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Policy for management of living collections at the Las Vegas Springs Preserve

Peter F. Duncombe

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POLICY FOR MANAGEMENT OF LIVING COLLECTIONS
AT THE LAS VEGAS SPRINGS PRESERVE

by

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1986

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Abstract

This paper, prepared for the Department of Public Administration, discusses policy in botanic gardens in regard to development and management of living collections and the potential implementation at the Las Vegas Springs Preserve. Review of the literature and study of policy from other institutions has resulted in recommendation of policy for the Preserve. Its basic contents describe the purpose and need for collections policy, examine the elements of collection policy, characterizes the types of living collections to be held at the Preserve, and outlines the objectives of these collections. This document raises issues associated with the management of living collections such as acquisition criteria, authority, accessioning and documentation, preservation and care, deaccessioning, inventory control, and ethics. While the aim is to recommend an approach for management of living collections at the Las Vegas Springs Preserve, it is expected that full development of the collections policy will be undertaken in full collaboration and consultation with the various stakeholders.
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Overview of the Las Vegas Springs Preserve

Introduction

The Las Vegas Springs Preserve (the Preserve) is a 180-acre tract of land owned by the Las Vegas Valley Water District (the District) and is located approximately three miles west of downtown. It is the site where 3-to-4 springs once fed a large cieniga with a perennial stream, trees, and meadows in a vast oasis. Located in the heart of the Desert Southwest, in the Mojave, the smallest and driest of Southwest deserts, the Preserve has always been important to inhabitants of this arid land and to those who have passed through this crossroads for thousands of years. The remnants of this once great oasis called “The Meadows” by the Spanish, represents perhaps one of the richest and most unique cultural and biological resources in Southern Nevada. (http://www.lvspringspreserve.org) A process to design and develop the property into a regional center for the environment has been defined. The opening date of May 15, 2005, is targeted to coincide with the centennial celebration for the City of Las Vegas.

Together with the Las Vegas Springs Preserve Board of Trustees and Foundation, the District will create a unique institution for conservation programs and community education using preservation and management of the Preserve’s natural and historical resources against the dramatic backdrop of the industrial facilities occupying the site. The mission of the Preserve, “To preserve and manage the cultural, biological, and water resources of the Las Vegas Springs Archaeological Site, and to promote sustainable life in the Mojave Desert by integrating environmentally sensitive design and conservation through demonstration, education and research”, reinforces this purpose.
### Definition of Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accession</td>
<td>The act of formally including an item or group of items in a managed collection. Implies commitment to long-term care and the keeping of records about the accession.</td>
</tr>
<tr>
<td>Acquisition</td>
<td>Physically taking possession of an item which may or may not ultimately be included in a managed collection.</td>
</tr>
<tr>
<td>Cieniga</td>
<td>A spring fed wetlands or marshy area that is characteristic to the desert southwest.</td>
</tr>
<tr>
<td>Deaccession</td>
<td>The act of formally deleting an item from a managed collection.</td>
</tr>
<tr>
<td>Eco-geographic Collection</td>
<td>Major plant collection organized for public display so as to simulate natural plant communities from a particular region. E.g. Sonoran Desert.</td>
</tr>
<tr>
<td>Ethnobotanic</td>
<td>Referring to the utilization of a plant by indigenous peoples.</td>
</tr>
<tr>
<td>Exotic Species</td>
<td>Species not native to a given area.</td>
</tr>
<tr>
<td>Ex-situ</td>
<td>As part of an overall strategy to ensure species ultimately will survive in the wild. Viewed as a means to an end but not an end in itself as a conservation measure.</td>
</tr>
<tr>
<td>Germplasm</td>
<td>The genetic material comprising the fundamental information governing the development of a particular organism and carried in each cell of the organism.</td>
</tr>
<tr>
<td>Horticultural Cultivars</td>
<td>Plants selected by humans, not existing naturally in the wild.</td>
</tr>
<tr>
<td>In-situ</td>
<td>Refers to a type of conservation program where there are efforts to preserve and restore plant species in their native habitats.</td>
</tr>
<tr>
<td>Known wild origin</td>
<td>Having specific, reliable knowledge either firsthand or otherwise, of the geographic location of the original site of an acquisition.</td>
</tr>
<tr>
<td>Native Plant</td>
<td>Occurring naturally and generally accepted as being indigenous.</td>
</tr>
<tr>
<td>Proagules</td>
<td>Units of germplasm utilized to create new individuals, e.g. seed, cuttings, bulbs, etc.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Protected Taxa</td>
<td>Taxa listed as rare, threatened or endangered, either by the U.S. Fish and Wildlife Service or IUCN Redbook.</td>
</tr>
<tr>
<td>Taxon (pl. taxa)</td>
<td>Any taxonomic grouping, such as phylum, family or species.</td>
</tr>
<tr>
<td>Taxonomic Classification</td>
<td>The place in the evolutionary order of organisms (phylogenetic position) to which an organism is assigned by a specialist known as a systematist or a taxonomist</td>
</tr>
<tr>
<td>Taxonomic Collections</td>
<td>Plant collections organized along systematic (phylogenetic) lines. E.g. arranged by family or genus, e.g. Pea Family, Cactus and Succulent Families.</td>
</tr>
<tr>
<td>True-to-Type</td>
<td>In reference to cultivars, refers to the degree of genetic identity that the cultivar has to the originally selected or bred cultivar.</td>
</tr>
</tbody>
</table>
**Purpose of this paper**

Frequently in the elaboration of a botanic garden conflicts arise, as a result of different objectives, relating to the various functions of the garden and constituencies it is anticipated to serve. Traditionally botanic gardens have been places where scientists would assemble and hold ordered collections of plants for the purpose of research and study. Gradually the use of gardens expanded to include the public functions of pleasure and amenity, a good day out. The scientists could put up with people coming into their gardens as long as they were allowed to carry out their work undisturbed, behind the scenes. With the shift away from botany and taxonomy, to microbiology and genetics, botanic gardens have had to reinvent themselves as places where science, education and amenity are integral elements of their design. The challenge and the contribution of this work will be to ameliorate the conflict between the design objectives of the Preserve emphasizing demonstration and education over the need for systematic curation of collections for scientific purposes. A good example of where this has been successfully accomplished is the University of Cambridge Botanic Garden, where a tradition of more than 150 years, inspired by Professor J.S. Henslow, incorporated the premise that amenity should be combined with the roles of research and education in a botanic garden. There the systematic collections are presented in an artistic and aesthetically pleasing manner that breaks the traditional model of rigidly organized beds for systematic study and is a good example of how a botanic garden can satisfy many users (Cambridge University Botanic Garden, 1998, p. 1). This illustrates the vision and leadership, of those whose charge it is to oversee development of living collections, that is required for successful integration of botanical science and horticultural roles.
The design objectives of the Preserve have downplayed and even ignored the botanic garden function in lieu of gardens for demonstration and educational purposes. At the same time there is an expectation that the Preserve will be managed as a botanic garden in that certain baseline information will be gathered in relation to the plants growing in its collections. The emphasis is on design with limited accommodation for thematic organization of plants around logical attributes, such as geographic origin, or family associations of plants. While public education is a primary function of the project, with preservation, history, water conservation and amenity being primary objectives, it is my aim to establish that the function of systematic curation of collections is not counterintuitive to these purposes. Not only is it achievable for the Preserve to become a botanic garden, but it is desirable because of the benefits that may be realized by achieving this status.

The purpose of this study is to determine the state-of-the-art in systems for management of living plant collections in botanic gardens and implications for the Preserve. Information from review of the literature and study of the current practices for the management of living collections in botanic gardens has yielded policy recommendations for management of the Preserve’s living collections. While actual policy will need to be developed with the complete collaboration of all stakeholders, the findings as a result of this study will be useful in informing and guiding the process. It is critical for staff at every level of the organization to buy into the policies that will be developed as a result of this study and the ensuing process. Without a complete and thorough understanding and acceptance of the system, the aims of the organization may not be fully realized.
Description of the Las Vegas Springs Preserve

The Executive Design Committee through workshops, critical review, and research conducted the programming phase of design for the Preserve. The culmination of their work represents approved findings and assumptions for elements incorporated into a final programming document for the project including site design, staffing and service requirements, interpretive content, and building character. This programming document is the guiding element for the subsequent design phases that are now in progress. The Final Programming Report for the Las Vegas Springs Preserve, submitted in October 2000, defines eight zones that separate the site into design and construction areas within the project. The zones are (1) the Arrival Sequence; (2) the Visitor Center; (3) the Desert Living Center; (4) Desert Living Center Gardens, Garden Support, and Research; (5) the Site Experience – the Trails; (6) Nevada State Museum; (7) Administration Building; and (8) Services.
While the information contained within the programming document is useful from the standpoint of guiding the physical and design content, it provides little direction from a management perspective of how the Preserve will operate as a major botanical institution, including curation and management of its living plant collections. A full color version of the site map is provided in Appendix I, and the program zones are described in the text below:

**Zone 1: The Arrival Sequence**

The Arrival Sequence includes the streetscapes along Valley View Boulevard, and Alta Drive, the main entrance drive at Meadows Lane, on Valley View and the service drive off Alta, parking areas and Commons. From the main parking atop the new reservoir, visitors become oriented to the site and surrounding area through viewpoints. A pathway descending east from the orientation plaza will bring visitors into the heart of the Preserve called the “Crossroads Commons.” Plants throughout the arrival zone constitute a significant portion of the Preserve’s living collections and contribute to the overall message of the Preserve, that landscaping with native and comparable plants is beautiful. The Commons will feature the Desert Collection, a collection of desert and adapted plants assembled from around the world. This is the central access point to the Preserve’s key destinations including the Visitor Center, the trailhead for the Preserves “Loop Trails”, The Desert Living Center, and Gardens and various amenities.

**Zone 2: The Visitor Center**

The Visitor Center is comprised of a series of interrelated buildings and gardens that interpret the history of Las Vegas from its origins to the present. The Gardens that will be curated in association with the exhibits will illustrate the native flora, ethnobotanical, and historical uses of plants. Exhibits within the Visitor Center will be highly interactive and interpretive with the aim of engaging and educating the casual visitor around the themes of
the “Natural Mojave,” “The Birthplace of Las Vegas,” and “City at the Crossroads,” all within the overriding theme of “Water is Life.” The Visitor Center is part of the privately funded portion of the Preserve and is planned in the first phase opening in 2005, provided the appropriate funding levels are attained.

**Zone 3: The Desert Living Center**

The Desert Living Center is to be the primary resource in Southern Nevada to promote sustainability through active education, research, and demonstration relative to the Preserve’s mission. Elements of the Desert Living Center include the dialogue center where informal education programs, school programs, workshops, and conferences are held. The Public can come and interface with the various entities regarding horticulture, water and energy conservation, and other sustainability issues including design.

**Zone 4: The Desert Living Center Gardens/Gardens Support/Research**

The Gardens, Garden Support, and Research Facilities of the Desert Living Center constitute the bulk of activity for visitors and staff on the southern end of the Preserve. Elements of the DLC Garden include the Entry Garden, Competition Gardens, The How-to-Loop, The Residential Gardens, Gardens for Wildlife, and Therapy Gardens. Plants in these collections will concentrate on those most appropriate to the region displayed in conjunction with sustainable landscape practices. Garden Support will provide “back of house” facilities for propagation, testing, and daily operations in caring for and maintaining the living collections of the Preserve. Research facilities, slated for development beyond 2005, will be dedicated to research supporting conservation of biodiversity, in particular, rare and endangered plants, and will include other important elements of the Preserve’s mission relating to sustainable living and preserving the cultural and biological resources.
**Zone 5: The Site Experience – “The Trails”**

The Trails are the primary means for the visitor to access or experience the site and gain exposure to the richness of cultural, biological, and technological resources that remind them of the Las Vegas of the past. Several themes are expressed in the trails including the Cross Road Loop Trail, the Springs Loop Trail, Exploration Loop Trail, and the Cienega Loop Trail. The trails cover the largest portion of the site and offer the greatest opportunities for habitat creation, preservation and monitoring.

**Zone 6: Nevada State Museum**

The Nevada State Museum and Historical Society was added as an element in the programming phase. The missions of the Preserve and the State Museum complement one another and present the opportunity to establish a natural partnership to bring an added dimension to the resource.

**Zone 7: Administrative Building**

The Administrative area will house the staff responsible for marketing, development and implementation of programs, bookkeeping, and management of the Preserve.

**Zone 8: Services**

Services identified in the programming document are necessary for the project to move forward and allow for the ongoing activities on the site that will still function as the District’s North Well Field. Elements include service roads, fencing, security, site utilities, and a sound wall along US 95. Accommodation of easements, right-of-ways, and setbacks based on agreements with various utilities and governments and for access to the wells, pipes, pumps, reservoirs, etc. are necessary for Las Vegas Valley Water District, and Southern Nevada Water Authority operations.
**Need for defining policy**

Botanic gardens around the world are united through their missions containing common elements of conservation, research, monitoring, information management, education and public awareness. Botanic Gardens Conservation International (BGCI) defines botanic gardens as being “…institutions holding documented collections of living plants for the purpose of scientific research, conservation, display and education.” Their database includes 1846 botanical institutions in 148 countries. While collectively botanic gardens hold the world’s most diverse collections of plant genetic resources, individually each has a distinctive character and represents purposes unique to their organizations and work (Wyse Jackson and Sutherland, 2000). Many new botanic gardens are being opened and developed to act as centers for plant conservation, study, and education, particularly of plants native to their own region. An increasing awareness in Southern Nevada of the importance to conserve and protect the unique biological diversity of the Mojave Desert, in part, gave birth to the concept of the Las Vegas Springs Preserve as a premier botanical institution for the region.

While the impact and educational value of properly displayed collections is incomparable, its size, the condition of the plants, uniqueness, level of duplication, time frame and geographical scope can sum up its quality (Nudds and Pettitt, 1997, p. 23). It is in having and maintaining quality collections that are well documented and characterized that botanic gardens provide value to those who use them. The trend in botanic gardens design however, is toward thematic display of collections, imposing the objectives of the designer, which can limit the flexibility of their use (Nudds and Pettitt, 1997, p. 9). This is apparent in the Preserve’s programming document, which has a heavy weight on design and architecture, but little stress on treating the plants as contents of a living collection. While there is tremendous value in collections purely for amenity and educational purposes, the value of
collections from a scientific standpoint will be questionable without policy for proper
development and management with that purpose in mind. Calculating the investment costs of
acquisition, curation, and accommodation in addition to the scientific, cultural, aesthetic can
then assess the value of systematic biological collections, in addition to the educational value
associated with their appreciation and use (Nudds and Pettitt, 1997, p. 18). For a botanical
collection to have value for the purpose of science then, it must employ the science of
systematic botany to validate and authorize its existence. The application of consistent policy
is the keystone necessary to achieving this.

Other reasons for defining policy include safeguarding the collections, and ensuring
they are properly cared for and maintained. A long-range view should be taken with respect
to botanical gardens and the collections they possess. They evolve and change overtime and
are ever increasing in value as they mature. The expenditure of time, energy and resources in
a garden and the plants themselves represents a voluminous investment on the part of the
institution. Gardens that have been around for fifty years or more have historical significance
and the landscape needs to be preserved in that respect. Likewise, specimen plant materials
that are integral with the origin of the gardens and are historically important to that institution
must be preserved at all cost.

For example, the Huntington Botanical Garden, in San Marino, CA, established in
1903 employs a talented curatorial staff and Director to oversee the development of the
collection containing over 80,000 accessions, and professionally manage the Garden. They
are currently in the process of redefining the Huntington’s policy with regard to the living
collections, to provide a mechanism that safeguards the core collections that represent long-
term commitment of the institute, and prevent ill-advised decisions in relation to change of
leadership.
Collections Management Policy – Best Practices

Definition

Museums and related institutions engage in the practices of development and management of collections relating to their specified purpose or mission. Curation is the term that is often applied to collection development and management, which in botanic gardens refers largely to plants, although other types of collections are also held. A written document that serves as a practical tool for management of collections is a collection policy. Such a document establishes criteria and identifies protocol for implementation and decision-making and is typically included as part of an organization’s strategic plan. A collection policy is a concise statement emphasizing purpose, rationale, and layout of collections and broadly sets direction for their long-term development, but does not establish daily procedures and practices. Collection policy needs to be supplemented therefore, by more detailed documentation, typically a procedures manual, regarding systematic curation matters including management protocols, plant acquisition, labeling, plant identification, evaluating collections, and releasing material (Leadlay & Greene, 1998, p. 32).

Purpose

Botanic gardens formulate policy for management of living collections based on goals and objectives that have been identified and written down. The purpose of the collection(s) in relation to the mission statement of the organization along with any other statutory or legal requirements is what determines policy. Living plant collections consist of plants that are grouped together on a related characteristic and grown for a specific purpose. A policy supports strategic development by ensuring the largest number of institutional goals is met in relation to the living collection. A good policy makes more efficient use of time through planning to avoid duplication or omissions in the collection. It also links work plans to the
objectives of the collection. A collection policy improves communication within the organization regarding the purpose of the collection, how it relates to other collections and the future. Teamwork, morale, commitment, and motivation are greatly improved when all parties concerned understand the common purpose and goals. Having a good policy linked to collections and long term goals also gives the collection continuity of purpose over time and may ultimately out last the staff, meaning that the garden’s direction or focus may not need to change. The policy may also be a valuable tool for public relations and fund raising in that it gives stakeholders an understanding of the garden’s direction. It is also important in fundraising to demonstrate sound planning to management boards and financial committees who evaluate grant requests (Leadlay & Greene, 1998, p. 34).

**Elements of Collection Policy**

While each botanic garden establishes policy to address its unique circumstances, several key elements are common to many of them. Key elements of collection(s) policy include Introduction, Purpose, Authority, Acquisitions, Preservation and Care, Collections Inventory and Evaluations, Deaccession and Disposal, Access, and Ethics. These common elements of policy are explored in the following section through the literature. Additionally comparison of collection management policies from five botanical institutes is drawn with respect to the various elements and incorporated into the discussion. Table 1 summarizes the treatment of the policy elements by the various institutes and is found on pages 14 -15. The institutions included in the comparison are the Arizona-Sonora Desert Museum (ASDM), Tucson, AZ; The Bloedel Reserve (BR), Seattle, WA; Boyce Thompson State Arboretum (BTSA), Superior, AZ; the Missouri Botanic Garden (MBG), St. Louis, MO; and the Transition Zone Horticultural Institute (TZHI), Flagstaff, AZ. The elements of policy are readily apparent in the comparison of collection policies for these botanical institutions.
Table 1: Policy Comparison of Various Institutions
Table 1: Policy Comparison of Various Institutions (Continued)
While the policies essentially include the same elements for each of them, their uniqueness of character and mission are reflected in the various purposes, priorities, and structure illustrated in the comparison. Here the matrix is used to compare the policies of the institutions and contrast how the various elements have been applied. The discussion below illustrates the common elements of policy from the literature and highlights the commonality and exclusiveness of each of the policies in an institutional comparison expanding on their application from the table.

**Introduction**

The introduction is a general statement about the rationale for the policy. It may include reference to the governing authority ultimately responsible for the institution. It may also address who is responsible for administration and implementation of the policy, including the review and recommendation process. The introduction may give insight into who the users of the collection are and who is the main audience for the collection policy.

**Institutional Comparison (Introduction)**

The comparison of policy introductions reveals a large degree of commonality among the various institutions. Four of them in particular, the Bloedel Reserve (BR), Boyce Thompson State Arboretum (BTSA), Missouri Botanical Garden (MBG), and the Transition Zone Horticultural Institute (TZHI) have common language that identifies policy purpose, and who is responsible for defining, approving, administering, implementing, and reviewing of the policy. As determined in the exploration of best policy practices and as indicated in Table 1, these are the appropriate kinds of information to incorporate into the introductory statement of a collection policy.

**Purpose**

This section generally gives the overall purpose of the collections relative to the mission. The purposes of the collections are outlined in this statement supporting the mission and relating the benefits of the collections for the people who use them. It is likely that the actual mission statement for the institution will be stated here to emphasize the relationship
to the purposes. It also identifies the purpose of the collection policy as the document that
guides the development and management of the living plant collections.

**Institutional Comparison (Purpose)**

While there are many common elements in the purposes of the various institutions, their distinct flavor and unique character are completely evident as well. For the majority of them, the elements of conservation, education, and research are primary purposes that are central to their missions. An emphasis on native and adapted species was also a shared value of the various institutes with the uniqueness of their character relating specifically to a regional focus, as is the emphasis of many modern botanic gardens today. With the exception of the Bloedel Reserve, all these institutions would be classified as a combination of ‘Classic’ multi-purpose gardens and Conservation Gardens. The former have a wide variety of functions in horticulture, training, and research (primarily taxonomic), while the latter respond to the need for conservation of biological diversity on a regional basis (Wyse Jackson and Sutherland, 2000, p.14). Many of them, such as the Arizona Sonoran Desert Museum (ASDM), and BTSA, contain areas of natural vegetation in addition to their cultivated collections. Bloedel on the other hand, is unique in that it does have natural areas that are protected and managed, along with displays of exotic species, but the objective is primarily design and not systematic collection. It has no science emphasis other than an ecological perspective to allow natural processes to occur and be observed over time. The emphasis rather is on stewardship of the Reserve and not on germplasm preservation, public education, collection assembly, or research.

**Authority**

Management of living collections in botanic gardens typically falls under one person, the curator, who is responsible for management and maintenance of its collections. The curators’ roles and responsibilities are management and maintenance of the plant collections, supervision of the daily horticultural activities, supervision and responsibility for recording collections, maintenance of labeling on collections, and providing necessary training for staff (Leadlay & Greene, 1998, p. 42). For a plant to have any value for research or reference, it must be properly identified by scientific name, which is essential to accessing the literature and communicating information about it. Any plant coming into a collection should be verified as to its identification by an authority in accordance with the nomenclature system regulated by internationally accepted rules in the International Code of Botanical
Acquisitions

The cost of maintaining living collections at an acceptable level for science and other purposes is high, while the trend in public funding is reduced, resulting in ever increasing financial challenges for botanic gardens. As a result, even tighter standards must be applied to acquisition policy to ensure that plants grown are those that have usefulness and that those no longer needed are removed from the collection in the appropriate manner.

Recommendation Process

Acquisition and retention of living collections must reflect strategic plans and the resources available to maintain them. Policy therefore, dictates why a plant should be acquired and held in a collection in accordance with the purpose for maintaining it. The Royal Botanic Gardens, Kew, U.K., operates under a 5-year Corporate Strategic Plan, which is revised annually in order to renew public funding. Kew’s corporate plan illustrates the gardens activities under eight program areas that define the institution’s work in regard to curating and maintaining its living collections (Taylor, RBG KEW, 2000). The Acquisition
Policy of the Royal Botanic Garden Edinburgh (RBGE), U.K. aims to “define, highlight, and designate the plant families and genera which will be required in the foreseeable future for the RBGE to fulfill its scientific, education, amenity and conservation programs.” It is the intent of the policy to make sure that the plant material is acquired in an efficient manner so as to adequately provide for the needs of those who use the collection (Leadlay & Greene, 1998, p. 33).

**Criteria for Acquisition**

It is necessary to establish criteria for acquisition to control the volume and type of plants that are accepted into the collection. How plant material is obtained should be determined by policy as well. The criteria for acceptance must take into account the ability of the institution to accommodate new acquisitions with limited space and staff time in the garden, and the relevance to the purposes and themes of the collection. The source of plant material is generally specified and may include such categories as collection from the wild, donations from another garden, and commercially grown plants. Policy should also include what material may be accepted as gifts. If gifts are to be accepted, they should be subject to the same criteria as other acquisitions collection (Leadlay & Greene, 1998, p. 34).

**Viable Collectors**

Guidelines for collection of plants need to be well defined to avoid violation of any laws including local, state, national and international frameworks. Defining who is responsible for initiating acquisitions to the collections and who is responsible for approval should be included. Horticulturists and garden Curators for example may initiate the acquisition that must meet the acquisition criteria and be approved by the Director or an established plant collections committee. Collections should be conservation minded in
observing legal and ethical standards including impact on native populations from invasive
species, pest, and disease.

**Institutional Comparison (Acquisitions)**

Each of the policies addressed specific criteria that must be met for acquisition of
plant material into a living collection. The policies ranged from concise statements of criteria
regarding acquisition to more detailed descriptions of policy and procedure for acquisition of
plants. Selection criteria most generally related acquisitions to the purpose of the institution
through their mission statements including any environmental parameters, such as ambient
temperature range and climate that have been established. Each institution has specific
criteria addressing the circumstances under which a plant may be acquired including issues
of collection from the wild and invasive potential. Other common themes were
accommodating the acquisition, and having a plan for where the acquisition will be planted
in the collection, and the approval process. Several of the policies specifically addressed gifts
and loans, which were generally subjected to the same criteria as any other acquisition.
Having a policy on gifts is useful in providing a basis to reject plants that don’t meet the
criteria or objectives of the collection. The acceptance of gifts was implicitly unconditional
and unrestricted in the policies and in some cases required that the accommodation must be
provided for. Legal and ethical issues are frequently addressed in regard to acquisition but
are also addressed separately in some policies.

**Accessioning and Documentation**

Accession policies define not only what is in the collection, but also how an accession
comes into the collection. It is essential for a collection policy to have a well-defined
accession policy as a component. Any plant coming into the collection (accessioned) should
support the purpose and objectives of the collection. Botanical record keeping is the accurate
identification and documentation of plants in cultivation and the accumulation and
consolidation of information about them for future use. Several manual systems exist for
capturing the necessary information but today computers offer a more efficient way to
organize data. Keeping records of plants in cultivation by writing down relevant information
about them adds value and importance to the plant collection (Leadlay & Greene, 1998,
p.88). Maintaining plant records is essential to proper curation of living collections. A well-
documented collection makes the collection valuable to those who would use it. Knowing
who the constituents are and what information they require should determine what
information to capture. The collection policy should identify what data is to be recorded for each type of collection (Leadlay & Greene, 1998, p.37).

**Accessionable Items**

New acquisitions are brought into a collection within the bounds of the accession policy and legal requirements. Decisions to accession plants should be supported by strategic development and only added if sufficient resources are available. Acquisitions should be positively identified and evaluated immediately for invasiveness, disease, and pests (Leadlay & Greene, 1998, p. 35).

**Registrar**

The term registrar is borrowed from the museum field, and is applied to the person who is responsible for the administration and accuracy of the plant records system. Depending on the size of the botanic garden, that person may be a registrar, collections manager, curator, director, botanical recordkeeper, volunteer, or a host of other job titles and functions (Buck and Gilmore, 1998, p. XIII). The registrar is responsible to the director and is in a position to provide advise regarding issues of policy or activity to maintain accountability and responsibility for the collections while serving the garden’s various constituencies. A large degree of the responsibility and authority vested in the registrar is because of that person’s collections audit function. This function includes inventorying the collections, maintaining integrity of the records, assigning accession numbers, maintaining computerized databases, conservation records, images, and control of access to records (Buck and Gilmore, 1998, p. XVI).

**Registration**

The registrar manages information about the botanic garden’s collection regarding transactions and activities involving plants in the collection. Several documents are typical to
most botanic gardens and form the basis of collection record. These documents describe the plants, record transactions, and define legal status of ownership or custody. The documents are used by the registrar to track the movement of plants from receipt and consideration to accessioning in the collection or return to the owner (Buck and Gilmore, 1998, p. 1).

**Body of Documentation**

Without trying to list every category, the essential elements of information to be maintained for each item, at a minimum, should be included in the collection policy. The essential categories generally include scientific name, accession number, source, date acquired, and location information. (Leadlay & Greene, 1998, p. 91).

**Forms of Documentation**

There are several ways to approach the monumental data management challenge inherent in documentation of living collections in a botanic garden. The alternative and perhaps complementary methods of holding accession data include keeping a ledger or notebook, a card index system, or record sheets kept in a ring binder, and/or computerized database. A ledger/notebook system has limited application for holding accession data beyond the essential information of accession number, name date of accession, propagule type, source, and location. With larger collections it becomes difficult to store and extract information with this sort of a system. Alternatively, an index card system or paper forms, which can be organized by plant name and accession number in a card index or ring binder/filing cabinet respectively, can be used. Such systems have flexibility to record additional information relating to accessions, but become difficult to manage as collections become larger (1,000 accessions or more) because of duplication of back-up records required, and the difficulty in sorting and extracting information (querying). Never the less these systems remain viable methods of holding accession information. Computers, however,
have revolutionized botanical record keeping and offer great advantages over manual systems in capturing and manipulation of records for all purposes (Leadlay & Greene, 1998, p. 97).

### Institutional Comparison (Accessioning and Documentation)

The sections of policy regarding accessioning and documentation reveal a wide variety of details and scope of the institutions reviewed. The ASDM policy addresses the issue in a concise manner under the heading of Records with a four item procedure including what is accessioned, types of information and databases kept, labeling, and computerization.

The Bloedel Reserve has only general statements referring to documentation and labeling indicating that the action required is dependent on the procedures in place at the time. Keeping in mind that their purpose is not to be collection oriented, the requirements appear to be less stringent.

The BTSA, MBG and TZHI all have much more comprehensive policies for accessioning and documentation. BTSA has detailed policy that addresses responsibility for the record system upkeep at various levels, timeliness of completing documentation in database, and recording changes in status, accessionable items, and minimum information requirements.

MBG had the most detailed information in their collection policy regarding accessioning and documentation going beyond policy into procedural practices. Their policy addresses records maintenance requirements, who is responsible for supervising and completing the data entry, and the responsibility for capturing and providing the information to be recorded. The forms used by the staff to supply information to the plant recorder for accession plants and changes in location or status are included in the policy’s appendix. Procedure for labeling is detailed along with the accessioning procedure. Information about the horticultural database is provided including details of the computer system, organization and types of data collected for each accession.

The TZHI breaks its collections into two categories: its **Core** collections, which have strict requirements for acquisition and documentation, and **Adjunct** collections, which supplement the Core collections and may be incorporated later, and Research collections (that are considered Adjunct), which are documented separately.

### Preservation and Care

A collection policy may address maintenance of collections including horticultural practices with the aim of increasing display value, plant health and safety in the garden. It includes regular monitoring and evaluation of the collection(s) and inventorying procedures.
Care of collections involves maintenance standards, special requirements, gene-pool specifications and security of the collections.

**Standards**

Standards address plant health and appearance along with issues of liability and safety. Priority is given to collections of special concern such as conservation plants especially those rare, threatened, and endangered species. While specific maintenance procedures are addressed in a collection management manual, the minimum standards of care applicable to various collections of a botanic garden are covered in the collections management policy (Donnelly & Feldman, 1990). Planning and scheduling of work required to maintain the living collections in a botanic garden is the most efficient way to achieve the aims of the organization as a smooth running operation. A system for objective planning and scheduling of work allows priorities to be set based on good information rather than responding to crises or demand.

**Special Requirements**

Specific requirements of a particular accession can be tied to the collection database and used to generate schedules at the appropriate time. Requirements of the collection are determined by the users and relate to the mission statement and strategic plan. Accessions in a living collection should meet the requirements of the collection established by the goals relating to reference, research, conservation, plant breeding, display or other purposes. A higher priority is given to accessions that meet the greatest number of institutional goals. This applies particularly to display and exhibition, thematic collections, and collections for conservation (Leadlay & Greene, 1998, p. 41).
**Gene Pool Specifications**

Genetics are addressed in the collection policy of botanic gardens regarding the purpose of the collection. Collections for conservation held *ex-situ*, in particular need to have the representative make up of genetic variation that exists within the existent population of the species. Other considerations are for conservation of species *in-situ* where introducing genetic variation from another population may be undesirable. In certain circumstances it is desirable to introduce germplasm into a population to increase diversity.

**Security**

A statement of institutional commitment to protection and safeguarding of living collections and collection records from theft, loss, and damage is made in the collection policy (Donnelly & Feldman, 1990). The theft of valuable specimens has become a bigger issue and is of primary concern for botanic gardens.

<table>
<thead>
<tr>
<th>Institutional Comparison (Preservation and Care)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The element of preservation and care is treated in a variety of ways in the various policies. Some of the institutes address the issue only as a statement of commitment and/or reference to separate documentation for specific standards and maintenance protocols.</td>
</tr>
<tr>
<td>The ASDM policy has two items under the heading of “Use and Care”. The first item refers the reader to the Botany Department Standards and Procedures for specific information regarding landscape and plant care standards. The second item addresses water conservation as a priority for management of the ASDM grounds. It is interesting to note that water conservation is a high priority for many botanic gardens and is mentioned specifically in several of the policies reviewed</td>
</tr>
</tbody>
</table>
The Bloedel’s policy has only general statements under the heading of Maintenance, but alludes to a high standard of care. More specific information regarding the care of collections is given in the section under the heading of Reserve Plant Collections. Although the Reserve is not collections oriented, its policy does outline four collections under that section including Native, Non-Native, Nursery Collection, and Seasonal/Container Collection. Included in the section for the Native collection are statements that address gene pool specification. In them they address maintaining the genetics through acquisition of native plants from local sources or propagation from site natives. Policy also suggests that additional strains of native species from further away sources may be introduced to increase genetic diversity into the population where benefit is perceived.
Institutional Comparison (Preservation and Care) Continued

The other institutions have more generalized sections under the headings of either Maintenance or Care of Collections. BTSA policy refers to Procedural Guidelines for Care of Collections. Policy specifically addresses issues of water conservation, collections planning, safeguarding of collections and transplanting of large specimens. The MBG policy on preservation and care outlines the responsibility of the horticulture division to maintain the health, appearance and performance of collections and address any safety or liability issues. Without getting into too much detail from a procedural perspective, it does provide some general guidelines for routine care and special care considerations. The TZHI has a general statement concerning responsibility for plant’s welfare with special consideration for rare, threatened or endangered species.

Collections Inventory and Evaluations

Inventories are performed in botanic gardens to know where plants are located and ensure records are accurate and up to date (Buck & Gilmore, 1998, p. 117). A regular inventory of collections should be undertaken to ensure that plants and their labels are still there. Collections should be evaluated on an ongoing basis to ensure that they are fulfilling the purpose(s) for which they were assembled. Such evaluations help in planning including future acquisitions, maintenance, horticulture, design, and interpretation.

Categories

Categories of inventory vary but all share in the function of verifying the plant location against the location record. The most thorough category is a complete, wall-to-wall inventory, in which location and status of every plant is recorded. The second category is a section-by-section inventory, which limits the scope by some means such as section, genus, or plant type. A thorough inventory can be completed in this manner over time by scheduling and rotating through the collections. A third category, a spot inventory, is of limited magnitude and is done essentially to check the accuracy of records (Buck & Gilmore, 1998, p. 117).
Timing

How often an evaluation is carried out depends on the size and type of collections, staff size and availability of personnel, types of records, percentage of collection catalogued, and computerization. Ideally a wall-to-wall inventory should be carried out annually. Otherwise, it can be carried out on an ongoing basis through rotation and spot checking inventory techniques (Buck & Gilmore, 1998, p. 117).

Process

The goals of the inventory must be determined. If a complete inventory has never been done, or if it has been a while, the goal should be to locate every plant in the collection. A carefully planned inventory will save time and produce the best results. Developing data sheets to record the physical location of plants and verify against catalogue or accession records is an efficient means of inventorying (Buck & Gilmore, 1998, p. 118).

Computerized records assist greatly in the inventory process and new technology in the application of bar coding on plant labels is a means of streamlining the inventorying process (Leadlay & Greene, 1998, p.90).

Institutional Comparison (Collections Inventory and Evaluation)

The collection inventory practices outlined in the policies ranged from once per year at the ASDM to once every ten (10) years at the Bloedel Reserve. The BSTA, MBG and TZHI were at four (4), five (5) and three (3) years respectively. The BSTA policy stated the aim of inventorying and evaluating one quarter of the collection every year. The MBG had as a matter of policy to complete a wall to wall inventory on all the permanently curated collections every five (5) years including horticultural evaluation and monitoring. The TZHI evaluates its Core collections every three (3) years but rare, threatened and endangered species are monitored more frequently. It seems that the BSTA method is a practical approach to completing the inventory and evaluation by rotating through the collection every four to five years. On the two extremes, it seems attempting completion of the inventory on an annual basis may be difficult to achieve but once every ten years also seems unrealistic. As important an element as this is to maintaining the value of the collection, taking into consideration the labor intensity of conducting the inventory/evaluations, it is essential to achieve the proper balance.
**Deaccession and Disposal**

Just as it is important to document when plant materials are accessioned, it is equally important to have a policy on how plants may be removed (deaccessioned). The policy should address who is responsible for making decision to remove plants from the collection and under what circumstances. Plants (accessions) need to be evaluated on a regular basis to determine if they still have relevance to the collection. Both space and staff time is at such a premium in a botanic garden that careful consideration should be given to a plant’s usefulness (Leadlay & Greene, 1998, p. 37).

**Criteria**

Deaccession should be considered if plants are no longer within the scope or mission of the garden or beyond its capacity to maintain them. Deaccession should also be considered if plants are not useful for research, exhibition or education in the foreseeable future, they duplicate other collections, are in poor condition or dead. How plants were acquired, if plants were originally acquired illegally or unethically, and any previous material transfer agreements should be taken into consideration (Buck & Gilmore, 1998, p. 169). Plants may be removed from a collection if they are no longer relevant, have lost identification or authenticity, plant deterioration or death, or because of collection development (Leadlay & Greene, 1998, p.37).

**Process**

Deaccessioning in the literal sense means to change the plant record at the time it is removed from the garden. Maintaining records of plants that may no longer be in the collection remains valuable including information relating to why and how removed, and any other pertinent information (transfer, etc.) (Leadlay & Greene, 1998, p. 90).
Authority

Recommendations for deaccession are reviewed and approved by the registrar/curator who has responsibility for managing the collection or by a collections committee (Donnelly & Feldman, 1990, p. 36).

Disposition Methods

The guiding principles for disposition of deaccessioned material should be addressed in the collection policy. Where possible, material should be donated or exchanged with another garden rather than sold. Plants are sometimes subject to being destroyed if other disposal criteria cannot be met. Special consideration and treatment need to be given to rare, threatened, and endangered species (Donnelly & Feldman, 1990, p. 36). Methods for disposition include donation to another institution for educational or research purposes, exchanges with other botanic gardens, physical destruction, private sale, return to donor, or by public auction.

Institutional Comparison (Deaccession and Disposal)

The policies for deaccession and disposal of the various institutions reviewed were equally diverse in the treatment of this element as in the others. Criterion for deaccessioning was a common element in all the policies reviewed, as were issues of process, authority and disposition methods.

The ASDM policy was very concise in its treatment of the element. Its criteria for deaccessioning included plants that are no longer relevant to the collection, duplicated plants in own or another collection, dead or stolen plants, or determination that another method, i.e. seed bank, would be a more effective means of maintaining the collections.

The Bloedel Reserves policy is fairly general but it does address who is responsible for making the decision, the Senior Horticulture Staff, and emphasizes that plants should be disposed of by donating them to another garden if possible.

The BTSA policy is fairly comprehensive in the treatment of the element addressing the process for decision making, restrictions that apply, governing principles and criteria and means for disposition. The MBG does not deaccession plants. If a plant dies or is removed, then the records are updated to change the status of the accession but all other information is maintained. The TZHI outlines criteria, process, authority and disposition methods in its policy.
Access

Policy should state who might use and have access to the various collections and their records and for what purposes. A policy on who may have access to collections and collection records is important for the protection against theft or damage, in particular when collections are valuable or have importance for conservation (Leadlay & Greene, 1998, p. 38).

Levels

Botanic gardens hold and safeguard their collections, providing reasonable public access within the confines of policy. Records are part of the gardens’ accountability to the public, but sensitive and confidential information should remain inaccessible to unauthorized persons (Buck & Gilmore, 1998, p. 351). Key information regarding provenance of conservation species should be safeguarded. Ethical considerations need to be taken into account regarding access to information especially in regard to the Internet.

Purposes

The information contained in botanic garden records is used to generate labels to plants or groups of plants in the living collections that are linked to the living collection. Additional information, generally not provided to the public, may be supplied to bona fide researchers upon request.

Records Duplication

It is essential to safeguard the records by maintaining back up or duplicate copies away from the site in case of fire, flood, or other hazard. While this is difficult with a manual (paper) system, it is easily accomplished with computerized records, especially in a networked application (Leadlay & Greene, 1998, p. 90). Issues such as copyright and charges for copying records should also be considered.
Institutional Comparison (Access)

Access issues in the institutional policies were varied and inconsistently applied in the policies. Neither the ASDM nor the Reserve addressed the element of Access although they certainly both address the issue elsewhere in policy. The BTSA addresses the issue in terms of loans, availability of propagules and special access to collections including collections not normally accessible to the public and records. The MBG has stringent policy on Access for protection and safeguarding of collections. Access to the collections other than normal public access requires the permission of the Director. The TZHI similarly states provisions for access to grounds, plant records and herbarium, and plant material.

Ethics

Provision for accepting and releasing plant material in a garden should be subject to the Code of Conduct. Written policies regarding how botanic gardens will adhere to the legal framework provided in the Convention on Biological Diversity (CBD) is extremely important. Material Transfer Agreements (MTAs) are commonly employed in moving plant material between botanic gardens, individuals, or other institutions to control access to genetic materials and ensure the equitable sharing of benefits as specified in the CBD.

Acquisitions

Including a code of conduct as part of a collection policy is important to protect the organization and staff against violation of national and international laws or legally binding agreements with other organizations. Codes of conduct should address issues relating to collection of plants in the wild. Accession policy addressing collection of wild plants should include guidelines for collection (e.g. documentation, sampling procedures, and collecting techniques and procedures for meeting legal requirements). The two most significant international laws concerning botanic gardens and plant conservation are the Convention on Biodiversity (CBD) and the Convention on International Trade in Endangered Species (C.I.T.E.S.). National laws including the Endangered Species Act of 1973, state and local regulations must also be adhered to. Legal requirements include obtaining prior informed
consent from the national, regional, or local authorities, exporting across national boundaries, and special permits required. Botanic gardens have a high moral obligation to ensure that accessions are evaluated for invasive potential and that they have quarantine procedures in place to protect native flora, local horticulture, agriculture, or forestry against pests and disease (Leadlay & Greene, 1998, p.35).

**Dispositions**

Plants found to be no longer needed in a collection may be deaccessioned in accordance with the collection policy and any previously made agreements subject to material transfer agreements stating how the material may be used. There are certain legal and ethical concerns associated with the disposition of plants, which must be taken into account before plants are disposed of. These involve the adherence to the letter and spirit of international, national, state and local legal frameworks and any internal policy regarding employee protocols and codes of ethics.

**Institutional Comparison (Ethics)**

Ethics issues are not treated consistently across the board with all the institutions. While neither the MBG nor the TZHI had separate treatments of the element, they both address ethics in regard to acquisition. The Bloedel Reserve’s policy is unique with a method for determining the invasive potential of new acquisitions using a key to evaluate them. The two that stood out were the ASDM, and BTSA.

The ASDM has conservation as a primary ethical issue. It addresses negative impacts on the natural communities, as a result of accessioning plants into the collection that should be avoided. Other ethical elements of the ASDM policy include adherence to the American Association of Museums (AAM) Code of Ethics, and staff disclosure of any extracurricular activity that potentially could result in a conflict of interest with the organization. Legal considerations are also addressed in the policy.

BTSA is also committed to protecting against invasive species, pest, and disease from affecting the collection or the natural plant communities. They have as a matter of policy about this element the adherence to the letter and spirit of all laws, regulations and conventions, including local, state, national, and international framework. It is important for botanical gardens to work within the legal framework and increasing on a global scale regarding CBD and C.I.T.E.S in order to maintain access to genetic resources of the world.
Case Study: Living Collections Policy – Desert Botanic Gardens, Phoenix, Arizona

The full perspective of policy for management of living collections in a botanic garden is best illustrated in an actual application of living collections policy in a botanical garden. This section presents a case study of the Desert Botanic Garden (DBG). Their Living Collections Policy provides guidelines to be used in determining collection goals and priorities of DBG in support of the institute’s mission, “To exhibit, to conserve, to study and to disseminate knowledge of the aridland plants of the world, with special emphasis on succulents and the native flora of the Southwestern United States.” This diverse collection represents a wide variety of life forms from deserts throughout the world serving multiple purposes. Several categories are used including display, education (interpretation), scientific research, horticultural introduction, and conservation of biodiversity.

The DBG Living Collections Policy is subdivided into the following sections: Acquisition, Accessioning, Plant Records System, Evaluation, Care and Maintenance, Deaccession Policy, Disposal, Access, Gifts, Loans and Exchanges.

The Garden follows a policy of selective acquisition citing restrictions of space and manpower making it both “unwise” and “unethical” to allow indiscriminate acquisitions. Policy states that all new acquisitions must relate to the purpose of the Garden and must meet the criteria to be added to the collections. The Curator of Living Collections is listed as the authority for reviewing and approving acquisitions in regard to the collection guidelines.

The policy states that acquisitions may be obtained by collection from the wild, exchange, purchase, or gifts under the collection guidelines. Plants of known provenance of wild origin are preferable. All others are considered temporary. Having stringent criteria on acquisition gives every member of staff a basis for accepting or rejecting donations or gifts. Origination of acquisitions may be by the horticulture, research, or conservation staffs, but
must be approved by the Curator. Strict adherence to national, international, state, and tribal laws, codes and conventions is required. New acquisitions are quarantined until determined to be free of pests and disease and monitored and evaluated for invasive potential.

The second section covering **Accessioning** addresses how plants that meet the acquisition guidelines become a permanent part of the living collections and the exceptions to this. The **Plant Record System** identifies the commitment to maintaining plant records, who is responsible for maintaining them and the minimum categories of information to be maintained. This section also addresses issues of mapping, security, inventoring, and access regarding collection records. **Evaluation** of collections is carried out by the Curator annually to certify adherence to collection policy. The **Care and Maintenance of Collections** section outlines responsibility for maintenance of collections and expresses the general standards and priorities for care. The **Deaccession Policy** provides the rational for deaccessioning a plant, outlines the recommendation procedure, and ultimate decision making process. The **Disposal** section describes how a plant that has been deaccessioned is disposed of from the collection including ethical concerns. **Access to the Collections** defines how and why the non-public portions of the collections many be accessed and by whom. Finally, an extensive section on **Gifts, Loans, and Exchange** outlines protocols for exchange of plant material/germplasm between institutions or scientists and the role of DBG in commercial horticulture. It addresses guidelines for acquiring propagules, the approval process, ethics questions, and loans. The primary collections are categorized as Taxonomic, Geographic, Research, Conservation and Landscape Display/Ethnobotanical Collections, and illustrated in Table 2.
**DBG Living Plant Collections**

<table>
<thead>
<tr>
<th><strong>TABLE 2</strong> DBG LIVING COLLECTIONS</th>
</tr>
</thead>
</table>

The DBG Living Plant Collections consist of plants native to the warm arid and semi arid regions of the world including several key areas of emphasis:

1. Plants from arid regions of Southwestern North America, especially the Sonoran Desert.
2. Plants in the families Cactaceae and Agavaceae.
3. Rare/Endangered plants.

<table>
<thead>
<tr>
<th>Collection Focus</th>
<th>Features</th>
<th>Criteria</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taxonomic</td>
<td>• Cactaceae</td>
<td>Should be of known provenance of wild origin.</td>
<td>Be as comprehensive, representative, and synoptic of collections as is feasible and to display morphological, geo-graphic and taxonomic diversity.</td>
</tr>
<tr>
<td></td>
<td>• Agavaceae</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Other Succulent families</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Trees and shrubs of arid regions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geographic</td>
<td>• Sonoran Desert</td>
<td>Should be of known provenance of wild origin.</td>
<td>Includes Sonoran Desert Nature Trail</td>
</tr>
<tr>
<td></td>
<td>• Chihuahuan Desert</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Australia</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Africa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research</td>
<td>Selected taxa supporting research.</td>
<td>Unspecified</td>
<td>Must be approved by Research Director</td>
</tr>
<tr>
<td>Conservation</td>
<td>Reflect institutional mission and be plants native to arid regions of the world.</td>
<td>Should be of known provenance of wild origin.</td>
<td>Center for Plant Conservation.</td>
</tr>
<tr>
<td>Landscape Display/Ethnobotanical</td>
<td>Collections display economically important plants, plants of landscape value and historically important plants from arid regions of the world.</td>
<td>Material of both known provenance of wild origin and cultivated origin are used</td>
<td>Center for Desert Living: Appropriate plants for landscape use. Plants and People of the Sonoran Desert: Plants important to Sonoran Desert people for economic, medicinal or historical purposes.</td>
</tr>
</tbody>
</table>

**Desert Botanic Garden Summary**

A collection policy has been in place at the Desert Botanical Garden since the mid-1980’s that has been updated, ideally every 4-5 years, though when it was revised in 1997, it
had not been looked at for almost ten years. The policy in its current form was developed using the existing document as a guide, acquiring policies from other botanic gardens, through the American Association of Botanic Gardens and Arboreta (AABGA), and the American Association of Museums (AAM). Once developed the policy was sent out to other botanic gardens and museums for review and comment. In soliciting comment from the field of museology, they felt a more stringent standard for curation of the living collections at the DBG could be achieved. The draft policy was then presented to the Research and Collections Subcommittee of the Board of Directors whose comments and questions were incorporated and addressed in the policy. A member of the subcommittee then presented the policy to the full board, the ultimate governing authority, for approval.

According to the Curator, the staff at the DBG is following the policy closely. It did meet with certain resistance initially by those groups most impacted in their work. The process is cumbersome in having to justify and obtain approval for actions to be taken in the garden regarding plant acquisition and deaccessioning. The horticulturists in particular “like to deal with plants as plants” and dispose of them at will, “rather than treating them as valuable components of a collection.” To put it in context, no self-respecting museum would consider just throwing away a painting. Having the criteria, procedures, and approval processes in place results in orderly management and development of the living collections in fulfillment of the Garden’s mission. Although policy requires acceptance and involvement at all levels of the organization to ensure its effective implementation, having the Curator as the central authority maximizes the efficiency of the process without compromising the integrity of the collection. The DBG Living Collections Policy is a living document in that it is actively used, reviewed and implemented to guide development and management of the Garden’s living collections.
Living Collections Policy for the Las Vegas Springs Preserve (Proposed)

Elements of the Policy

The policy elements included in this paper are the ones determined by the author to be pertinent and relevant to the unique purpose and character of the Las Vegas Springs Preserve. The purpose here is not to decide but to explore and recommend the best approach to development and management of the living collections at the Preserve and to inform the process of policy development and implementation for the institution. The format will be to include the elements from the ‘Best Practice’ and institutional comparison portions of this paper, drawing the best from what they have to offer, and to apply them to the Preserve along with the associated relevant information.

Introduction

A general statement of the rational will be included in this section stating that this document is to establish a policy governing the acquisition, accession, documentation, preservation and care, inventory, horticultural evaluation, deaccessioning, disposal, access and ethics issues pertaining to the living collections of the Las Vegas Springs Preserve. Also, that the Living Collections Policy will be defined and implemented by staff and administered by the Horticulture Manager. While the Las Vegas Valley Water District is the ultimate governing authority for the Preserve, a tripartite committee composed of staff, plus a couple members each of the Preserve Foundation and Board of Trustees will likely carry out review and approval of the policy.

Purpose

Relative to the Living Collections Policy at the DBG, the Preserve’s living collections policy will support the institutional mission “To preserve and manage the cultural, biological, and water resources of the Las Vegas Springs Archaeological Site, and to
promote sustainable life in the Mojave Desert by integrating environmentally sensitive
design and conservation through demonstration, education and research.” The policy is to
provide guidance in how the living collections are to be acquired, used, and managed,
functioning as a working document to be reviewed and updated as needed. Like the BTSA,
the purpose of the Preserve’s collection should be further defined here in a more concise
“Statement of Purpose” that specifically includes provision for opportunities associated with
arid land plants in relation to education, demonstration, and research and conservation of
biodiversity.

Authority

The responsibility for the administration of policies outlined in this document will lie
with the authority over the living collections at the Preserve. Although it is uncertain at
present what the structure and organization of the Preserve will be, it is likely that a Manager
of Horticulture or Collections Manager will oversee the development and management of the
living collections. Because of the size and diversity of the living collections, it is certain that
the Preserve will employ whole curatorial, horticultural, and supporting staffs to manage the
day-to-day operations.

Acquisitions

The Preserve will face the same challenges of other institutions regarding the high
cost of accommodating collections in terms of space, labor, and water, so plants must be
acquired only when their proper maintenance and care can be assured. This is a fundamental
premise of managing a collection of plants that are held in the public trust making
indiscriminant acquisition both unwise and unethical. Plants may be acquired by mechanisms
of exchange, donation, selection and breeding, purchase, and collection from the wild. Plants
acquired by the Las Vegas Springs Preserve should meet the goals and objectives of the
Preserve’s strategic plan and conform to the selection criteria outlined in the Preserve’s Living Collections Policy below. Due to the size and diversity of the collections at the Preserve separate acquisition objectives may be required for specific collections.

**Criteria for Acquisition**

The recommended criteria for acquisition of plants at the Preserve have been adapted from other institutional policies with particular reliance on the DBG and BSTA. The primary criteria should include the following:

- Plants adapted to arid or semi-arid conditions with the exception of riparian areas and small discrete “mini-oases”.
- Plants adapted to ambient temperature range of -9°C to 46°C (15°F to 115°F).
- Collection data shall accompany all incoming plant material particularly in the case of plants of known provenance of wild origin. Acquisitions without supporting data will be rejected.
- Acquisitions of horticultural cultivars should contain adequate documentation to ensure trueness to type.
- Acquisitions must have demonstrable education, conservation, research or landscape value in alignment with the Preserve’s purposes.

Categories of emphasis include:

- Species of similar geo-climatic regions of the world that have landscape value.
- Woody and herbaceous species native to the Mojave Desert.
- Plants that support wildlife potential.
- Plants of economic, medicinal, historical or ethnobotanical utility.
- Rare, endangered or threatened species within the region as defined by the Center for Plant Conservation and Clark County’s Multi-Species Habitat Conservation Plan.
- Horticultural cultivars having adaptability to our region and possessing outstanding ornamental characteristics or educational value.
- Taxa that add to the diversity of present collections or that have educational/interpretive or research potential.

**Recommendation and Approval Process**

The Collections (Horticulture) Manager or Curator must review all new acquisitions to determine that guidelines are being met. A Collections Committee for the Preserve should
be established to screen acquisitions. The Committee may include the Manager, Curator(s), Horticulturist(s), Gardener(s) and potentially some members of the Board of Trustees and/or Foundation. The Committee should meet on a regular basis to give input in collection development. The process for recommending plants for the collections at the Preserve may be initiated at any level, but the final approval must be by the Manager of Horticulture before accessioning.

**Legal and Ethical Aspects of Acquisition**

- All new acquisitions will be maintained in designated holding areas away from the bulk of the collection until determined to be free of pest and disease.
- Acquisitions from exotic source must be evaluated for invasive potential.
- Acquisitions must be obtained with the strict adherence to national, international, state and local laws, codes, conventions and agendas.
- Material obtained from or donated to another institution will be subject to a material transfer agreement stating how the plant material may be used in accordance with the above legal obligations.

**Gifts**

Following on the policies of various institutions compared and the best practices, gifts of living plants may be accepted only if they meet the Preserve’s acquisition criteria and are donated unconditionally. The Preserve will not give appraisals of donated material. Having a policy on gifts provides staff with a basis upon which to accept or reject plant material that is donated to the Preserve.

**Accessioning and Documentation**

As identified in the best practices and institutional comparison, proper documentation is essential to the efficient development and management of living collections. Plants that become part of the permanent collection are assigned a unique identifier (accession number) that will be used to track it in perpetuity. The Preserve shall be committed to maintaining
complete, accurate and comprehensive records on accessioned items in the living collections. The policy regarding accessioning and documentation should be concise, giving specific information but avoiding too much detail. Detailed procedures on documentation need to be developed as a separate document for that purpose.

**Accessionable Items**

The Preserve shall accession all acquisitions that meet the criteria to become a permanent part of the Living Collection. Plants obtained for resale, distribution to members, plants on short-term or temporary loan, plants used for temporary exhibit or educational purposes, plants used in flower shows and plants (usually annuals) used in seasonal displays, will not be accessioned. Plants originally obtained for purpose other than inclusion in the living collection that are subsequently slated to be included shall be accessioned at the time of transfer, subject to acquisition criteria. Plants obtained for research, education, or purely amenity may not be accessioned.

**Responsibility for Records System Upkeep**

The Preserve will need to have a key person (Registrar or Botanical Recordkeeper) who will be responsible for the administration, maintenance, and accuracy of the plant records system. This person will be responsible to the Curator who will report directly to the Manager of Horticulture. The horticulturists will be responsible for providing timely and accurate information to the Registrar of plants within their areas of responsibility. Information regarding new and existing plants in the living collections will be captured in accession forms or plant record forms. An example of the Accession Form from the Missouri Botanic Garden is included in Appendix II. The Curator will address taxonomic questions of a technical nature. Administrative oversight of the plant records system will be the responsibility of the Preserve’s Manager of Horticulture.
Body of Documentation

The information to be maintained on all accessioned plants of the Preserve can be divided into two main categories; taxon related, and accession related. The taxon related information contains information relevant to an entity at any taxonomic level (e.g., species, variety, cultivar, etc.). Accession information relates specifically to the accession(s) and includes accession number, botanical nomenclature, source, date acquired, and location within the garden. Additional information will be incorporated in the database for educational purposes including horticulture and design information.

Forms of Documentation

The living collections at the Preserve will be documented in several ways. A ledger system may be employed during the construction of the Preserve to keep track of the high volume of plant material that will be acquired to satisfy the initial development. The records will ultimately all be kept in computer databases using either application specific software for management of living collections or customized system developed for the specific needs of the Preserve. A system of labeling plants in the gardens will need to be developed to link them to the database through their accession number. Cartographic maps of the Preserve showing the location of accessions in the living collections on the ground and linked to the accession database will also be used. The computerized database will be administered through the computer network of the Las Vegas Valley Water District, which is backed up daily and will therefore be safeguarded from any potential harm.

Preservation and Care

A statement such as, “plants in the living collections are to be maintained in as healthy and aesthetically pleasing condition as possible,” should be included in the Preserve’s Living Collections Policy. Water conservation will be of paramount importance at
the Preserve and will be practiced diligently by all staff of responsibility. The Preserve’s focus on sustainability means that the highest standards of sustainable horticulture will be upheld. This will include the recycling, composting, and reuse of all green waste generated at the Preserve. Best practices of sustainable horticulture and biological control measures will be used in favor of chemicals on the site.

**Standards**

Like many other botanical institutions, actual standards for preservation and care of the living collection will be detailed in a separate document outlining procedures and standards of maintenance on the grounds at the Preserve. Procedures will address standards for maintenance including pruning, planting, and care of the living collections with detailed information on specific varieties of plants. High priority will be placed on the efficient use of water in maintaining the living collections.

**Special Requirements**

Collections of greater importance may be given special priority for care if they are conservation collections that are rare, threatened, or endangered (e.g. the Las Vegas Bear Poppy). Collections of high value or importance to the site, research and education collections, and other similarly unique applications may also be given special care beyond what would be considered routine maintenance, where required.

**Gene Pool Specifications**

For collections to have the highest scientific value, they should be of known provenance of wild origin. Seeds from openly pollinated plants of garden origin, especially those that hybridize readily in cultivation, are of limited value and should be avoided. This question has come up at the Preserve already in regard to the Las Vegas Bear Poppy, which has been determined to be a unique, a genetic population. It has been determined that the
introduction of germplasm from other populations may benefit the population at the Preserve by introducing species diversity to the site.

**Security**

The Preserve has several advantages in regard to safeguarding its collections. The site is secured by fencing and patrolled by the Water District Security, so that loss from theft will be minimized. Provisions for security are being incorporated into the design process and will include state-of-the-art surveillance systems and monitoring. The basic focus of the living collections is on plants that are appropriate to the region and therefore minimizes the impact of the environment conditions. Even so, the Preserve must make adequate provisions in policy to assure the safeguarding of its collections.

**Collections Inventory and Evaluations**

A virtual horticulture renaissance in the Desert Southwest is causing many native plants, including many from the Mojave Desert, to find their way into the nursery trade. In its role as a major botanical and horticultural institute, the Las Vegas Springs Preserve will have the responsibility to not only grow and display these plants, but also to find out and distribute information about them. The Horticulture Division will engage in short-term and long-term programs to evaluate the plants in its living collections and relate information regarding their performance to the public.

**Inventory Method and Timing**

A wall-to-wall inventory will be conducted on a periodic basis to ensure that plants and their labels are still there. While the horticulture staff will be responsible for monitoring the collection on an on-going basis, the complete inventory should be completed at least every four years as is done in the BTSA. Collections that are managed more intensively or that are of high value may be inventoried more frequently. Employing bar-coding and other
new technology, as identified in the best practices, will increase the speed and efficiency of the process.

**Horticultural Evaluation**

The Curator should carry out an annual evaluation to ensure that the collections are relevant to the Preserve’s mission, and to assess trends and developments in the collections, and certify that the collection policy guidelines are being adhered to.

**Deaccession and Disposal**

Deaccessioned plants are those removed from the active records and are no longer part of the inventory. Items no longer relevant or useful to the Preserve’s mission will be a candidate for deaccessioning. Like the MBG, plants in the Preserve’s living collection will not be deaccessionated, but rather the record will be altered to reflect a change in status, (e.g. from alive to dead) but all other information will be maintained.

**Criteria**

Plants may be disposed of from the Preserve’s living collections subject, but not limited to, any of the following criteria as adapted from the best practices and institutional comparisons:

- They no longer meet the acquisition criteria.
- A superior specimen of the same taxon is accessioned.
- The accession has deteriorated, died, or has been stolen.
- Plants of known wild source may not be sold.
- Threatened, and endangered taxa under the Endangered Species Act, cannot be Deaccessioned from the living collections unless dead or stolen.
Process

Recommendation for deaccessioning may be made by any member of the Preserve’s professional staff. The proposal will have to be submitted to the Curator, in writing, and must include all pertinent information relating to the accession, and justification for its removal. This will ensure the orderly management of the living collections and treatment of plants as valuable assets rather than disposable commodities. As in the case of the majority of institutions, major decisions regarding deaccessioning of plants are forwarded to the Preserve’s Collection Committee.

Authority

The Curator will be responsible for the proper disposition of plants. If the Curator deems the deaccession proposal appropriate, a recommendation will be made to the Collections Committee who will forward the recommendation to the Manager of Horticulture who will make the final decision in the interest of public trust.

Disposition Methods

In line with the best practices and other botanic gardens, plants may be disposed of by sale, donation, exchange or destruction. Preference for deposition will be donation to an organization with a mission consistent with the Preserve’s mission. The association of the Preserve with the schools and the University will provide good avenues for donation of plants that are not relevant to the Preserve’s collection.

Legal and Ethical Aspects of Disposition

Transfer of plants that are the property of the District to private interests could be perceived as being unethical, even if good justification and fair value has been established. This dilemma underpins the need for policy that addresses the disposition of plants in this
and similar circumstances. Otherwise, the only viable option left would be the destruction of the material.

Original restrictions, such as MTAs or requests related to the use or disposition of the material will be considered in the decision to deaccession a plant from the Preserve’s living collections. Employees and volunteers of the Preserve, their families and representatives are prohibited from acquiring material deaccessioned by the Preserve. No transaction will be carried out if it violates state, federal, or other applicable laws, Las Vegas Springs Preserve, or Las Vegas Valley Water District policy. Rare, endangered, or threatened plants and quarantined introductions will only be disposed of as per agreements with Federal and State agencies.

**Access**

The living collections on display at the Preserve will be fully accessible to the visiting public. Access to collection records shall be open to members of the Collections Committee, horticulture and curatorial staffs, and volunteers. Collection of plants, plant parts, or seed is prohibited except by persons who have legitimate need for specimens, and only after these persons have received permission from the Manager of Horticulture. Individuals or non-profit institutions requesting propagation material or specimens will be accommodated when possible, within established guidelines.

**Levels**

All museums including botanic gardens establish levels of access to their collections and the data associated with them. Levels will need to be established regarding access to the collections and botanical records of the Preserve to maintain the integrity of the data and safeguard the collections. The Manager of Horticulture, Curator, and the Registrar or Botanical Recordkeeper, are the only persons authorized to administer and modify the
database. All others will be able to view data, query, and print reports. The records may be made available to the public as a searchable database in a web format. Sensitive information relating to the accessions of Conservation status will be safeguarded and made available only to bona fide researchers.

**Purposes**

Botanic gardens are often very generous in providing plant material to other botanic institutions especially when purposes are in common. Access will be granted to the living collections for purposes of education. Community College and University Horticulture students will use the collections to study plant material. The access to collection records for purposes of research, especially in the area of biological sciences and taxonomy, and supporting the greater role of Conservation, is of tremendous potential for the Preserve. Access to plant material will be for the purpose of obtaining propagules and tissue may be granted to institutions of like mission, educational institutions, and horticultural industry persons within established guidelines.

**Records Duplication**

Having all the information documented in regard to the living collections is valuable and undoubtedly the various constituents are going to want access to it. Approval by the Manager of Horticulture or the Curator will be required for access to collection records. There will be reasonable charges for services rendered in searching records and reproduction work, particularly when the scope of the request is significant.

**Las Vegas Springs Preserve Living Collections**

The living collections of the Preserve and the objectives associated with them are characterized in relation to the Programming Zones and the institution’s mission as outlined in Table 3 below. This provides a more concise statement of purpose that further defines the
Preserve’s living collections specifically regarding the opportunities associated with arid land plants in relation to education, demonstration, research and conservation of biodiversity.

Zone 1, the Arrival Sequence, is not collection oriented although it will contain many important species of aridland trees demonstrating effective Streetscape and Parking lot plantings for shade. Other effective demonstrations will include the water harvesting off the parking areas.

Zone 2, the Visitor Center, will have gardens associated with it focusing on Mojave native plants including those that have economic, medicinal and historical uses. A great potential for Conservation exists within the purpose of those gardens. The Crossroad Commons will feature the “Desert Collection” that will incorporate non-native species of plants from around the world displayed in ecogeographic themes emulating their natural environment. This elaborate garden will emphasize plants that are appropriate to the region while pushing the limits of horticulture to expand on the variable plant palate.

Zone 3-4, is the Desert Living Center, DLC Gardens and Garden Support. While the Garden elements from the Programming Document indicate a purely demonstration function, it does not preclude the establishment of logical themes to assemble the collections around taxonomic or geographic themes. The Garden Support will be a center of activity for research and conservation of biodiversity.

Zone 5 will be treated similarly to the way that the Bloedel Reserve treats its natural areas in that they will not be collection oriented, although the area will be managed and documented intensively. The Trails will largely be restored habitat and site stewardship. Conservation of biodiversity on the site, particularly of our flagship species, the Las Vegas Bear Poppy will be of primary concern.
### Table 3 – Las Vegas Springs Preserve Living Collections

The LVSP Living Plant Collections will consist of plants native to the warm arid and semi-arid regions of the world including several key areas of emphasis:

1. Plants from arid regions of Southwestern North America, especially the Mojave Desert and plants from other regions of the world with compatible climatic conditions
2. Plants of historical, cultural and/or economical value
3. Rare, Threatened and Endangered Species

<table>
<thead>
<tr>
<th>Zone</th>
<th>Description</th>
<th>Garden Elements</th>
<th>Living Collections</th>
<th>Purpose</th>
</tr>
</thead>
</table>
| 1    | The Arrival Sequence | • Streetscapes  
• Desert Wash  
• Reservoir Parking  
• South Parking | Street Trees  
Riparian Habitat  
Shade Trees | Demonstration of appropriate Streetscape and Parking and water harvesting. |
| 2    | The Visitor Center | Water is Life Courtyard  
• The Natural Mojave  
• Birthplace of Las Vegas  
• City at the Crossroads  
Crossroad Commons  
• Ravine Walk  
• Desert Collection | • Mojave Natives  
• Ethnobotanical Gardens  
• Ranching Gardens  
• Desert Collection  
• Riparian | Mojave Native Plants; Economic, Medicinal and Historical uses of plants. Non-native species from ecogeographic regions of the world of similar climate. |
| 3 - 4 | The DLC Garden/Garden Support/Research | • Entry Gardens  
• Competition Gardens  
• How to Loop  
• Residential Gardens  
• Non-Residential Gardens  
• Garden Support Facilities | • Appropriate plants for landscape use  
• Taxonomic families of arid regions  
• Rare/Endangered Species Conservation  
• Selected Taxa for Research | • Horticultural/Landscape Display  
• Education  
• Research  
• Sustainability  
• Water Conservation  
• Conservation of Biodiversity |
| 5    | The Site Experience – “The Trails” | • Crossroads Loop  
• Springs Loop Trail  
• Preserve Exploration Loop  
• Cieniga Loop Trail  
• Spring Mound Spur  
• Plant Community Creation & Restoration | • Created Wetlands  
• Native plant communities  
• Natural areas  
• Rare, Threatened and Endangered species. (i.e. Las Vegas Bear Poppy) | • Stewardship of the Las Vegas Springs Preserve  
• Restoration Ecology  
• Habitat creation and preservation  
• Conservation of Biodiversity |
Conclusion

The Las Vegas Springs Preserve is on the threshold of becoming a significant center for cultural and environmental awareness in Southern Nevada. The focus of the project is without question on preserving the cultural resources of the site, protecting and enhancing the biological resources of the site, and promoting a sustainable future for the inhabitants of the Las Vegas Valley. As it has been throughout history, the site of the Las Vegas Springs is yet again at the ‘Crossroads.’ This time it is a philosophical journey that must take into account the variety of purposes for which the Preserve is being developed. The Executive Design team has created a vision for the Las Vegas Springs Preserve, that is set forth in the Programming document, and is now in the charge of the engineers, architects, landscape architects, contractors, and staff who will see the project through to fruition.

The subject of this paper has been to explore an area that has not been fully addressed in all the planning and design effort that has gone into the vision for the project. My purpose here is to go beyond the year 2005 and examine how the Preserve will be managed from the perspective of a botanical institution for the purposes of horticulture, education (interpretation), research and conservation. The emphasis on sustainability at the Preserve is addressed from the botanical garden perspective here, rather than the perspective of architecture and design. The objective of this paper has been to understand the inner workings of a botanic garden from a policy perspective and to apply these elements to the management and development of the Preserve’s Living Collections.

In defining the purpose of this paper, I’ve identified that conflicts can arise between the objectives of the various stakeholders in a project such as the Las Vegas Springs Preserve. In particular, I identified the conflict between the objectives of the Architects with a heavy emphasis on design, versus the objectives of the botanists and horticulturists to
establish the Preserve as a botanical institute through proper scientific and systematic curation of living collections. The conflict arose because Landscape Architects view botanic gardens, from a design standpoint, as difficult to address because of their collection orientation. They came to view botanic gardens as ‘plant zoos’ and didn’t fully comprehend the scope of work that most botanic gardens engage in, or the strength and vitality that comes from properly developing and managing collections in a systematic manner. In all fairness, limited understanding by staff regarding the work of botanic gardens provided little in the way of guidance. As a result, the Executive Design Team approached the gardens as a landscape project with a heavy emphasis on interpretation and design. This approach is fine and certainly meets the goal of their client, the Water District, to allow the ultimate demonstration of water efficient landscaping and educational facilities and to accomplish the objectives of sustainability by teaching the public how to save water and energy in their homes and gardens. It falls short however, of exploring the full potential for the Preserve in terms of the far reaching impact it can have on the environment, beyond the issues of water and energy conservation. The issue has yet to be resolved of how to satisfy the two proponents without compromising the objectives of either. It is to that end that this mechanism has been contemplated as a means of addressing the issue.

The question is; can the model be applied to the Las Vegas Springs Preserve? Will the Preserve attain the status of a botanic garden, or will it be a center for demonstration and education only? Can the multiple objectives of amenity, science, conservation, education and research be accomplished within the confines of the Preserve or will one set of objectives outweigh all the others? The mission statement says that all these different and complimentary roles are to be fulfilled by the Preserve. Only staff and management can answer these questions and make the decisions that will ultimately determine what the character of the
Preserve will be. Applying the model to the Las Vegas Springs Preserve as in section three of this paper clearly illustrates how policy for development and management of the living collections can be effectively employed. Putting policy in place for the Preserve will clarify the many issues regarding the assemblage and management of the living collections with shared understanding of the various stakeholder groups.

“Timing is everything,” as they say. It would have been ideal to have living collections policy during the programming phase of design, to inform the process. With the design process now in full swing and the previous process largely setting the parameters, due diligence and sensitivity must be employed in introducing the policy component. There is still plenty of time to establish policy for effective development and management of the Preserve’s living collections. But we must move quickly to put them in place to guide the design and construction processes and to ensure the resulting collections will have real and lasting value.

The components of an effective collections management system include policy, procedures, planning and documentation. All of these interrelated factors must work together for an effective operation that will meet the objectives of the organization. The initial collections’ planning is essentially being carried out in the schematic design, design development, and construction documentation phases, on going for the next eighteen months. In order for policy to be effective it must be established early in the process. The designs that come as a result of these processes will influence how the living collections will be managed for years to come. Establishing logical ways of organizing the collections will not only provide effective display of the plant material, but also a useful and effective platform for managing and developing the collections for the future.
References


Appendix I

Site Map

Legend

1. Arrival Sequence
2. Visitor Center
3. Desert Living Center
4. DLC Gardens / Garden Support
5. “The Trails”
6. State Museum
7. Administration
8. Service
Appendix II

Accession Forms

Missouri Botanical Garden

MBG Accession #
Destined for?
Date received

Justification for adding to Horticulture collection:

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<th>ACCESSION INFORMATION</th>
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<td>Plant Name</td>
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<tr>
<td>Source Number</td>
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<tr>
<td>Address</td>
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Wild coll. ___ Cultivated/wild origin ___ Cultivated ___ Unknown ___
Collector __________________________ Collection Number ________
Collection Date ___________________ Collection Country ____________
Collection State/Province ________
Township/Range/Locality ___________

Other coll. data

Habitat

Altitude __________ Latitude/Longitude __________

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(over)