

**BALCONES CANYONLANDS PRESERVE
LAND MANAGEMENT PLAN**

TIER II A

CHAPTER 1

LAND MANAGEMENT PLANS AND GUIDELINES



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1.0 LAND MANAGEMENT PLANS AND GUIDELINES

The BCCP preserve system is to be managed to permanently conserve and facilitate the recovery of the populations of target endangered species inhabiting western Travis County. This priority objective will govern preserve management activities to improve target species habitat, while protecting preserves against degradation caused by urbanization of surrounding lands and increased public demand for recreation usage within preserves.

The welfare of target species (species of concern) will be the overriding influence on all decisions regarding activities on preserve lands. Decisions about activities within preserves should be made cautiously, so as to meet biological objectives to protect and enhance target species and minimize risk of damage to their habitat.

2.0 LAND MANAGEMENT PLANS

Because individual tracts will have varying types of habitat and may offer varying degrees of public access, each preserve manager will be required to obtain Coordinating Committee Secretary approval of a land management plan for each tract within one year after issuance of the Permit, or within one year after land acquisition, whichever is later.

2.1 Tract Land Management Plans

A tract Land Management Plan will describe both short-term and long-term management objectives and will serve as the primary document for reference and justification for all operations on that preserve. Each plan will identify major operational needs, issues, problems, and strategies, with sufficient information to serve as a complete guidance document. The plan should be written to cover a period of five years, but revisions to the Plan during these five years can be made as appropriate. Management plans for existing parks and preserves which will be included in the BCCP preserve system will need to conform with BCCP management guidelines, goals and policies. Management plans for contiguous or adjacent tracts will be reviewed for compatibility with one another. If such tracts are operated by different managing partners, the land management plans for each tract should be coordinated with the respective preserve managers.

Management Plans will contain the following information: (1) tract descriptions, (2) a management program, and (3) a system for monitoring management activities.

The Tract Descriptions section will provide the location of the tract with acreages and a graphical representation of the tract boundaries. It will also include descriptive information (historical, archeological, administrative, legal, financial, social, physical, ecological) and any other relevant information affecting the preserve to provide the basis for successful and efficient management of the preserve.

The Management Program section will identify any specific goals for the tract and will set priorities based on these goals. It will discuss all current and proposed future activities for the tract and give an analysis of the impact of these activities on the tract and on the endangered species and species of concern located on the tract. No activity will be allowed which results in a "take" of an endangered species, or which degrades or in any way harms the preserve. The management activities will be designed so that observation and monitoring efforts can be used to increase the efficiency of future management activities. The Management Program will also identify the resources that will be needed for these activities.

When writing land management plans, consideration should be given to restoration and enhancement of endangered species habitat, including vegetation restoration and control of browsing pressure. Consideration should also be given to management and control of fire ants, oak wilt, cowbirds, nest predators, and other problem species, if they occur on the tract. Each tract should have a fire management plan, including sufficient details to guide decisions on whether to suppress or allow natural fires and/or controlled burns. A multiple-use management approach may be appropriate on some tracts, whereby other uses may be compatible with the primary habitat protection and species management goals, as long as these uses either benefit or have no negative effects on the species of concern and do not significantly compete with other management efforts for personnel or financial resources. Examples of such uses which may be compatible under certain circumstances include recreation, environmental education, scientific uses, watershed protection, and non-endangered wildlife species management.

Since portions of each preserve component may be uninhabited, continually inhabited, or only seasonally inhabited by target species, specific access and management prescriptions may vary within each preserve and may include a variety of access options: year-round unrestricted access; year-round restricted access; or seasonally restricted access. Despite the potential for variability in individual management plans for preserve components, the design and implementation of land management plans must follow the guidelines set forth in the following section. In particular, habitat for target species in

BCCP preserves should be managed for existing and expanding populations and for re-colonization when local populations decline or are extirpated.

The Management Monitoring section will state what process will be used to monitor and evaluate the progress of management on the preserves and the effects of the management program on the species of concern and their habitats. This evaluation and monitoring will form the basis for management plan revisions.

2.2 Interim Land Management Responsibilities

Prior to the submittal to the Coordinating Committing Secretary of a land management plan for a specific tract, the preserve land will be managed per the Land Management Guidelines in the following section. Issues that each managing partner must address during this interim period are controlling access, protecting habitats, law enforcement, and fire control.

2.3 Annual Reports

Overall land management activities will be reviewed annually by the Coordinating Committee Secretary. To facilitate this process, preserve managers must submit annual reports to the Coordinating Committee Secretary, documenting compliance with individual land management plans and summarizing any monitoring efforts. Managing partners shall provide reasonable access to preserve system lands to Coordinating Committee representatives and preserve land managers for inspection, monitoring, or other functions consistent with preserve system goals.

3.0 LAND MANAGEMENT GUIDELINES

The following land management guidelines, a modification of TPWD draft 1993 Balcones Canyonlands Conservation Plan: Management Standards and Guidelines, attempt to achieve the biological objectives of the Permit by means of relatively standard land-use methodologies in coordination with monitoring programs (TPWD 1993). They generally adhere to the recommendations of the Biological Advisory Teams report (1990) with regard to suitable protective measures and compatible recreational uses of preserve lands. As other land management practices become available, they may be incorporated into the land management guidelines as appropriate.

Long-term monitoring of both the environmental quality of the preserve and the health of its populations of endangered species is a necessary part of this endeavor. This is primarily because the basic biology of most local federally listed species is not

sufficiently well understood to allow prediction of the impact on those species of specific management activities or use-intensity levels for public recreation. Consequently, management practices should be prescribed and monitored with an appropriate multi-species emphasis and overall ecosystem approach.

In accordance with the habitat preserve objectives, the following land management guidelines have been prepared for on-site vegetation management alternatives, management browsing pressure, control of public access, problem animal control, management of springs and associated watercourses, research and monitoring, and species-specific management.

3.1 Vegetation Management

Each of the following techniques may be used only in accordance with individual land management plans approved by the Coordinating Committee and USFWS.

3.2 Prescribed Fire

This practice is likely to be an effective tool for creation or maintenance of black-capped vireo habitat. Since uncontrolled hot fires have the capacity to destroy golden-cheeked warbler habitat and sensitive plant areas, use of prescribed burns should be undertaken with proper caution. The proposed location of fire lanes should not increase internal woodland edges or fragment woodland communities in golden-cheeked warbler habitat. A fire lane construction in occupied habitat should not be constructed during the season that migratory birds are in residence.

3.3 Mechanical Control

If mowing of grassed areas is necessary (i.e., for control of fires), tired tractors with shredders are permitted. Brush cutting with hand tools or with push brush-hogs is also permitted. Heavy equipment techniques such as chaining, grubbing, root plowing, blading, and hydro-axing have a greater potential for long-term soil erosion damage. Unless specifically authorized by the Coordinating Committee Secretary as part of a site-specific land management plan, including individual projects, the practice of vegetation removal by heavy equipment is prohibited.

3.4 Chemical Control

Applications of herbicides for specific purposes such as control of stands of exotic, invasive, or nuisance plants, and vegetation management at human access points may be permitted, upon review by the Coordinating Committee Secretary. All applications of

chemical herbicides must be performed by licensed applicators. Documentation of all applications must be kept on file by the preserve manager and made available to the Coordinating Committee Secretary upon request.

3.5 Grazing

Grazing, when approved by both the Coordinating Committee Secretary and the USFWS, may be employed on preserve lands as a limited vegetation management tool. Use of cattle grazing will be restricted to locales where other practices are difficult or impossible to use. If used, grazing intensity must not lead to degradation of water quality or increased cowbird populations. A cowbird-trapping program should be considered whenever livestock grazing as a management practice is employed.

3.6 Control of Oak-Wilt

Treatment of oak wilt is encouraged and should follow oak-wilt guidelines as established by the Texas Forest Service Oak Wilt Suppression Project, and must be approved by both the Coordinating Committee Secretary and the USFWS.

3.7 Management of Browsing Pressure

Browsers are herbivorous animals, such as native/feral/exotic deer, goats, and sheep, and sometimes cattle, which forage on understory plant growth (i.e., forbs and deciduous and evergreen trees and shrubs).

3.8 Fenced Enclosures to Exclude Browsers

Sensitive plant sites may be protected from excessive plant loss through over-browsing by placement of effective fenced enclosures that keep browsing animals out.

3.9 Browsing Animal Populations

In some cases, over-browsing may suppress the abundance and distribution of tree and shrub species in plant communities preferred by golden-cheeked warblers and black-capped vireos. Management of browsing pressure within these vegetation communities is a complex task that may require perimeter fencing of preserve tracts (when possible), long-term monitoring, hunting programs and intensive control efforts of browsing-animal populations. Browsing-animal control efforts should be instituted when declines in important vegetation components have been documented at a particular site. Appropriate deer population objectives should be set after consideration of deer and vegetation data from each site. Introduction of browsing animals must be approved by the USFWS.

3.9.1 Indirect Control

Practices designed to increase deer populations are prohibited. This refers to manipulation of vegetation, placement and maintenance of mineral blocks, or establishment of supplemental animal feeding areas. Restrictions on placement of deer feeding stations may be relaxed if such stations are essential for approved population control programs.

3.9.2 Direct Control

Approved deer control efforts should be designed to remove unnecessary animals as quickly, safely, and humanely as possible. Because most preserve tracts will become increasingly surrounded by suburban developments and experience higher recreational use, application of the latest non-lethal population control technologies may be considered.

3.10 Public Access

The preserve system may offer public access and recreational opportunities within the Austin and Travis County area where possible and manageable. Public access may be allowed where and when such access does not threaten the welfare of the target species of concern, which is the overriding goal of the preserve system, nor cause the degradation of soil, vegetation, or water resources.

The key to allowing public access that is non-threatening and non-damaging to preserve lands is implementation of effective management strategies to control such access and use. These management strategies must be specified in the individual land management plans and implemented by the preserve tract managers. Demonstration over time of effectively implemented management strategies on a preserve tract may justify increased public access opportunities. Demonstrated non-effectiveness or habitat degradation may justify less public access for a particular tract.

Effective management strategies can be any combination of, but are not limited to: fencing; signage; seasonally-restricted access; selected access to non-habitat areas of a tract only; careful trail and amenities location, design and relocation; ranger patrols and enforcement; or prohibited access to selected sensitive areas of a tract. Preserve managers are encouraged to consider creative plans that could increase public education and recreational opportunities while ensuring the welfare of the target species of concern.

Access to specific sites during specific seasons will be regulated to conserve target species and their associated communities. Creation of new roadways, trails, and cleared right-of-ways that open the canopies of woodland and shrubland communities, create additional impervious cover, or facilitate public use of preserve interiors or high quality sites occupied by target species should be discouraged. Access routes for preserve operation and maintenance can be rerouted if in an approved land management plan.

3.10.1 Basic Preserve Access Control

Provisions for adequate fencing and signage on all preserve components shall be undertaken by BCCP land managers. As preserve lands are acquired, upgrading of fencing along perimeter boundaries should be undertaken as soon as practical to achieve human access control. Interior fencing, if appropriate, should be established as a lower priority. Posting of signs should also be undertaken as soon as practical to identify the land as a preserve component or to prevent unauthorized use. These signs should be placed along perimeter fences, gates and other access points, and long trails and roads.

3.10.2 Individual or Independent Group Use

It is necessary to avoid, detect, and reduce the types of localized detrimental impacts associated with human activity on the preserves. The following types of outdoor activities may be allowed if they do not conflict with conservation of target species as described in the individual preserve land management plans.

3.10.3 Walking/Jogging/Hiking

Unsupervised group access should not be allowed within 100 meters of occupied songbird habitat during the breeding/nesting season, unless such access can be documented to show no apparent degradation to the welfare of the species of concern. Relatively extensive trail networks along existing right-of-ways may have to be maintained and monitored if this activity is approved. Creation of new trails will be addressed in preserve land management plans and should leave woodland canopies intact. In golden-cheeked warbler habitat, new trails should not fragment woodland interiors or allow human use intensity that threatens this species.

3.10.4 Fishing

Fishing may be allowed where there is existing access to lake frontage that is not inhabited by target species. If allowed, fishing locations will be designated and fishing will not be allowed outside designated areas. Fishing in environmentally-sensitive springs and deeper spring runs, especially where rare salamander species are present, will

be prohibited. Construction of new roads, access points and other support facilities for fishing must be approved in the preserve land management plans. Stocking of native or exotic species is prohibited unless specified in an approved land management plan.

3.10.5 *Swimming/Boating/Rafting/Tubing*

Designated water access areas may be available at selected locations, based on approved land management plans. Bank access restrictions may be necessary to protect adjacent target species habitats.

3.10.6 *Bicycling*

This activity is prohibited, except for selected sites designated as experimental sites, with appropriate monitoring for effects on the preserve and enforcement of all applicable rules. As part of an approved plan, creation of new trails should leave woodland canopies intact. In golden-cheeked warbler habitat, trails cannot fragment woodland interiors or allow human use intensity that threatens this species. Any new bicycle trails should be designed to minimize erosion, and existing approved trails exhibiting significant erosion should be closed and repaired. Any existing trails not approved by the Coordinating Committee Secretary will be closed.

3.10.7 *Horseback Riding*

This activity is prohibited, except for selected sites designated as experimental sites, with appropriate monitoring for effects on the preserve and enforcement of all applicable rules. Stables and similar facilities for the long-term (overnight or longer) maintenance of groups of horses shall not be constructed within any part of the preserve system. Contracts with private and commercial facilities on adjacent lands may be negotiated for use of tracts during the non-nesting and breeding season, provided that mitigation, clean up, and cowbird trapping are implemented. However, horses may be used for appropriate preserve O&M activities.

3.10.8 Off-Road Vehicle (ORV) Riding

This is prohibited as a recreational activity because it is not compatible with preserve management objectives and goals. Furthermore, appropriate barriers and enforcement penalties should be established to minimize trespass into preserve properties and subsequent damage by ORV users. However, these vehicles may be used for appropriate preserve O&M activities.

3.10.9 Picnicking

This activity will require provision of trash receptacles and restroom facilities at staging areas located near the periphery of tracts. If preserve managers wish to allow this activity, preserve land management plans will designate picnic sites that can be easily maintained, to avoid creating focal centers for cowbird feeding activity.

3.10.10 Camping

This activity is allowed only in designated areas and if related to O&M or guided educational activities. When allowed, camping should be restricted to minimum-impact camping. Preserve managers will designate suitable camping areas, and these minimum-impact camping areas should be rotated frequently to enable each site to recover from past use. Only closed-burning fires (such as camp stoves) will be allowed.

3.10.11 Nature Viewing

Some examples of permitted nature viewing opportunities are designated viewing areas with blinds, trails with descriptive trail brochures, or guided tours. Educational tours should be encouraged but procedures for review of tour group activities will be established in land management plans, as discussed below. Attempts to artificially improve wildlife viewing by maintenance of supplemental feeding areas are prohibited.

3.10.12 Spelunking

All access to caves must be restricted to permits issued by the appropriate land management agency, based on an appropriate program in the land management plan for the preservation of the cave ecosystem.

3.10.13 Rock Climbing

Rock climbing and related activities are prohibited, except for selected sites designated as experimental sites, with appropriate monitoring for effects on the preserve and enforcement of all applicable rules.

3.11 Non-Commercial Group Use

Non-commercial groups are nonprofit organizations, schools, and educational groups that request visitation to any tract for educational purposes or research. This use should be encouraged as long as it is monitored for possible habitat degradation and adverse impacts. These groups will be issued permits by the appropriate land management agency. The permit process should include user guidelines that protect target species and their respective habitats.

3.12 Educational Uses

Educational use is defined as those activities whose primary intent is to present or interpret information about the ecology of the preserve sites or the target species. Daytime field trips by school groups are typical of this public-use category.

3.13 Research Uses

Research use activities include those activities that will gather and interpret site-specific data in a way that improves understanding of the ecology of preserve species, plant communities, and aquatic and subterranean environments. Such activities will be coordinated through the appropriate preserve land manager.

3.14 Commercial Use

3.14.1 Guided Tours

Commercial tour groups are allowed to schedule tours of preserve sites, subject to the provision that such groups abide by prevailing visitation guidelines for that tract. The preserve land manager remains responsible for appropriate land management, including public access, regardless of whether operations, including private group tours, are accomplished by the land manager or through contractual arrangement. Contractual arrangements for guided tours will be non-exclusive with regard to public access.

3.14.2 Film-Making

Film production projects may be allowed subject to approval by the preserve manager and the Coordinating Committee Secretary. The film production process must not negatively impact the preserve environment.

4.0 PROBLEM ANIMAL CONTROL

Certain animals have been identified as potential direct threats to target species, particularly cowbirds, fire ants, and predators. Typical animal control efforts on preserve tracts will likely involve some combinations of the following approaches: public education; manipulation of problem species habitat; selective relocation of individual problem animals; selective destruction of individual problem animals; and destruction of problem animals on a population level. Control efforts should use methods that emphasize maximum selectivity and effectiveness at minimum cost. Destruction of problem animals will be done in a humane manner.

4.1 Deer

White-tailed deer and other browsers can cause serious problems with over-browsing vegetation and need to be controlled. Such methods have been discussed previously in the guidelines found under the section entitled, "Management of Browsing Pressure."

4.2 Cowbirds

Cowbirds, an open-field bird species, are well known for parasitism of songbird nests. It is suggested that management approaches to reduce cowbird populations include the following elements: restoration of native ground cover and dense woodlands for those areas previously disturbed; removal of any supplemental bird feeding stations; elimination of wildlife food plots; and minimization of livestock stables and holding pens. Although these approaches have been associated with reduced cowbird abundance, it may still be necessary to remove individual cowbird eggs from parasitized songbird nests.

Intensive cowbird trapping programs on an interim or permanent basis may be necessary at selected sites. Preserve managers may use trapping, singularly or in conjunction with other habitat manipulation strategies. Trapping should be designed to maximize the effect of cowbird control and minimize capture and loss of non-target species.

4.3 Predators

Bird nest predators may be controlled selectively. Some problem animals that predate songbird eggs and young are domestic and feral cats, raccoons, possums, snakes, jays, and skunks. Managers of preserves adjacent to residential areas should consider a live-trapping program to reduce the number of domestic and feral cats that may hunt songbirds on preserves.

4.3 Fire Ants

Fire ants may be controlled with an integrated Pest Management (IPM) program using approved chemicals and bait formulations. Fire ant control should be designed to minimize impact on native ants and other flora and fauna. Chemical control of exotic fire ant colonies may be necessary to avoid infestation of caves.

5.0 MANAGEMENT OF SPRINGS AND ASSOCIATED WATERCOURSES

Flowing springs and spring runs downstream of spring discharges will be protected from destructive human impacts. This could include such suggested methods as informative markers, and/or fencing, in the case of damaged sites or sites occupied by species of concern. For remote springs, this objective may be achieved simply by designing preserve access points to keep such sensitive sites relatively inaccessible to human visitation.

The introduction of non-native fauna into spring runs is prohibited. Where necessary, spring runs may be fenced to exclude livestock from damaging stream banks and wetland vegetation.

Preserve managers should be aware that both water quality and spring discharge quantity are important to the viability of spring ecosystems. Monitoring should be conducted to design and evaluate management plans that prevent degradation of local groundwater resources or loss of aquatic habitats within preserves. This activity will be done subject to the availability of adequate funding.

6.0 MONITORING AND RESEARCH FOR ENDANGERED SPECIES VIABILITY

Long-term monitoring for endangered species viability will be the responsibility of every managing partner. In order to complete the required 30,428 acre preserve and karst acquisition in a timely fashion, it will be necessary for the Permit holders to direct BCCP

fund resources initially towards purchase of the remaining acres needed. As the preserve system grows, additional funds will be needed for ongoing operation and maintenance of the preserves. While the importance of monitoring and research is evident, it is likely to remain a secondary priority for funding by the Permit holders.

Baseline monitoring studies for biological data will be gathered in each preserve tract in accordance with the Land Management Guidelines and the approved land management plans. Subsequent monitoring as identified in the respective land management plan will be implemented to determine the status of each listed endangered species. These activities will be initiated as soon as possible, contingent upon available funding.

The Coordinating Committee may elect to work with managing partners on the establishment of a joint monitoring effort to be prorated on the basis of the number of acres that each managing partner holds.

6.1 Bird Species

Baseline monitoring studies should concentrate on determining basic population levels on preserve lands, key population parameters, and other ecological parameters that may affect the target species. Demonstration or research projects could be undertaken to determine the effects of different management techniques or specific human impacts on songbird productivity and/or habitat use.

6.2 Cave Invertebrates

Baseline monitoring studies should concentrate on basic inventory and distribution assessments for listed and rare karst invertebrates. Considerable information is needed on cave microclimates and related factors important to invertebrate populations. The effects of different management techniques on subterranean environments and on target karst populations may require complex experimental research designs.

6.3 Spring Systems

Springs and spring runs should be monitored for water quality and seasonal discharge, as well as for populations of aquatic target species. Effects of development within watershed recharge areas might also be considered as research topics for key springs on preserve lands.

6.4 Plants

Baseline monitoring studies should concentrate on plant distribution and abundance patterns within preserves, factors important to plant species survival, and the effects of different management techniques on those factors and on individual populations. Monitoring of browsing population levels as they relate to levels of hardwood regeneration, especially in golden-checked warbler and black-capped vireo habitat, should be an initial emphasis. Non-native and/or ornamental plant species that invade preserves should be removed where practicable to facilitate recovery of native species.

6.5 Community-Based Approaches

Monitoring of natural communities within the preserve system should be done at varying scales of detail. For example, randomly distributed field plots, aerial photographs, and satellite imagery all may be appropriate techniques to assess ecological features. Monitoring of the natural communities will help to determine ecosystem-wide factors affecting the success of the preserve system. Population dynamics for hill-country woodland plants are not well known and will need to be studied in order to predict future woodland and forest distribution and composition.

6.6 Species-Specific Management Strategies

6.6.1 *Management of Songbirds*

Basic concerns of songbird management include: nest parasitism and predation; vegetation dynamics; habitat fragmentation and edge effects; and conflicts between black-capped vireo and golden-checked warbler habitat requisites and management for the two species when in close proximity.

Nest parasitism by cowbirds and browsing pressure should be controlled using a unified approach. In general, fragmentation of woodlands will decrease habitat quality for target nesting songbirds by increasing exposure of their nests to predation and parasitism. This appears to be true along even narrow trails and small, clear-cut openings within wooded environments. Consequently, vireo and warbler habitat ideally should be managed as large blocks with no interior artificial clearings or cleared right-of-ways. Where existing permanent easements, roads, and trails are already established, site-specific maintenance and monitoring activities should be used.

When the habitats (or potential habitats) of the two key endangered songbirds occupy the same general area, conflicts may arise over which environmental variables to emphasize

in preserve land management strategies. Ultimately, resolution of this technical dilemma may require consultation with USFWS staff, species experts, practicing land managers, and designated species recover teams. General site characteristics, current vegetation cover type, land use history, terms and conditions of the application section 10(a) permit, and the location of individual tracts within the preserve system should be considered when determining management practices at any given location.

Black-Capped Vireo Management: Public access into the vireo habitat during the breeding/nesting season should be strictly regulated. For the purposes of public access, that period is defined as from March 1 to September 1.

Use of prescribed fires and other types of permissible vegetation management techniques used to create or restore vireo habitat must be conducted outside of the breeding season. Selected vireo management sites need to be identified and then manipulated using previously described vegetation control techniques designed to create favorable vireo habitat. Vireo population goals for a given area and associated numbers of managed vireo habitat areas should be established using current technical knowledge.

Golden-Cheeked Warbler Management: Public access into warbler habitat during the breeding/nesting season should be strictly regulated. For the purposes of public access, that period is defined as from March 1 to September 1. To minimize impact from humans, preserve managers may rotate public access among various units of habitat, close trails and roads that enter occupied habitat, or allow only supervised access to trails that provide viewing of target species from the periphery of occupied habitat.

Disturbed woodland interior openings and other areas clear of a mature tree cover should be considered for habitat restoration activities. Overall emphasis for warbler habitat should be placed on native hardwood regeneration. This will likely require direct plantings of native hardwood species in combination with exclusion of browsing animals. In addition, localized thinning of young junipers may be required to reduce competition with hardwoods.

6.6.2 *Cave Invertebrates*

Public access to caves and larger karst openings should be strictly regulated using a permit system obtained from the appropriate preserve land manager. Fire ant control should be implemented where cave infestations occur that can threaten sensitive cave invertebrates. The surface drainage and sub-surface environment must be maintained in a natural condition with minimal ground and vegetation disturbances.

6.6.3 *Plant Species*

Preserve sites with observed stands of target plant species should be protected from human disturbance, browsing, and soil erosion, using fencing and other appropriate measures. Preserve land managers may choose to develop plots using rare plant species grown through seed recovery from external populations threatened by destruction, or from other internal or external sources.