tree (or bench) in the future.

The gift designations and fund numbers for physical memorials are:

'BELIVNGGFT' (Fund #225080 – this is the current restricted gift fund)
'EPLLIVING' (Fund #625060 – this is the endowment principal fund; this generates spend rule income which is credited to fund #275060)

Related expenses should be charged only to the current restricted gift fund (#225080) or the endowment income fund (#275060) using the account code that is appropriate for the expense.

Stewardship Plan:

Gifts of $25 or more that are made in honor of an individual are acknowledged by the Donor Relations Office to the honoree. All gifts made in memory of an individual are acknowledged to the memorialized individual's family to the extent possible.

The Donor Relations Office provides donors(s) with photos of the physical space and plaque, if applicable, as soon as possible after installation. In addition, upon request from the donor(s), the

Donor Relations Office will plan a dedication program in consultation with other appropriate offices (e.g., Chaplain's Office, College Relations). As some species of trees are best planted only in the spring, the timing for a dedication service may be dictated by the optimal planting period.

The Donor Relations Office photographs all trees, plaques, benches or other physical memorials, and catalogs the photos in a named spaces database with the plaque wording, class year being honored (where applicable), and exact campus location.

Memorial Longevity:

Some physical memorials may have life spans of only a few decades. The College will make every effort to maintain a memorial for the full length of the given material's "life." If the tree or bench becomes unsafe or unacceptable from an aesthetic standpoint, the College will inform the donor (s) that it will be removed and either relocated or replaced with a similar one.

Endowment Gifts for Large Scale Memorials, Buildings and Other Physical Spaces

The College offers opportunities for more substantial giving for physical memorials. For example, donors may wish to establish an endowed fund for the creation of a garden within the Arboretum. Such endowment funds support specific areas of interest.

Individuals who are interested in larger projects may contact the director of major gifts for further information.

Donors whose gifts allow for the naming of buildings or physical spaces will be recognized appropriately at the site based upon the overall design determined for that location in connection with the individual gift.

Source: Connecticut College Office of College Advancement 1.9.12