

SFA ARBORETUM'S "THREE R'S" ENDANGERED SPECIES PROGRAM: RESCUE, RESEARCH AND REINTRODUCTION - Dave Creech

(The following article appeared in the American Nurseryman, January 1997 issue - reprinted with their permission - summarizes the conservation part of the Arboretum mission and attempts to delicately make the point that horticulture can make a big difference in improving species survival).

Bring up the endangered species issue in a group of scientists, electorate, industry or government and you've got a hot kettle of divergent opinions and mixed strategies. Protecting animals and plants in their natural habitat runs head first into the property rights of large companies and individual landowners. The nursery industry is caught right in the middle. The effort to rescue species, both plants and animals, is fraught with ambiguities. After all, there's little doubt that a coalition of university scientists, smart nurserymen, and enthusiastic conservation and gardening groups could take care of much of the extinction problem. Yet, the sale and movement of endangered or precarious species is regulated by a myriad of state and federal rules, many of which are confusing and time-consuming. This fact alone encourages most nurserymen to skip the inclusion of "listed" species in their inventories. The latest U.S. animal/plant extinction-survival data is not encouraging - applying the talents and resources of the nursery industry and concerned, educated gardeners makes sense now more than ever.



As a nurseryman, why even care about endangered species? After all, extinction has been going on for a long, long time. If it's a natural part of the process of evolution, why worry if we lose a few species along the way? The answer lies in respecting the growing body of scientific evidence that extinction rates are actually unparalleled in over 65 million years (Wilson, 1988). In fact, around 15 - 25% of the estimated 265,000 species of vascular plants in the world are expected to become extinct within the next 50 years, depending on the degree of conservation effort employed (Raven, 1987). The reason for this abysmal prediction is right in front of us: conversion of "wild" lands to other uses by man. Worldwide, the problem is most severe in the tropics; while only 7% of the land, tropical rainforests make up fully 50% of the world's species. Unfortunately, these regions of the world are often home to developing countries experiencing high population growth, strong demands on space and resources and civil unrest, and, let's face it, environmental protection is not high on the list.

Even in the U.S., where laws and resources to protect animals, plants and habitats are much stronger, there's solid evidence that loss of biological diversity is at an all time high. While most of the national attention is focused on the "mega-charismatics" (i.e., spotted owl in the northwest and the red cockaded woodpecker in the south), every state works with long lists of plants moving between the fine lines of stable, threatened, endangered, and extinct. In fact, Falk estimated that twenty-two percent of the vascular plants in the United States are currently of

conservation concern. There is another big problem: funding. Although nearly 50% of the 728 federally listed or endangered species are plants (USFWS 1992a), they received only 8% of recovery funds spent by the USFWS since 1990 (Campbell 1991). In plain words, there are plenty of plants in decline and the funds and technical experts aren't there to monitor their progress, much less insure their survival.

Plant conservation efforts received a critical boost with the passage of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544:USFWS 1988a). The Act established a legal mandate to promote the collection, analysis, and exchange of biological information. The Act requires a recovery plan be developed for each endangered or threatened species occurring in the United States and the plan must "delineate, justify, and schedule the research and management actions necessary to support the recovery of a species" (16 U.S.C. 1531-1544:USFWS 1988a).

How successful has the Endangered Species Act fulfilled its goals? Of 998 plants and animals listed as endangered or threatened since 1973, five have recovered and listing is no longer warranted. Seven endangered species are known to have become extinct and fourteen are thought to be so. Thirty-eight percent of listed species are stable or improving, 33% are still in decline, the status of 27% is not known, and 2% are believed extinct. Opponents say the record is dismal and the ESA is not working. Proponents argue the opposite; considering the limited funding, the results are encouraging.

ROLE OF THE NURSERY INDUSTRY:

No one should doubt the nursery industry's or enthusiastic gardener's ability to propagate, multiply, and "cover up the gardening world" with endangered species. In many ways, this is already being done with many of the showier types. However, biological and ethical questions have been raised about allowing and/or regulating endangered plants in the nursery trade or in the hands of gardeners. First, there is always the danger, particularly with showy, hard-to-propagate types, of unscrupulous harvests from the wild. Second, there is the biologists concern that "genetic drift" may threaten the integrity of the species (the species "evolves" through seedling populations to be more adapted to the introduction "garden" site than the original provenance). For the propagator and for the plant's "survival," it ends up being a balance between clonal integrity via asexual propagation and the genetic variability available in seedling populations. The general consensus among scientists is that protection of entire habitats is the preferred approach and *ex situ* strategies should be seen only as "back-ups" in the effort to preserve and protect a species. In fact, some biologists and conservationists believe distribution of endangered species is unhealthy and counter-productive to the protection of habitats; that is, by having secure colonies in arboretums, botanical gardens, and private and public plantings, the need to protect an "original" habitat may be less important to government. They may have a point.

There's another reason nurserymen and the gardening public have a vested investment in protecting endangered plants and, whenever possible, preserving the natural range of a native species. Restricted ranges of native plants means a reduced gene pool. Opportunities for a heterozygous germplasm base are less; nurserymen searching for disease, insect and drought resistance, plant form differences, cold tolerance and a myriad of other characteristics will be looking at a smaller playing field. In many cases, endangered species are relatives of garden cultivars, carry divergent genes of interest to breeders and nurserymen, and should be preserved purely on industry health grounds. After all, biodiversity is at the core of the nursery industry.

EAST TEXAS: A CASE STUDY

Texas is botanically diverse with ten vegetational zones and about 5500 species in the state (about 30,000 species in the U.S. and Canada) The Pineywoods Vegetational Area of East Texas contains some 2,300 plant species and there are about fifty plants of conservation concern. In eastern Texas, four species are endangered, one is a federal candidate category one plant, and 23 federal candidate category two plants are listed by USFWS (1993).

The SFA Arboretum's goals in the endangered plants arena are really quite simple. We have initiated a three R's conservation program for protecting endangered plants: rescue, research, and reintroduction. A small grant from the Norcross Wildlife Foundation and cooperation of the Texas Parks and Wildlife Natural Heritage Program, the U.S. Fish and Wildlife Service, the Center for Plant Conservation, and the Nature Conservancy of Texas has allowed this program to prosper. This is not a unique program and it's no accident that most arboretums and botanical gardens (over 500 in the U.S.) have initiated some kind of endangered plant conservation program. While *Hibiscus dasycalyx* endangered animal programs in the zoo world have caught the public's attention and the big dollars, plant scientists at universities or working for state and federal agencies are making something positive happen for many threatened plants.



Arboretums and conservation groups make a difference and taking advantage of resources to press on a problem makes sense. SFA horticulture resources, like those at most universities sporting biology, agriculture and forestry programs, are outstanding for work of this type. Greenhouses, propagation and container-growing facilities, enthusiastic environmentally-oriented students and plenty of opportunities for plantings makes real impact possible - often on a very low budget. The Arboretum has set aside a one-acre portion for the rare, threatened and endangered plants of East Texas; this garden has a five-year goal to display, sign and interpret 25 endangered and threatened plants of the Pineywoods. The conservation program of the Arboretum received a wonderful boost in 1995 with a 119-acre conservation easement six miles west of the university and a substantial endowment to fund endangered plants research, a gift of Ms. Elisabeth Hayter Montgomery. This special property is blessed with dry upland pine forests, mesic mid-slopes, and wet stream bottoms and features an eight-acre lake at its center. Mill Creek Gardens serves as the "natural" area for SFA Arboretum introduction studies of species back into the "wild". The goal is to learn just what plant establishment conditions are best for the long-term sustainable health of the community - with an emphasis on low-maintenance. While still early in the program, there's good reason to believe that the strategy is working with the first two plants tackled, two of the most endangered and interesting.

Hibiscus dasycalyx, the Neches river rose mallow, is now down to three tiny communities

in East Texas. Sadly, one of those was recently reduced to just a few specimens after the landowner sprayed the open bottomland with a pasture herbicide. The two other sites are in decline and the data is not encouraging. The Neches river rose mallow is a woody based, hirsute calyx, many-stemmed, extremely narrow-leaved perennial to four foot that sports a fine display of showy ivory-petaled, three-inch blooms throughout summer and fall. This mallow makes a home around the edges of sunny depressions in the often-flooded bottomlands of the Neches river. The species is endangered due to loss of wetland habitat and interspecific hybridization with the Soldier Rose Mallow, *Hibiscus laevis*, a similar species intruding into its natural home. The latter is of special concern; seed from **Jeff Williams, Mud Creek near Ponte, TX**



the three locations are suspect as to parentage. In plain words, all three colonies are in immediate danger of becoming a hybrid swarm with *H. laevis* the predicted winner. The Arboretum has several Neches river rose mallow colonies in the Arboretum and one 124 - plant establishment study was put in place in the fall, 1995, in a full-sun, wetland area at Mill Creek Gardens (no other Hibiscus species in the preserve). This trial will test the influence of four rates of fertilizer and various mulching strategies on growth and longevity. At this writing, all plants are thriving, flowering has been strong and good seed set is apparent. Four year of working with this species indicates easy propagation under mist and photoperiod interruption important for late-summer and fall collected cuttings. We have found plants pest-free, quite easy to grow in one-gallon containers, and simple to establish in the landscape.

Phlox nivalis ssp. *texensis*, Texas trailing phlox, is a beautiful little plant and one of the rarest globally endangered phloxes. Once occurring at 17 sites in Hardin, Polk, and Tyler counties in East Texas, this species is now only found in the wild in two locations in Hardin county and in one new find in Polk county (Nemec 1996). The species is endangered because of habitat loss due to canopy closure, fire suppression, encroachment by woody vegetation, and land disturbance by man. This attractive evergreen, lavender-flowered phlox is herbaceous or subshrubby and makes a matting clump to a foot or two wide and six to nine inches high. Texas trailing phlox is one of the diminutive treasures in the pine lands of East Texas. From 20 plants received from the Center for Plant Conservation in December, 1995, the Arboretum has produced over 1200 individuals via mist propagation (2-inch cuttings, pine bark:perlite at a 1:1



ratio, intermittent mist for three weeks, moved to shade house for two time daily watering, and slow-release fertilizer to push the plant). The Arboretum has established two communities of several hundred plants each in the Arboretum and one thousand plants are being readied for planting at Mill Creek Gardens in the fall, 1996. The introduction site will include a broad mix of conditions in a twenty-acre mid-slope section of the preserve characterized as a dry upland sand. The project area supports primarily patriarch loblolly pines under a fire management program. The results of this work are yet to come.

CONCLUSIONS

Protecting endangered animals and plants is not just an academic issue. Administration of the ESA has already conflicted directly with the private ownership rights of not just large landowners but average citizens. As nurserymen, it is important to present a balanced assessment of the costs and benefits involved, yet still find room to guarantee species survival. Arboretums, botanical gardens, the green trade and private gardening enthusiasts can help quash the often misguided hysteria associated with the more strident opponents of the endangered species act. We must convince others, including our legislators, that having a diverse and healthy gene pool from which horticulture, agriculture, and the environment can benefit is good for everyone.

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Texas Natural Heritage Program Rare Special Plant List with taxon that occur in East Texas (1995). Category 2 or higher.

GENUS

SPECIES

COMMON NAME

<i>Abronia</i>	<i>macrocarpa</i>	large fruited sand verbena
<i>Agrimonia</i>	<i>incisa</i>	incised groovebur
<i>Aster</i>	<i>puniceus</i> ssp. <i>elliottii</i>	roughstem aster
<i>Bartonia</i>	<i>texana</i>	Texas screw stem
<i>Carex</i>	<i>hyalina</i>	white sheath sedge
<i>Coreopsis</i>	<i>intermedia</i>	golden-wave tickseed
<i>Crataegus</i>	<i>warneri</i>	Warner's hawthorne
<i>Cyperus</i>	<i>grayoides</i>	Mohlenbrock's umbrella sedge
<i>Cypripedium</i>	<i>kentuckiense</i>	southern lady's slipper orchid
<i>Eriocaulon</i>	<i>kornickianum</i>	smallhead pipewort
<i>Gaillardia</i>	<i>aestivalis</i> var. <i>winkleri</i>	white fire wheel
<i>Hibiscus</i>	<i>dasycalyx</i>	Neches River mallow
<i>Lachnocaulon</i>	<i>digynum</i>	tiny bogs button
<i>Leavenworthia</i>	<i>texana</i>	golden gladecress
<i>Lesquerella</i>	<i>pallida</i>	white bladderpod
<i>Liatris</i>	<i>tenuis</i>	slender gayfeather
<i>Mirabilis</i>	<i>collina</i>	four O' clock
<i>Phlox</i>	<i>navalis</i> spp. <i>texensis</i>	Texas trailing phlox
<i>Physostegia</i>	<i>longisepala</i>	long sepaled false dragonhead
<i>Prenanthes</i>	<i>barbata</i>	rattlesnake root
<i>Quercus</i>	<i>boyntonii</i>	Boynton's Oak
<i>Rudbeckia</i>	<i>scabrifolia</i>	bog coneflower
<i>Silene</i>	<i>subciliata</i>	catchfly
<i>Spiranthes</i>	<i>parksii</i>	Navasota ladies tresses orchid
<i>Talinum</i>	<i>rugospermum</i>	roughseed flame flower
<i>Thalictrum</i>	<i>arkansanum</i>	meadowrue
<i>Thalictrum</i>	<i>texanum</i>	Houston meadowrue
<i>Trillium</i>	<i>pusillum</i> var. <i>texanum</i>	Texas trillium
<i>Xyris</i>	<i>drummondii</i>	yellow-eyed grass
<i>Xyris</i>	<i>scabrifolia</i>	yellow-eyed grass
