



**Policy Statement Regarding *in situ* and *ex situ*
Plant Conservation Between Members of the
Georgia Plant Conservation Alliance.
2008**

Purpose:

This policy statement between members of the Georgia Plant Conservation Alliance establishes protocols for an integrated plant conservation strategy combining *in situ* and *ex situ* projects and including habitat restoration and plant population safeguarding. It is intended to expand the scope and accelerate the process for determining and approving *ex situ* conservation projects in order to protect plant population integrity and genetic diversity in Georgia.

The Mission of the Georgia Plant Conservation Alliance is to study and preserve Georgia's flora through multi-disciplinary research, education, and advocacy; facilitate the recovery of rare, threatened, and endangered plants of Georgia and the southeastern US through collaborative efforts in our state; and communicate the importance of preserving biodiversity worldwide.

Background:

In July of 1995 a statewide network for plant conservation was established as the Georgia Plant Conservation Alliance (GPCA). For the first time in Georgia, botanical gardens, state agencies, universities, and non-profit environmental organizations joined forces to coordinate research, education, and conservation programs focused on threatened and endangered plants. From rigorous scientific research to hands-on projects with elementary schools, the combined resources, expertise and outreach strategies of GPCA members provide powerful tools for plant conservation in Georgia. Charter members of GPCA include three botanical gardens (Atlanta Botanical Garden, Callaway Gardens, and The State Botanical Garden of Georgia), the Nongame Conservation Section of the Georgia DNR, United States Forest Service, The Nature Conservancy of Georgia, and the University of Georgia. This Alliance, one of the first of its kind in the United States, has been studied by neighboring states and national conservation organizations as a model for their own programs. GPCA initiates and coordinates efforts to protect natural habitats and endangered species through biodiversity management and public education.

Rare plants and endangered plant communities almost always receive less publicity, less protection, and lower levels of funding than do animals, although the threat to their survival is even greater. Extinction rates for plant species are seven times greater than for animals.

Seventeen vascular plants are presumed extinct in the United States, 164 are possibly extinct, 2,530 are imperiled or critically imperiled, and an additional 2,556 are vulnerable. Plants constitute more than half of the 1,290 plant and animal species on the federal endangered or threatened list, yet animals receive 97 percent of the available funding, according to the 2003 U.S. Fish and Wildlife Service expenditure report, which includes money spent by all federal and state agencies. This disproportionate emphasis ignores the essential role that plants play in the structure and function of ecosystems or in our daily lives.

The southeastern U.S. supports 33% of the total number of plant species in the United States on just 17% of the land mass. Species richness reaches a maximum in the region which includes such hot spots of biological rarity and diversity as rock outcrops, pitcherplant bogs, sandhills, cove hardwoods, boulderfields, relict prairies, canyons, and remnants of the Longleaf Pine ecosystem. Georgia ranks seventh in the nation in the number of extant plant species behind other high biodiversity states, such as Hawaii and California. This richness of plant species results in part from the diversity of physiographic provinces (from the Blue Ridge, Cumberland Plateau, and Ridge and Valley in the north through the Piedmont and south to the Coastal Plains and Barrier Island complex.) Unfortunately, however, Georgia is also experiencing tremendous threats to its biodiversity. These include not only habitat destruction, reflecting rates of population growth and development among the highest in the nation, but also include the degradation caused by invasive species and exotic pathogens.

The GPCA is committed to protecting natural habitats in Georgia by developing innovative strategies for biodiversity management and mobilizing the public through educational programs. Collectively, GPCA members own or manage extensive research facilities and nature reserves throughout the state. Their professional expertise embraces the entire field of plant conservation, from laboratory research to natural areas management and conservation education. Participation of the largest botanical gardens in the state, as well as the University of Georgia, enables GPCA to take advantage of an extensive, pre-existing network for public education. The GPCA member gardens alone attract 1,360,000 visitors annually. Finally, GPCA's interdisciplinary structure is well suited to addressing the scientific, social, and regulatory complexities of conservation issues.

One aspect of GPCA distinguishing it from other networks is the commitment to keep the alliance simple, decentralized, and project driven. Projects are steered by committee chairs that discuss projects with team members, set priorities for each field season with calendar deadlines, and provide project status reports to the GPCA body at each of our three annual meetings. Normally, GPCA projects are suggested by Georgia Natural Heritage Program botanists who identify conservation needs. The GPCA Coordinator facilitates and expedites the project by using the GPCA network to establish a project team and secure contributions from various member organizations towards its successful completion. Contributions among members vary with each project, given a particular organization's resources, expertise, constraints of time and budget, and other project demands, etc. The project team then selects a chairperson who is responsible for communicating regularly and pro-actively with the GPCA Coordinator. Current projects include restoration and management of pitcherplant bogs; propagation, genetics, and management of a Georgia endemic tree, *Elliottia racemosa* (Georgia plume); safeguarding

Torreya taxifolia (stinking cedar), *Tsuga caroliniana* (Carolina hemlock), and *Gentianopsis crinita* (fringed gentian); and the creation of a network of volunteers called the Botanical Guardians who conduct searches for rare species, and monitor rare species' populations and habitat. There is also an in-school conservation project titled the Georgia Endangered Plant Stewardship Network (GEPSN) where children become active stewards of the environment by propagating and caring for rare plants. To increase communication around the state, a GPCA newsletter is periodically produced; and in an effort to better support teachers and students within the stewardship network, several products were created such as a GEPSN newsletter, the Green Plant Blues News, and a web site with background information on plant projects and plant conservation in Georgia. GPCA maintains a website describing its projects and listing member contact information. We also produce and publish posters and brochures about our conservation projects and issues effecting plants in Georgia such as invasive species.

The Georgia Plant Conservation Alliance is adopting a new, aggressive plant conservation initiative targeting a prioritized list of critically endangered plant species. The list was assembled by a technical team of knowledgeable botanists, ecologists, and conservation professionals from throughout Georgia, and was coordinated by the Georgia DNR as part of the State Wildlife Action Plan (formerly Comprehensive Wildlife Conservation Strategy). Specially trained volunteers from the Botanical Guardians network will be working with GPCA scientists to help locate populations of these rare plants to assess their sites and collect seeds for propagation at GPCA botanical gardens. Plants will be propagated for safeguarding at the botanical gardens (*ex situ*) and at specially selected and secured safeguarding sites in the wild (*in situ*). Plants will also be propagated for restoration of parent populations in the wild, to be reintroduced back to their source populations.

GPCA Participating Organizations and Research Collaborators

Atlanta Botanical Garden

Atlanta History Center

Callaway Gardens

Chattahoochee Nature Center

Coastal Plain Research Arboretum

Fort Valley State University

Georgia Botanical Society

Georgia Department of Natural Resources

Georgia Department of Transportation

Georgia Native Plant Society

Georgia Power

Georgia Southern Botanical Garden

Georgia Wildlife Federation

Joseph W. Jones Ecological Research Station

The Nature Conservancy of Georgia

North Georgia College and State University

The State Botanical Garden of Georgia

The University of Georgia

USDA Forest Service

Existing Technical and Ethical Guidelines for Conservation Horticulture:

With regard to integrated plant conservation techniques *in situ* and *ex situ*, GPCA has been operating under the guidelines of our own institutions and those set by governing plant conservation organizations such as Botanic Gardens Conservation International, the Center for Plant Conservation, the World Conservation Union (IUCN) Re-introduction Specialist Group of the Species Survival Commission, the Convention on Biological Diversity, The Nature Conservancy, and the Society for Ecological Restoration International; and publications including, but not limited to, the Global Strategy for Plant Conservation (CBD and IUCN, 1992), A Handbook for Botanic Gardens on the Reintroduction of Plants to the Wild (BGCI, 1995), the New England Plant Conservation Program (Brumback, 1992), Ex Situ Plant Conservation, Supporting Species Survival in the Wild (Guerrant, Haven, and Maunder, 2004), Genetics and Conservation of Rare Plants (Falk and Holsinger, 1991), Principles and Practices of Plant Conservation (Given, 1994), and Restoring Diversity: Strategies for Reintroduction of Endangered Plants (Falk, Miller, Olwell, 1996).

Plant conservation literature is quite consistent in its ethical guidelines internationally and nationally. The following is a summary of these guidelines as they relate to collaborative projects developed by GPCA for restoration and safeguarding activities involving plant reintroduction, introduction, augmentation, seed banking, and rescue.

Definitions:

Safeguarding refers to all types of propagation and/or outplanting activities that constitute a conservation strategy of last resort. Specifically, safeguarding refers to various propagation and outplanting activities as they relate to *ex situ* or *in situ* efforts, including re-introductions, augmentations/enhancements, and introductions. **I. *Ex situ* safeguarding collections** - indexed collections of plants, seed banks, and germplasm of known provenance at botanical gardens, arboreta, nature museums, etc.

II. *In situ* safeguarding outplantings:

A. Introduction (a.k.a. establishment, experimental) - controlled placement of plants into an area where the plant is currently absent and historically unknown.

B. Augmentation (a.k.a. enhancement, reinforcing) - the addition of plants to an existing population, with the aim of increasing population size or diversity, and thereby improving its viability.

C. Reintroduction - the process of placing plants back into formerly occupied habitat or into suitable habitat within the plants' natural range.

Guiding Principles:

Plant conservation projects emphasizing safeguarding (*in situ* and *ex situ*) and restoration are planned and determined on a case-by-case basis with consensus from the GPCA body. There are exceptions to every rule when working with biological systems, and all decisions for restoration and safeguarding projects are deliberated and documented in writing. The following principles guide GPCA's restoration and safeguarding projects.

1. The GPCA recognizes habitat protection as the preferred method for preserving species. Maintaining viable populations in their natural habitat is the best way to conserve rare and endangered plants. However, protection for all plant species in the wild is not feasible as populations decline or are destroyed. GPCA opposes any activities that harm plant populations *in situ*. GPCA endorses habitat restoration; population augmentation, introduction, and reintroduction; and safeguarding *ex situ*: when it is necessary to 1) increase the viability of a population (especially in cases of dwindling and non-reproductive populations) or 2) safeguard genetic diversity (creating indexed populations to guard against extinction). Under the right circumstances, such responses as reintroduction, introduction, augmentation, safeguarding *ex situ*, and rescue may be suitable to prevent the decline of existing populations or restore lost populations to suitable habitats within their historical range.

2. A top priority for GPCA is the protection and safeguarding of individual plant populations, maintaining their genetic integrity in order to protect the full range of genetic diversity within a species. For all of our horticulture conservation projects for restoration and safeguarding, indexed plant material of documented origin is maintained. Plant provenance is fundamental and strictly maintained. GPCA uses voucher specimens, formal plant records and accessioning systems, and special plant labeling to track indexed plant material. Plant material is not mixed between populations unless a highly unusual project specifies a dramatic need for such an aggressive practice, and then only with the consent of the GPCA body and appropriate state and federal organizations. Plant material is not reintroduced to a population unless it comes from that original population or unless a special breeding project is necessary for the survival of a species. A species may be in serious decline requiring crosses between populations to try to encourage reproduction and increased genetic diversity (possible examples include *Torreya taxifolia* and *Rhus michauxii*). Plant introductions *in situ* for safeguarding are created within the historical range of the species but not within breeding range of other viable populations of that same species. Plants without proper provenance documentation are suitable for education and display. Plant material from educational displays is valuable for safeguarding in the extreme situation that all other surviving plant material *in situ* and *ex situ* has been lost.

3. Reintroduced and introduced populations *in situ* are deemed experimental with no long-term guarantee of survival. Careful documentation of these sites is maintained by GPCA and Georgia DNR. Until a population is self-sustaining (actively reproducing with evidence of seedling recruitment) it is not deemed successful and contributing to the survival of the species as a whole. However, it is important to note that properly planned, documented, and monitored projects, even when they fail, add to the body of scientific knowledge.

4. GPCA obtains all required permits for collecting, reintroduction, introduction, augmentation, and rescue, and will obey all state and federal guidelines while working with rare and endangered plant species. GPCA does not advocate destructive collection methods or collection that may impede the progress of natural populations.

5. GPCA will obtain landowner permission before collecting material or implementing any horticulture conservation projects on private land. Landowners are seen as partners and their participation and support for a project is vital for its success. Respect for landowners is a GPCA priority.

6. GPCA will consider participation in the rescue of plant populations, only when the population is legitimately doomed to destruction and we have the landowner's permission. GPCA follows plant rescue guidelines set by the Georgia Native Plant Society. GPCA offers suggestions to landowners to help protect populations *in situ*. We prefer to remove propagules only (seeds, cuttings, and divisions) rather than whole plants. GPCA is cautious in its involvement in mitigation and participates only as a last resort and only with approval from the GPCA body.

7. When removing plant material from an original population, GPCA uses the 10% standard, collecting no more than 10% of the seeds or removing divisions or other propagules from no more than 10% of the parent plants on site. Research has shown that collecting, on average, a minimum of 30 propagules from a population is recommended to give a 95% chance that at least one individual will survive (Guerrant, 1992). Collection at this level can only be done if it does not jeopardize the viability of the original population. If seed production is low, seed collection may be spread over a series of years to reduce any negative impacts to the parent population. In this situation, if a population is declining quickly and no safeguarding material exists, a larger percentage of the existing seed or other propagules may be collected. These collection guidelines may be modified depending on a species' type of breeding system and the distribution of genetic diversity within and among populations. For example, if a species is primarily a selfing species (crossing genetically within an individual plant) or if the species maintains most of its genetic diversity within populations (each population holds alleles unique to that population and different from all others), then more plant material will need to be collected in order to capture that genetic diversity. As is often the case with rare plant species, this genetic and breeding system information is not known and a best guess based on experience and the scientific literature must be used.

8. Site location and landowner information is kept confidential by all members of GPCA to protect wild populations of rare plants. GPCA reserves the right to deny someone location information to protect sensitive rare species as specified in Section 50-18-72 of the Open Records Act (below). All volunteers working with GPCA agree to maintain confidentiality regarding all site location and project specifics.

THE OPEN RECORDS ACT (O.C.G.A. 50-18-70 through 76).
Section 50-18-72. When public disclosure not required.

(a) Public disclosure shall not be required for records that are:

(11) Records that contain site specific information regarding the occurrence of rare species of plants or animals or the location of sensitive natural habitats on public or private property if the Department of Natural Resources determines that disclosure will create a substantial risk of harm, theft, or destruction to the species or habitats or the area or place where the species or habitats are located; provided, however, that the owner or owners of private property upon which rare species of plants or animals occur or upon which sensitive natural habitats are located shall be entitled to such information pursuant to this article.

Criteria for Release of Plant Material *In Situ*:

A successful restoration or safeguarding project requires detailed knowledge of a species' survival criteria. Growing plants successfully *ex situ* provides a significant amount of information on the life history and growing requirements of that species. GPCA brings a special talent to *in situ* conservation projects in Georgia because of the horticultural expertise of its member botanical gardens and the life history knowledge and ecological understandings of GPCA land managers. Coupled with the research knowledge of GPCA ecologists, botanists, and geneticists, this makes for an effective integrated plant conservation team.

1. Site selection

Using the GPCA network and expertise of the Georgia DNR, Nongame Conservation Section staff, sites for *in situ* recovery projects are chosen based on the following set of criteria and considerations.

Conservation Status - Is the site protected by state or federal categories of ownership, land trust, or conservation easements? Do we have landowner permission to easily access the site when needed? Is there a long-term commitment from the landowner to secure the site and the project?

Accessibility - Is the site accessible to GPCA for work? In addition to landowner permission, will the site reasonably accommodate equipment and plant material transport, and return visits for monitoring and management? Conversely, will the site be readily accessible to people who might tamper, tramp, or take plants from the site?

Appropriateness - Does the site meet the needs of the species? While sites can be managed, do the basic characteristics of the site match the needs of the species to be conserved (soils, hydrology, light, aspect)? GPCA will often test the survival and success of a few individual plants at an *in situ* introduction (safeguarding) site for at least one growing season prior to planting an entire indexed safeguarding collection. Are there other factors (land for purchase, invasive species, effluent or erosion, feral animals, dual land use) that are concerns limiting the use of a site?

2. Plant material health and preparation

When placing plant material *in situ*, GPCA takes great care not to introduce any pests or pathogens. Roots are washed clean of potting soil before plants are transported to the field to prevent greenhouse weeds or soil pathogens from being introduced *in situ*. Only healthy plants free of any signs of disease, fungal infections, or pests are allowed *in situ*.

3. Establishment

GPCA uses a variety of techniques to help plants establish *in situ*.

Water - Members will hand water plants weekly or more frequently when plants are first placed in the field, although plantings are usually performed in the dormant seasons, in order that newly placed plants are not unduly stressed by heat or drought. Plants placed in wetlands generally require no additional water. Species established in other habitats may require watering initially until their roots become established. If the source of the water is a concern, GPCA can take steps to use distilled water or natural water from a nearby source.

Cages - GPCA also uses exclusion devices, such as cages, and in some cases simple fencing, to exclude animals that might pull or root-up the plants before they are established. These can be removed from the site when it is determined they are no longer necessary.

Erosion controls - It is unlikely GPCA would place plants into a site with an existing erosion problem. However if necessary, GPCA will use silt fencing to protect plants from washing away before they are established. It is often preferable to use natural materials selected from the site such as logs, branches, and rocks to help slow and spread water that may wash severely over newly planted material.

Labels - GPCA will often discretely mark a planting site with flagging tape and may mark planting sites for individuals with some sort of plant label to help relocate the plants when monitoring. Stainless steel photo stakes to mark photo-points for establishing long term photo monitoring of a site have also been employed.

Chemicals – Depending on the project, the use of chemicals *in situ* may be required, with permission from the landowner. GPCA has used herbicides when removing Chinese Privet. Other research projects *in situ* have involved the uses of various fungicide applications and fertilizer regimes. These are only used for very specific projects and are not applied on a broad scale.

4. Management

GPCA members are often directly involved in the management of their *in situ* projects, but GPCA will transfer responsibility to another party as long as active management in perpetuity is guaranteed. Many sites require restoration before safeguarding material can be introduced. Depending on the condition of the site, this may take several growing seasons. Once the plant material is in place, active management will continue, often with multiple work party visits during the first few years. After a site appears self-sustaining, management may only be required once a year or less.

5. Monitoring

GPCA has utilized a variety of monitoring techniques as appropriate for the project, including photo monitoring, mapping, vegetation sampling (species richness, percent woody cover), and population surveys (from formal counts to a variety of sampling methods). GPCA monitors all *in situ* projects annually, or more frequently when projects are newly established. Monitoring reports are kept on file at GPCA member gardens. Copies of monitoring reports are sent to the Georgia DNR Nongame Conservation Section as well. GPCA also utilizes a network of specially trained volunteers who are selected to participate in our Botanical Guardians project. Volunteers

living near an *in situ* project are able to perform regular site visits, especially during such critical times as flowering, fruiting, or during periods of drought or other management concerns.

This **Policy Statement between members of the Georgia Plant Conservation Alliance** formalizes the ethics and guidelines to be used by all GPCA members when engaged in GPCA sponsored plant conservation (*in situ* and *ex situ*) activities, including safeguarding and restoration.

Bibliography

Akeroyd, J. and P. S. Wyse Jackson. 1995. A Handbook for Botanic Gardens on the Reintroduction of Plants to the Wild. Botanic Gardens Conservation International, in association with IUCN Species Survival Commission (Reintroductions Specialist Group). Botanic Gardens Conservation International, U.K.

Center for Plant Conservation. 1991. Genetic sampling guidelines for conservation collections of endangered plants. Pages 225-238 in D. A. Falk and K. E. Holsinger, editors. Genetics and Conservation in Rare Plants. Oxford University Press, New York.

Botanic Gardens Conservation International. 2006. Conserving threatened plants and restoring plant diversity B A contribution to the Global Strategy for Plant Conservation Implementing Target 8: *Ex situ* Conservation supporting recovery and restoration programmes. Botanic Gardens Conservation International, U. K.

Falk, D., C. I. Miller & M. Olwell. 1996. Restoring Diversity: Strategies for Reintroduction of Endangered Plants. Island Press. Washington, DC.

Given, D. R. 1994. Principles and Practices of Plant Conservation. Timber Press. Portland, Oregon.

Guerrant, E. O. 1992. Genetic and demographic conservation in the sampling and reintroduction of rare plants. In Conservation Biology: The Theory and Practice of Nature Conservation Preservation and Management, P. L. Fiedler and S. K. Jain editors, pp. 321-344. Chapman and Hall, New York.

Havens, K., M. Maunder, & E. O. Guerrant, editors. 2004. Ex Situ Plant Conservation: Supporting Species Survival in the Wild. Island Press. Washington, DC.

New England Wildflower Society, Inc. 1992. New England Plant Conservation Program. Wild Flower Notes. Volume 7 Number 1.

The Botanical Gardens Conservation Strategy. 1989. IUCN Botanical Gardens Conservation Secretariat, Kew.

The Gran Canaria Declaration calling for a Global Program for Plant Conservation. 2000. Conference of the Parties to the Convention on Biological Diversity. Nairobi, Kenya.

The Interim Secretariat for the Convention on Biological Diversity. 1992. Convention on Biological Diversity. Chatelaine, Switzerland.

Wyse Jackson, P. S. and L. A. Sutherland. 2000. International Agenda for Botanic Gardens in Conservation. Botanic Gardens Conservation International, U. K.