

PROPAGATION OF RARE AND ENDANGERED SPECIES FOR RESTORATION

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INTRODUCTION

Certain plant species that are now or may become threatened with extinction are protected under one or several, international, federal, state, or local laws. These laws place restrictions on certain activities such as import, export, foreign or interstate commerce, and removal from areas under agency or governmental jurisdiction. The purpose of this paper is to outline the legal protection, explain the terminology, and mention certain programs regarding endangered plant species. A list of ten principles for propagation of endangered species is offered as a guide for restorationists and nursery professionals.

LEGAL PROTECTION FOR PLANTS (INTERNATIONAL LEVEL)

IUCN. The International Union for Conservation of Nature and Natural Resources (IUCN) is an international, non-governmental organization based in Gland, Switzerland, whose goal it is to aid all countries in their efforts for detailed documentation and preservation of their threatened native plant resources. The Threatened Plants Unit of IUCN's Conservation Monitoring Center has undertaken to monitor and, where appropriate, to coordinate and advise on the documentation and preservation of threatened plant species throughout the world. Recently, the Conservation Monitoring Center prepared a Plants Conservation Program. A few of the many projects in this program are: 1) sponsorship of several books on plant conservation, including Anthony Huxley's "Green Inheritance," and David Given's forthcoming "Plant Conservation: Principles and Practice"; 2) promote stronger legal and planning tools for international and local plant conservation; 3) help increase *in situ* preservation, especially of primitive cultivars and races of economically important plants; 4) increase coordination among botanic gardens and others for carrying out *ex situ* conservation of plants critically threatened in the wild.

CITES. The Convention of International Trade in Endangered Species (of Fauna and Flora), (CITES) was established in 1977. The main focus of the rules of this convention is on international trade; import and export. The United States and more than 90 other

nations are party to the convention, which was created in order to regulate "import and export of imperiled species covered by the treaty." Permits are required from the Management Authorities (U.S. Fish and Wildlife Service in the United States) of both the importing and exporting countries. The import permit must be obtained prior to requesting the export permit (from the country of origin. Seeds, parts and products, and hybrids are afforded full protection as Appendix I specimens. Artificially propagated Appendix I plants are given special consideration, depending on whether they were propagated for commercial purposes. They may be imported to the U.S. with a certificate of exception issued from the country of export.

LEGAL PROTECTION FOR PLANTS (FEDERAL LEVEL)

Endangered Species Act—Background. The Senate and House of the 93rd Congress of the United States passed the "Endangered Species Act" on the 19th and 20th of December 1973, respectively. Signed by then President Nixon eight days later, the Endangered Species Act of 1973 repealed much of the "Endangered Species Conservation Act of 1969," which replaced the "Endangered Species Preservation Act of 1966." The ESA affords protection to various species of fish, wildlife, and plants (animals other than vertebrates, mollusks, crustaceans, and plants for the first time) threatened to extinction by both human and non-human causes. Some foreign species are also protected. The ESA places restrictions on import, export, interstate and foreign commerce of listed species.

Endangered Species Act—Terminology. The words "endangered" and "threatened" are often used interchangeably as pronouns and adjectives in conservation or written material about unusual plants or species whose future survival is in jeopardy. It should be noted that crucial legal differences exist in the meaning of these words under the provisions of the ESA. Brief definitions of some of the important terms are given below.

"Endangered Species"—Any species, including subspecies (U.S. Fish and Wildlife service considers "varieties" to be "subspecies"), in danger of extinction throughout all or a significant portion of its range.

"Threatened Species"—Any species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

"Listed" or "Federally Listed Species"—Terms often used in conjunction with endangered or threatened; they indicate that a species has been the subject of a proposed and final rule or regulation published in the Federal Register.

“Proposed Species”—Endangered or threatened species for which a proposed regulation has been published in the Federal Register, but not a final rule.

“Candidate Species”—Taxa the Service is considering for listing as endangered or threatened species, but not yet subjects of a proposed rule.

Category 1—Taxa for which the Service currently has on file substantial information on biological vulnerability and threat(s) to support the appropriateness of proposing to list the taxon as an endangered or threatened species. Development and publication of proposed rules for such plants takes several years.

Category 2—candidates are those taxa for which information now in possession of the Service indicates that proposing to list them as endangered or threatened species is possibly appropriate, but for which substantial data on biological vulnerability and threat(s) are not currently known or on file to support the immediate preparation of rules.

Category 3—(Non)-candidates are former candidate plants grouped into three subcategories: 3A) extinct; 3B) taxonomically invalid or not meeting the Service’s definition of a ‘species’; 3C) too widespread or not threatened at this time.

Endangered Species Act—Protection. Listed endangered and threatened plants receive full protection and authority of the ESA. Section 4 of the ESA requires the Service to develop recovery plans and directs Service recovery monies to help procure the services of appropriate public and private agencies in an effort to recover listed species. Section 5 permits federal agencies within the Department of the Interior and the Forest Service to conserve listed plants by land (habitat) acquisition. Section 6 enables the Service to enter into management and conservation agreements with state agencies (including research), species management and recovery plans. Twenty-one states, including California, have cooperative agreements for plants. Section 7 provides the most significant protection of the 14 sections of the Act by regulating the activities of federal agencies toward recovery and conservation of plants on their lands or impacted by their activities. Section 9 prohibits removal, collection and possession of listed plants from lands under federal jurisdiction. This section makes illegal the international and interstate transport, import, export, and sale or offer for sale of endangered and threatened plants.

Proposed species are granted limited protection under the ESA. Federal agencies must address these taxa in biological assessments and the Service typically reviews project plans and makes (non-binding) accommodations for the protection of the proposed species.

Candidate species do not enjoy any protection under the Endangered Species Act. Some federal agencies accord some level of protection or management consideration to candidates. Such federal policies are not mandatory under the ESA.

LEGAL PROTECTION OF PLANTS (STATE LEVEL—CALIFORNIA)

As a result of the endeavors of many farsighted people, and as concern for preserving California natural heritage has grown over the past several decades, the State has an exemplary program to protect the future of its endangered plants. Three different pieces of legislation have emerged as part of this program.

California Native Plant Protection Act (NPPA). The NPPA was passed in 1977. This act gave the power to the California Department of Fish and Game (CDFG) to “preserve, protect and enhance endangered plants in this state.” The CDFG can designate native plants as endangered or rare. The Act prohibits the taking of the plants from the wild and requires salvage of state-listed species on impacted private land. Under this act, permits are required for collecting, transporting, or selling such plants.

California Endangered Species Act (CESA). The CESA was passed in 1984. The major intent of this legislation was threefold: 1) to unite various sections of the Fish and Game Code and the NPPA which deal with endangered species and to align state laws as closely as possible with federal laws; 2) to provide formal public opportunity to add, delete, or change the listing status of a species; and 3) to provide a consultation process whereby potential impacts to species and habitats can be determined in light of the California Environmental Quality Act (CEQA).

There are three categories for listing plants in California:

“Rare”—Species although not presently threatened with extinction, are in such small numbers throughout their ranges that they may become endangered if their present environment worsens.

“Threatened”—Plants likely to become endangered species in the foreseeable future.

“Endangered”—Plants whose prospects of survival and reproduction are in immediate jeopardy.

A “candidate” species category exists for taxa under review for possible addition to the Threatened or Endangered list. Rare, threatened, endangered and candidate species are all protected from taking. All are subject to the code sections of the CESA concerning preservation, recovery and management.

California Environmental Quality Act (CEQA). CEQA is a piece of legislation which provides protection for listed species by enforcing native habitat protection. Under CEQA, a project cannot have a significant impact upon the environment without adequate mitigation or compensation.

STATE PROJECTS AND PROGRAMS (CALIFORNIA)

In addition to, and in support of state law, there are several programs of interest to anyone concerned about rare plants.

The Endangered Plant Project (EPP) was created by the CDFG in 1977 to carry out listing, protection, and education activities for plants. It is the EPP's responsibility to direct protection efforts and conduct reviews of species status.

The Natural Diversity Data Base (NDDDB) is a CDFG program which inventories the locations of the State's rarest species and natural communities. With extensive computer files, the NDDDB records can be accessed as a planning tool in order to avoid conflicts between environmental and developmental interests. Within the structure of the NDDDB, the Natural Communities Program documents the occurrence of the State's rare plant communities; essential information for the preservation, management and recovery of critical species.

The California Native Plant Society (CNPS) is a private, nonprofit conservation and education-oriented group dedicated to furthering the awareness of the State's rich botanical resources. A major work of the Society's Rare Plant Program is the publication of the CNPS "Inventory of Rare and Endangered Vascular Plants of California," the fourth edition of which was released in September, 1988. The accuracy and credibility of this model publication is evidenced by statements and land-planning documents. In fact, CEQA recognizes many plants listed in the CNPS Inventory, even though they may have no other legal protection under the CESA. Plants in the CNPS inventory are listed alphabetically by botanical name; federal and state status (if any) are indicated and each plant is segregated into one of five CNPS lists:

List 1A—Plants presumed extinct in California.

List 1B—Plants rare, threatened or endangered in California and elsewhere.

List 2—Plants rare, threatened or endangered in California, but more common elsewhere.

List 3—Plants about which we need more information—a review list.

List 4—Plants of limited distribution—a watch list.

All of the plants on lists 1A, 1B and 2 meet the criteria and are eligible for state listing under the Native Plant Protection Act. Furthermore, each entry in the CNPS Inventory is rated as to its degree of ‘‘rarity,’’ ‘‘endangerment,’’ and ‘‘distribution.’’

BOTANIC GARDENS

The role of the botanic garden in handling rare and endangered species is key in terms of taxonomy, identification, research, preservation (*ex situ*), propagation, education, and display. Storage of pollen, seed, herbarium specimens and vital information on the status of critical species, and making those resources available to researchers is an important facet of rare plant preservation and management. Especially useful are herbarium specimens, as changes in range and distribution can be documented from old collections. Several major botanic gardens in North America have very active rare plant programs.

LEGAL RAMIFICATIONS OF PROPAGATION

The propagator interested in rare plants should look first to laws and regulations concerning the same, obtain the proper permits, and proceed in accordance with federal, state and local laws.

International Level—For obtaining ‘‘Import Permit for Plants and Plant Products’’ to be imported into the U.S.:

U.S. Department of Agriculture
Animal and Plant Health Inspection Service
Plant Protection and Quarantine
Hyattsville, Maryland 20782

For import permit to import Appendix I CITES plants into the U.S. (plant list as published in the Federal Register; 50CFR 23.23, also available from the same address):

U.S. Fish and Wildlife Service, Wildlife Permit
U.S. Department of Interior
1000 N. Glebe Road
Arlington, Virginia 22203

Request Fact Sheet FWS F-018 for permit procedure. Request Fact Sheet FWS F-006 for CITES information.

Federal Level—For a list of plants protected by the U.S. Endangered Species Act:

Federal Wildlife Permit Office
U.S. Fish and Wildlife Service
U.S. Department of Interior
Washington, D.C. 20240 (703) 235-1903

For a permit application for interstate commerce or export of artificially propagated Endangered/Threatened plants:

Federal Wildlife Permit Office
1000 N. Glebe Road, Room 611
Arlington, Virginia 22201

Request Fact Sheet FWS F-037 for Endangered Species Act information.

For information on Federally listed plants in California:

Fish and Wildlife Service
Sacramento Endangered Species Officer
2800 Cottage Way, Room E-1823
Sacramento, California 95825
Attn.: Staff Botanist

State Level (California). For inquiries and permits on state-listed plants and information on the Natural Diversity Data Base:

Department of Fish and Game
Nongame-Heritage Program
1416 Ninth Street, Twelfth Floor
Sacramento, California 95814

Non-governmental State Level (California). For information on the California Native Plant Society, Rare Plant Program, and Inventory of Rare and Endangered Plants in California:

California Native Plant Society
909 Twelfth Street, Suite 116
Sacramento, California 95814

PRINCIPLES OF PROPAGATION

The principles of nursery plant propagation and restoration with Rare and Endangered Plants are as follows:

1. A permit from the U.S. Fish and Wildlife Service and/or state or local agencies is required.
2. Field trips for collection of propagation materials must be planned carefully to obtain ripe seed and good cutting wood. Gathering material of poor quality will result in propagation failure and negative impact to the plants in their native habitat.
3. Many species have never been grown in cultivation. Research is often required to determine the best propagation and production methods. Consult botanic gardens and conduct tests on sample quantities of seeds or cuttings.
4. The propagator/collector should never deplete the natural supply of rare plant propagation material by collecting all the seeds or cuttings available. This is especially true for species of limited distribution and unknown horticultural requirements.

5. The nursery site used for growing rare plants for revegetation should have a climate similar to that of the native "field" site of the plants.
6. Given sufficient time for "subsequent generation" propagation, seed and/or cuttings may be obtained from cultivated "mother" plants (*ex situ*) which were grown from seed or cuttings collected from plants in nature (*in situ*). This is a very effective method to secure high quality seed and cuttings from plants in a controlled environment. Extra care should be taken with regards to labeling. This technique will not provide guaranteed pure seed if related plant species can be found in or near the nursery, as cross-pollination and hybridization are possible. By observing the plants in a cultivated setting, the grower can learn how susceptible the plants are to disease and insect damage and determine the proper handling methods in the nursery as well as on the out-planting site.
7. Preparation of nursery-grown plants for out-planting includes the total elimination of all exotic weed, pest and disease organisms from the plants. Introduction of harmful organisms to the native site would be completely contrary to the goals of revegetation and restoration.
8. Phytosanitary precautions in preparation for out-planting on the project site include insect pest and disease prevention and control, weed control in the containers, natural plant vigor and non-dependence on residual influence of agricultural chemicals. It should be noted that the high percentage of success in seed and cutting propagation of dry-land plants can be attributed to modern agricultural "tools" including equipment and chemicals. Pathogenic fungi (damping-off, water molds, etc.) which plagued native plant propagators in earlier years, can be prevented or controlled, to a large degree, with the use of fungicides. The propagator/grower of endangered species is presented the challenge of raising healthy plants and preparing them for reintroduction to the native site, "weaned" of their nursery treatment and capable of unimpaired establishment in their "new" home. This is done by maintaining healthy standards in nursery production and reducing the frequency of chemical treatment on the plants as they grow older.
9. It is necessary to keep accurate records of all field collections, nursery production methods, crops and crop failures, and subsequent seed and cutting collection from plants of nursery provenance.
10. Eventually, plants with ornamental or useful qualities may be introduced into the horticultural trade. This can only be done under provisions of the permit, using seed and cuttings from

nursery-grown plants (the new plants are considered “artificially propagated.”)

CONCLUSIONS

While the programs for the management and preservation of rare and endangered plants may include nursery propagation, it should be noted that the mere preservation of the species is not the main issue. Artificial propagation and garden cultivation of sensitive species could never replace their existence in the wild state, nor justify the total destruction of their natural habitats.

The Franklin tree (*Franklinia alatamaha* Marsh.), a North American species, serves to remind us of the loss of a beautiful flowering tree, extinct in the wild, and today known only in cultivation.

Let us hope that the rare plants in California will be preserved in the wild, and when necessary, their populations enhanced by carefully planned revegetation and restoration programs.

REFERENCES

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- Smith, James P Jr and Ken Berg 1988 Data Entry and Management. Inventory of Rare and Endangered Vascular Plants of California. 4th Ed. Sacramento, CA. California Native Plant Society, 168 pp