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THE SONORAN DESERT CONSERVATION PLAN

BARBARA TELLMAN

After two years of intensive study, publication of more than one hundred reports, and hundreds of meetings, Pima County issued its Draft Preliminary Sonoran Desert Conservation Plan (SDCP) in September 2000. SDCP is an elegant solution to a problem so common in Arizona and elsewhere. Many people lament the loss of prime desert and wildlife habitat while others want to "develop" the area for human use and dislike regulations that prevent or delay construction. SDCP offers a new win-win way of looking at the problem: First, use good scientific information to delineate the more sensitive areas and prime wildlife habitat, define areas where construction can occur with minimal damage to the natural world, and then map the area and establish clear rules for building. The rules should be predictable and the same for all, leaving sensitive areas alone as reserves.

SDCP involves a multitude of aspects which are discussed below, including:

- Preservation of sensitive species of plants and animals and their habitat.
- Reintroduction of extirpated native species and species that have become rare in Pima County.
- Reduction of invasive nonnative species of plants and animals.

- Designation of certain areas as appropriate for human use and others as appropriate for nature reserves.
- Establishment of new parks and reserves.
- Preservation of ranchlands where sensitive species currently thrive.
- Preservation of historic and archaeological sites.

The plan originated when the endangered Cactus Ferruginous Pygmy-owl (*Glaucidium brasilianum cactorum*) was found to be using habitat in the path of population growth on the northwest side of the Tucson metropolitan area. The U.S. Fish and Wildlife Service entered the picture and major disputes arose over new construction, especially a new high school. Pima County elected officials decided to take a large-picture approach and work on a Multi-species Habitat Conservation Plan, a program in which all the threatened and endangered species in the area would be included, and an overarching plan for considering the needs of all the species would be developed. This would give the greatest benefit to the species and would give maximum protection to the habitat, while providing predictability to the developers who would know when they could and could not build structures and what the conditions for building would be.

Scientific Biological Studies

A team of the best local biological scientists was assembled to provide guidance and Congress appropriated funds to pay for skilled consultants to conduct the necessary studies. The project grew month by month as new aspects needed to be considered. The Science Team determined early on that more species than the eighteen threatened and endangered ones needed to be considered. In all, more than 125 species of plants and animals were chosen. Emphasis for study was placed on those species found in unprotected areas - mainly private land. Consultants wrote reports assessing the present state of

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PRESIDENT'S MESSAGE

BARB SKYE

I am very pleased to become active again in ANPS. Why have I decided to dive in again, and just what are my intentions? I moved to Tucson in 1995, as a horticulture graduate student who was sweating it out writing a thesis on ethnobotany of desert southwest plants. Within months, I was caught up in the magnetism of ANPS (no exaggeration here!) and became the Tucson Chapter President. By 1997, I finished up my thesis and was fortunate enough to land a job at the Desert Museum. I soon discovered that the new job challenged my time management skills to the max, resulting in my self-destruction as an ANPS board member.

Okay, fast forward in time to the present. I recently heard about the vacancy for the ANPS President and then ... outta nowhere ... the ANPS magnet knocked me upside the head - THUNK! Then, dazed and confused, I thought out loud, "Well, maybe I could help out now?!" I thought, with the ever expanding conservation work at the Desert Museum, perhaps ASDM would be willing to donate some staff time toward fulfilling the Native Plant Society's presidential duties. The answer from ASDM Director Rick Daley and Director of Collections Pete Siminski was a resounding "Yes!"

So ... my story explains the past, now ... on to the future, and back to my intentions. Here are some goals I hope we can all work towards:

1. ANPS infrastructure
 - streamline operations
 - create unity statewide
2. Strategic Plan
 - define and prioritize education and conservation goals for the next five years
3. Membership
 - strengthen benefits and effectiveness of membership
 - expand audience base
4. Community Outreach
 - raise the society's profile throughout communities in Arizona through events, publications, and best of all ... by word of mouth.

Do you have additional suggestions? Would you like to volunteer to help work towards these and other goals? Feel free to e-mail me at bskye@desertmuseum.org, fax 520-883-2500, or call 520-883-3009.

Thanks to all of you for your continued interest in ANPS. I look forward to working with you as we further our knowledge and conservation of native plants.

In appreciation, Barb Skye

WEB SITE UPDATE

The address of the Arizona Native Plant Society web site has changed to www.aznps.org.

ARIZONA HERBARIA 1: THE DEAVER HERBARIUM

TINA AYERS

The Deaver Herbarium (ASC), which currently has more than 70,000 specimens, is a public facility housed in a bright and airy room on the third floor of the Department of Biological Sciences at Northern Arizona University (NAU). Large east-facing windows provide wonderful light for sorting through specimens although in June, before the monsoons start, we sweat a bit for lack of a climate controlled environment. Because of the elevation and dry southwestern climate, the Deaver Herbarium smells "normal," unlike most herbaria located at lower elevations and in wetter climates. A decided advantage to our location is that the only insect control we need to use is freezing specimens to combat against incoming cigarette or herbarium beetles. To facilitate use of the herbarium, the collections are organized alphabetically in color-coded genus covers.

Leslie Goodding, the original biology faculty member at the Northern Arizona Normal School (a teachers college), collected some of the oldest specimens in the Deaver Herbarium at the turn of the century. His specimens were incorporated into the herbarium that was established by Chester F. "Danny" Deaver in 1930 when NAU was known as Arizona State College (thus our ASC acronym). Deaver not only taught botany, chemistry, geography, and physical science courses during his tenure, but he was a coach of the women's basketball team and the now-defunct college baseball team. It was with the encouragement and support of J.J. Thornber of the University of Arizona and T.H. Kearney of the California Academy of Sciences that Deaver began his avid collecting forays in northern Arizona. His collections from the White Mountains, the Navajo Reservation, and Havasupai Canyon, often sent to Kearney for verification, added numerous new records to the impending Arizona Flora and, along with duplicates from Tucson, formed the basis for what was to eventually become the largest herbarium on the Colorado Plateau. Upon his retirement in 1965, the herbarium, which then contained 15,000 specimens, was officially designated the Deaver Herbarium. Deaver was succeeded as curator by James M. Rominger, who, over the next 25 years, oversaw the addition of nearly 37,000 specimens to the herbarium. Many of these specimens were culled from collections made by avid

students for the very popular Rominger-taught Plant Taxonomy classes. In addition to Rominger's ca. 3500 personal collections (primarily grasses), the most important collections from this period were graduate student theses vouchers representing botanical studies from Walnut Canyon, Bill Williams Mountain, Wupatki and Sunset Crater National Monuments, Petrified Forest National Park, Sycamore Canyon, Coconino County riparian areas, and the San Francisco Peaks.

My curatorial legacy began in 1990 and has primarily focused upon processing the backlog of specimens, reorganizing the collections, and introducing archival quality materials. With the addition of nearly 20,000 specimens in the past 10 years it would appear that the staff and students have been "baling hay" but most were collections made in the 1960s and 1970s. The backlog was considered a priority because most were Arizona collections that should be available for consultation during the preparation of the new Vascular Plants of Arizona currently underway. Deaver Herbarium staff and students are currently working on the a new treatment for the Portulaccaceae, the purslane family.

This winter you will find H. David Hammond working in the herbarium most mornings. He assists visitors, mounts and files specimens when he is not identifying his own collections from the previous summers forays into the White Mountains and the Pacific Northwest. Susan Vogel, the curatorial assistant, will be making labels for new specimens (many emphasizing the undercollected Mohave Desert areas), administering the exchange and loan programs, and completing her checklist of Meteor Crater. Daniela Roth, botanist for the Navajo Heritage Program, is in the herbarium most of the winter identifying her collections from the Navajo Reservation. Although Nancy Morin's Flora of North America office is on the first floor, we are delighted when she walks into the herbarium. In addition to the faculty and students of the Biological Sciences Department there are usually botanists from the Center for Ecosystem Science and Management (CESM), Forest Ecology Lab in the herbarium during the winter months, identifying plants from their plots on Mt. Trumbull and elsewhere in northern Arizona. Some of the faces occasionally seen in the Deaver

Herbarium cont. on page 17

RARE PLANTS OF THE HUACHUCA MOUNTAINS

MILLS TANDY

The Huachuca Mountains of southeastern Arizona are one of the most biologically diverse areas of North America (Wallmo 1955; Bowers and McLaughlin, 1995). Almost 1000 plant taxa have been documented from this area. Among these are 45 species that are apparently rare, at least in the United States (Table 1). Most of these are treated as Sensitive Species by Coronado National Forest, one is listed as an Endangered Species, one is a Candidate for Listing and twelve are listed as Species of Concern by the US Fish and Wildlife Service. Only ten species have some protection under Arizona's Native Plant Law (Arizona Game and Fish Department, 2000) (Table 2).

In the United States, most of these rare species are found only in southeastern Arizona and extreme southwestern New Mexico. Seven are also known from the mountains of Trans-Pecos Texas. Forty of the species are extreme northern representatives of species of the Sierra Madre Occidental of Mexico, as are many more common species in SE Arizona. Five species appear to be endemic and are known only from SE Arizona. Table 3 shows the known distributions of the species within the United States, in the Mexican States just south of the US border, but not farther south, in mountain ranges in Arizona and in various areas in or near the Huachuca Mountains.

Most of these species occur primarily in either wetland plant communities (19 species) or in grasslands of various types (16 species) (Table 4). Eleven species are restricted to marshes. Eight occur

principally in riparian forests. These wetland communities are among the smallest and rarest community types in the southwestern United States.

Grasslands cover large areas of the Huachuca region, but many of the rare species of plants are found primarily in the higher elevation grasslands—many in the oak or pine woodland zones. It is possible that the rarity of some of these species may be related to suppression of naturally occurring wildfires in this area during the past 100 years (Danzer, 1998; Danzer, Baisan and Swetnam, 1997).

Eight of the rare species are found primarily in forest communities. Two are known only from Interior Chaparral.

Some of these species may be more common than is currently realized because they are inconspicuous or are difficult to distinguish from closely related species that occur in the same areas. This is true for *Arabis tricornuta*, *Carex chihuahuensis*, *Erigeron arisolius*, *Hexalectris warnockii*, *Ipomoea tenuiloba* (*Ipomoea tenuiloba* var. *lemmonii*), *Margaranthus lemmonii*, *Muhlenbergia dubioides*, *Pectis imberbis* and *Rumex orthoneurus*.

Steve McLaughlin (personal communication) has found *Carex chihuahuensis* to be common at Arivaca Cienega, and he thinks it may be the common sedge in wet areas of the San Rafael Valley. In the Huachucas, I have found this species in a few marshlands. Perhaps the rarity of such wetlands, is reason enough to consider the species rare and vulnerable.

McLaughlin (pers. comm.) considers *Erigeron arisolius* to be the most common *Erigeron* in the grasslands of southeast Arizona.

Hedeoma dentatum is widespread in the Oak Woodlands of the Huachucas, though never very abundant. McLaughlin has similar impressions of this species. He has found populations to be sparse but frequently encountered in southeast Arizona. The AGFD Heritage Database account lists the total range as southeast Arizona and northern Sonora. They state: "This species is restricted to a relatively small geographic area and populations are apparently small." This species does not seem to be threatened within its range, principally because the Oak Woodlands of these areas are so large.

Berlandiera macrophylla A. Gray is not recognized in most current botanical literature as being different from *B. lyrata* A. Gray. I have evidence that *B. macrophylla* is a distinct biological species known only from two sites in Arizona and from several



North slopes of Garden Canyon with Scheelite Canyon and the highest peaks of the Huachuca Mountains to the south. The foreground of oak savanna including Encinal (*Quercus emoryi* and *Q. arizonica*) and Madrean Grassland is habitat for *Asclepias lemmonii*, *Hedeoma dentatum*, *Margaranthus lemmonii* and *Tephrosia thurberi*. The watershed contains populations of twenty of the species described here. Photo: Mills Tandy.

Table 1. Rare plant species of the Huachuca Mountains. USDA, 2000 names are those used in the USDA PLANTS database; AGFD, 2000 names are those used in the AGFD Heritage Data Management System if different from the USDA database. Synonyms are given in parentheses. *not currently in USDA database

Species USDA, 2000	AGFD, 2000	Common name USDA, 2000	AGFD, 2000	Family
<i>Allium glandulosum</i> (<i>A. rhizomatum</i>)	<i>Allium rhizomatum</i>	Gland Onion	Redflower Onion	Liliaceae
<i>Arabis tricornuta</i>		Rincon Mountain Rock Cress	Chiricahua Rock Cress	Brassicaceae
<i>Asclepias lemmonii</i>		Lemmon's Milkweed		Asclepiadaceae
<i>Asclepias uncialis</i>		Wheel Milkweed	Greene Milkweed	Asclepiadaceae
<i>Astragalus hypoxylus</i>		Huachuca Mountain Milkvetch	Huachuca Milk-vetch	Fabaceae
<i>Berlandiera macrophylla</i> *		Large-leaved Chocolate Daisy*		Asteraceae
<i>Browallia eludens</i>		Bush-violet		Solanaceae
<i>Carex chihuahuensis</i>		Chihuahuan Sedge		Cyperaceae
<i>Carex ultra</i>		Cochise Sedge	Arizona Giant Sedge	Cyperaceae
<i>Cheilanthes arizonica</i>		Arizona Lipfern		Pteridaceae
<i>Coursetia glabella</i>		Smooth Babybonnets		Fabaceae
<i>Cynanchum wigginsii</i> (<i>Metastelma mexicanum</i>)	<i>Metastelma mexicanum</i>	Wiggins' Swallow-wort	Wiggins Milkweed Vine	Asclepiadaceae
<i>Erigeron arisolius</i>		Arid Throne Fleabane		Asteraceae
<i>Erigeron lemmonii</i>		Lemmon's Fleabane		Asteraceae
<i>Eryngium phytumae</i>		Huachuca Mountain Eryngo		Apiaceae
<i>Euphorbia macropus</i> (<i>E. plummerae</i>)	<i>Euphorbia plummerae</i>	Huachuca Mountain Spurge		Euphorbiaceae
<i>Hedeoma costata</i> var. <i>pulchella</i>	<i>Hedeoma costatum</i> var. <i>pulchellum</i>	Chiricahua False Pennyroyal	Chiricahua Mock Pennyroyal	Lamiaceae
<i>Hedeoma dentata</i>	<i>Hedeoma dentatum</i>	Dentate False Pennyroyal	Mock Pennyroyal	Lamiaceae
<i>Heterotheca rutteri</i>		Rutter's False Goldenaster	Huachuca Golden Aster	Asteraceae
<i>Hexaletris warnockii</i>		Texas Crested Coralroot	Texas Purple Spike	Orchidaceae
<i>Hieracium rusbyi</i>		Rusby Hawkweed		Asteraceae
<i>Ipomoea plummerae</i> var. <i>cuneifolia</i>		Huachuca Mountain Morning-glory	Huachuca Morningglory	Convolvulaceae
<i>Ipomoea tenuiloba</i> (<i>I. t.</i> var. <i>lemmonii</i>)		Spiderleaf	Trumpet Morningglory	Convolvulaceae
<i>Ipomoea thurberi</i>		Thurber's Morningglory		Convolvulaceae
<i>Laennecia eriophylla</i>				
<i>Laennecia eriophyllum</i>		Cochise Marstail	Woolly Fleabane	Asteraceae
<i>Lilaeopsis schaffneriana</i> var. <i>recurva</i>	<i>Lilaeopsis schaffneriana</i> ssp. <i>recurva</i>	Schaffner's Grasswort	Huachuca Water Umbel	Apiaceae
<i>Lilium parryi</i>		Lemon Lily	Lemon Lily	Liliaceae
<i>Lupinus huachucanus</i>		Huachuca Mountain Lupine		Fabaceae
<i>Margaranthus solanaceus</i> (<i>M. emmonii</i>)	<i>Margaranthus lemmonii</i>	Netted Globecherry	Lemmon Globe Berry	Solanaceae
<i>Matelea balbisii</i> (<i>Pherotrichis balbisii</i>)	<i>Pherotrichis balbisii</i>	Balbis' Milkvine	Huachuca Milkweed Vine	Asclepiadaceae
<i>Muhlenbergia palmeri</i> (<i>M. dubioides</i>)	<i>Muhlenbergia dubioides</i>	Southwestern Muhly	Box Canyon Muhly	Poaceae
<i>Pectis imberbis</i>		Beardless Cinchweed	Beardless Chinch Weed	Asteraceae
<i>Penstemon superbus</i>		Superb Beardtongue		Scrophulariaceae
<i>Psilactis gentryi</i>		Mexican Tansyaster		Asteraceae
<i>Roldana hartwegii</i> (<i>Senecio carlomasonii</i>)	<i>Senecio carlomasonii</i>	Hartweg's Groundsel	Seemann Groundsel	Asteraceae
<i>Rumex orthoneurus</i>		Chiricahua Mountain Dock		Polygonaceae
<i>Samolus vagans</i>		Chiricahua Mountain Brookweed		Primulaceae
<i>Senecio multidentatus</i> var. <i>huachucanus</i> (<i>S. huachucanus</i>)	<i>Senecio huachucanus</i>	Huachuca Groundsel		Asteraceae
<i>Sisyrinchium cernuum</i>		Nodding Blue-eyed Grass		Iridaceae
<i>Symphotrichum potosinum</i> (<i>Aster potosinus</i>)	<i>Aster potosinus</i>	Santa Rita Mountain Aster		Asteraceae
<i>Talinum humile</i>		Pinos Altos Flame Flower		Portulacaceae
<i>Talinum marginatum</i>		Tepic Flame Flower		Portulacaceae
<i>Tephrosia thurberi</i>		Thurber's Hoarypea	Thurber Hoary Pea	Fabaceae
<i>Tragia laciniata</i>		Sonoita Noseburn	Sonoran Noseburn	Euphorbiaceae
<i>Viola umbraticola</i>		Ponderosa Violet	Shade Violet	Violaceae

Table 2. Protective status given to rare plant species of the Huachuca Mountains by the Endangered Species Act, U. S. Forest Service and/or the State of Arizona Native Plant Law. Most of the species names are those used in the USDA PLANTS database. Synonyms are given in parentheses. LE - ESA listed as endangered; C - candidate species for listing as endangered or threatened; SC - ESA species of concern; S - USFS sensitive; SR - salvage restricted; HS - highly safeguarded.

Species	Endangered Species Act	U.S. Forest Service	Arizona Native Plant Law
<i>Allium glandulosum</i>		S	SR
<i>Arabis tricornuta</i>		S	
<i>Asclepias lemmonii</i>		S	
<i>Asclepias uncialis</i>	SC	S	
<i>Astragalus hypoxylus</i>	SC	S	SR
<i>Berlandiera macrophylla</i>			
<i>Browallia eludens</i>	SC	S	
<i>Carex chihuahuensis</i>		S	
<i>Cheilanthes arizonica</i>			
<i>Carex ultra</i>		S	
<i>Coursetia glabella</i>	SC	S	
<i>Erigeron arisolius</i>		S	
<i>Erigeron lemmonii</i>	C	S	HS
<i>Eryngium phyteumae</i>		S	
<i>Euphorbia macropus (Euphorbia plummerae)</i>		S	SR
<i>Hedeoma costatum</i> var. <i>pulchellum</i>		S	
<i>Hedeoma dentatum</i>		S	
<i>Heterotheca rutteri</i>	SC	S	
<i>Hexalectris warnockii</i>	SC	S	
<i>Hieracium rusbyi</i>		S	
<i>Ipomoea plummerae</i> var. <i>cuneifolia</i>		S	
<i>Ipomoea tenuiloba (Ipomoea tenuiloba</i> var. <i>lemmonii)</i>		S	
<i>Ipomoea thurberi</i>		S	
<i>Laennecia eriophylla</i>		S	
<i>Lilaeopsis schaffneriana</i> ssp. <i>recurva</i>	LE	S	HS
<i>Lilium parryi</i>	SC	S	SR
<i>Lupinus huachucanus</i>		S	
<i>Margaranthus lemmonii (Margaranthus solanaceus)</i>	SC	S	
<i>Metastelma mexicanum</i>	SC	S	
<i>Pectis imberbis</i>	SC	S	
<i>Penstemon superbus</i>		S	
<i>Pherotrichis balbisii (Matelea balbisii)</i>		S	
<i>Psilactis gentryi</i>		S	
<i>Rumex orthoneurus</i>		S	HS
<i>Samolus vagans</i>		S	
<i>Senecio carlomasonii (Roldana carlomasonii)</i>		S	
<i>Senecio multidentatus</i> var. <i>huachucanus</i> (<i>Senecio huachucanus</i>)		S	HS
<i>Sisyrinchium cernuum</i>		S	
<i>Symphotrichum potosinum (Aster potosinus)</i>		S	
<i>Talinum humile</i>	SC	S	SR
<i>Talinum marginatum</i>	SC	S	SR
<i>Tephrosia thurberi</i>		S	
<i>Tragia laciniata</i>		S	
<i>Viola umbraticola</i>		S	

Table 3. Known geographic distributions of rare plant species of the Huachuca Mountains. * - documented occurrence; (•) now extirpated. None found in Utah or Nevada

Species (USDA, 2000)	States (U.S. & Mexico)								Mountain Ranges in Arizona										Huachuca Areas																
	CO	OK	CA	AZ	NM	TX	SN	CH	COA	M	SA	WH	PN	G	SC	R	B	SR	Wh	D	Ch	AT	Pat	H	M	P	E	S	W	N	C--H	SG			
<i>Arabis tricornuta</i>				•											•		•				•							•							
<i>Astragalus hypoxylus</i>				•																			•												
<i>Browallia eludens</i>				•																															
<i>Erigeron lemmonii</i>				•																															
<i>M. dubioides</i>				•											•		•	•																	
<i>Asclepias uncialis</i>	•	•		•	•	•																													
<i>Allium glandulosum</i>				•	•	•	•	•														•													
<i>Asclepias lemmonii</i>				•			•	•?										•				•													
<i>Berlandiera macrophylla</i>				•			•	•																											
<i>Carex chihuahuensis</i>				•	•		•	•																											
<i>Carex ultra</i>				•	•		•			•																									
<i>Cheilanthes arizonica</i>				•			•	•																											
<i>Coursetia glabella</i>				•			•	•																											
<i>Erigeron arisolius</i>				•	•		•	•																											
<i>Eryngium phyteumae</i>				•			•	•																											
<i>Euphorbia macropus</i>				•			•	•																											
<i>Hedeoma costatum</i> var. <i>pulchellum</i>				•	•	•		•																											
<i>Hedeoma dentatum</i>				•	•		•	•																											
<i>Heterotheca rutteri</i>				•	•	•	•	•																											
<i>Hexalectris warnockii</i>				•	•		•	•																											
<i>Hieracium rusbyi</i>				•	•	•		•																											
<i>Ipomoea plummerae</i> var. <i>cuneifolia</i>				•	•		•	•																											
<i>Ipomoea tenuiloba</i> var. <i>lemmonii</i>				•	•		•	•		•																									
<i>Ipomoea thurberi</i>				•			•	•																											
<i>Laennecia eriophylla</i>				•			•	•																											
<i>Lilaeopsis schaffneriana</i> ssp. <i>recurva</i>				•			•	•																											
<i>Lilium parryi</i>			•	•			•	•																											
<i>Lupinus huachucanus</i>				•			•	•																											
<i>Margaranthus lemmonii</i>				•			•	•																											
<i>Metastelma mexicanum</i>				•			•	•																											
<i>Pectis imberbis</i>				•			•	•																											
<i>Penstemon superbus</i>				•	•		•	•																											
<i>Pherotrichis balbistii</i>				•			•	•																											
<i>Psilactis gentryi</i>				•			•	•																											
<i>Rumex orthoneurus</i>				•	•		•	•																											
<i>Samolus vagans</i>				•			•	•																											
<i>Senecio carlomasonii</i>				•			•	•																											
<i>Senecio multidentatus</i> var. <i>huachucanus</i>				•			•	•																											
<i>Sisyrinchium cernuum</i>				•			•	•																											
<i>Symphotrichum potosinum</i>				•			•	•																											
<i>Talinum humile</i>				•	•		•	•																											
<i>Talinum marginatum</i>				•			•	•																											
<i>Tephrosia thurberi</i>				•			•	•																											
<i>Tragia laciniata</i>				•	•?		•	•																											
<i>Viola umbraticola</i>				•			•	•																											

Key: SN=Sonora, CH=Chihuahua, COA=Coahuila. M=Mazatzal, SA=Sierra Ancha, WH=White Mtns., PN=Pinaleno, G=Galiuro, SC=Santa Catalina, R=Rincon, B=Baboquivari, SR=Santa Rita, Wh=Whetstone, D=Dragoon, C=Chiricahua, A=Atascosa, Pat=Patagonia, H=Huachuca, M=Mule Mtns., P=Peloncilo. Huachuca Areas: C-H=Canelo Hills, SG=Sonoran Grasslands.

Table 4. Plant communities of rare plant species of the Huachuca Mountains. Plant community data are from AGFD (2000), Warren and Reichenbacher (1991) and files of the Fort Huachuca Natural Resources Management Office. Terminology follows Brown, Lowe and Pase (1979) and Brown, Reichenbacher and Franson (1998) as applied to the Huachuca Mountains by Tandy (2000).

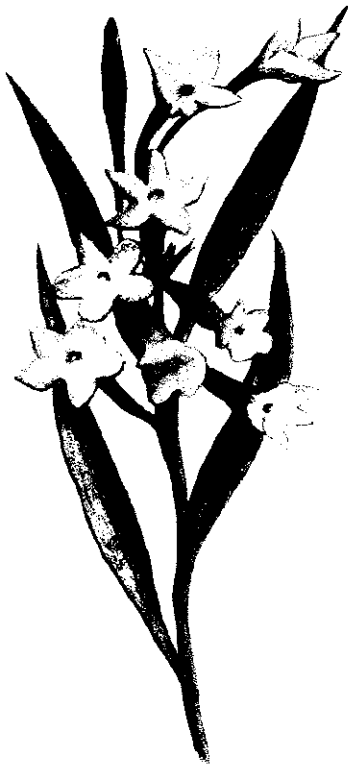
Species (USDA, 2000)	Plant communities
<i>Allium glandulosum</i> (<i>A. rhizomatum</i>)	Scrub-Grassland, Madrean Grassland, Southwestern Interior Swamp and Riparian Scrub (Mixed Scrub-Grass)
<i>Erigeron arisolius</i>	Scrub-Grassland, Madrean Grassland
<i>Heterotheca rutteri</i>	Scrub-Grassland, Madrean Grassland
<i>Laennecia eriophylla</i>	Scrub-Grassland, Madrean Grassland
<i>Talinum humile</i>	Scrub-Grassland, Madrean Grassland
<i>Asclepias uncialis</i>	Scrub-Grassland
<i>Astragalus hypoxylus</i>	Madrean Grassland
<i>Asclepias lemmonii</i>	Madrean Grassland, Madrean Evergreen Forest and Woodland (Encinal)
<i>Hedeoma costatum</i> var. <i>pulchellum</i>	Madrean Grassland?
<i>Ipomoea thurberi</i>	Madrean Grassland
<i>Margaranthus lemmonii</i> (<i>M. solaraceus</i>)	Madrean Grassland
<i>Metastelma mexicanum</i>	Madrean Grassland
<i>Pectis imberbis</i>	Madrean Grassland
<i>Tephrosia thurberi</i>	Madrean Grassland, Madrean Evergreen Forest and Woodland (Encinal)
<i>Berlandiera macrophylla</i>	Madrean Montane Grassland
<i>Ipomoea plummerae</i> var. <i>cuneifolia</i>	Madrean Montane Grassland, Madrean Montane Scrubland, Madrean Grassland?
<i>Erigeron lemmonii</i>	Southwestern Interior Chaparral (Mixed Evergreen Sclerophyll)
<i>Talinum marginatum</i>	Southwestern Interior Chaparral (Mixed Evergreen Sclerophyll)
<i>Hexalectris warnockii</i>	Madrean Evergreen Forest and Woodland (Encinal)
<i>Pherotrichis balbisii</i> (<i>Matelea balbisii</i>)	Madrean Evergreen Forest and Woodland (Encinal)
<i>Hedeoma dentatum</i>	Madrean Evergreen Forest and Woodland (Encinal and Oak-Pine)
<i>Ipomoea tenuiloba</i> (<i>I. t.</i> var. <i>lemmonii</i>)	Madrean Evergreen Forest and Woodland (Encinal and Oak-Pine)
<i>Coursetia glabella</i>	Madrean Evergreen Forest and Woodland (Oak-Pine)
<i>Arabis tricornuta</i>	Madrean Montane Forest, Madrean Montane Grassland, Madrean Evergreen Forest and Woodland (Oak-Pine)
<i>Lupinus huachucanus</i> (Pine)	Madrean Montane Forest (Pine), Madrean Evergreen Forest and Woodland (Oak-Pine)
<i>Hieracium rusbyi</i>	Madrean Montane Forest, Rocky Mountain Montane Conifer Forest
<i>Browallia eludens</i>	Madrean Evergreen Forest and Woodland (Encinal), Southwestern Interior Swamp and Riparian Scrub (Mixed Scrub-Grass)
<i>Carex chihuahuensis</i>	Madrean Marshland
<i>Carex ultra</i>	Madrean Marshland
<i>Eryngium phyteumae</i>	Madrean Marshland
<i>Lilaeopsis schaffneriana</i> ssp. <i>recurva</i>	Madrean Marshland
<i>Lilium parryi</i>	Madrean Marshland
<i>Muhlenbergia dubioides</i>	Madrean Marshland
<i>Psilactis gentryi</i>	Madrean Marshland
<i>Rumex orthoneurus</i>	Madrean Marshland
<i>Samolus vagans</i>	Madrean Marshland
<i>Sisyrinchium cernuum</i>	Madrean Marshland
<i>Symphotrichum potosinum</i> (<i>A. potosinus</i>)	Madrean Marshland
<i>Penstemon superbus</i>	Southwestern Riparian Deciduous Forest and Woodland (Mixed Broadleaf)
<i>Tragia laciniata</i>	Southwestern Riparian Deciduous Forest and Woodland (Mixed Broadleaf)
<i>Cheilanthes arizonica</i>	Madrean Riparian Deciduous Forest (Mixed Broadleaf-Mixed Conifer) ?
<i>Euphorbia macropus</i> (<i>E. plummerae</i>)	Madrean Riparian Deciduous Forest (Mixed Broadleaf-Mixed Conifer)
<i>Senecio carlomasonii</i> (<i>Roldana carlomasonii</i>)	Madrean Riparian Deciduous Forest (Mixed Broadleaf-Mixed Conifer)
<i>Senecio multidentatus</i> var. <i>huachucanus</i> (<i>S. huachucanus</i>)	Madrean Riparian Deciduous Forest (Mixed Broadleaf-Mixed Conifer)
<i>Viola umbraticola</i>	Madrean Riparian Deciduous Forest (Mixed Broadleaf-Mixed Conifer), Rocky Mountain Riparian Deciduous Forest (Mixed Broadleaf-Mixed Conifer)

SDCP from page 1

knowledge about those species. More species were added as time passed. Many species of talus snails found only in very restricted habitats, for example, increased the list greatly. It soon became clear that since many of these species had not been studied in depth, little was known about their habitat needs.

Experts at Arizona Game and Fish and elsewhere did in-depth studies of the Pygmy-owl and learned much more about the owl and its needs as time went on. They determined, for example, that the amount of territory needed per owl changed annually depending on the rainfall and prey base. Studies of minimum territory size are still underway, along with the ability of the birds to coexist with human activity.

Another set of studies dealt with native and exotic amphibians and fish. Phil Rosen, of the University of Arizona, wrote a report leading to a reintroduction program for leopard frogs and native fish. He determined



Kearney's blue star: Drawing by Bill Singleton

Vulnerable Plants

Species covered under SDCP

Pima pineapple cactus	<i>Coryphantha scheeri</i> var. <i>robustispina</i>
Gentry indigobush	<i>Dalea tentaculoides</i>
Nichol's Turk's Head Cactus	<i>Echinocactus horizonthalonius</i> var. <i>nicholii</i>
Acuna Cactus	<i>Echinomastus erectocentrus acunensis</i>
Needle-spined pineapple cactus	<i>Echinomastus erectocentrus</i>
Huachuca water umbel	<i>Lilaeopsis schaffneriana</i> ssp. <i>recurva</i>

Sensitive species not covered because already protected on public lands

Trelease agave	<i>Agave schottii</i> var. <i>treleasei</i>
Kearney's blue star	<i>Amsonia kearneyana</i>
Saiya	<i>Amoreuxia gonzalezi</i>
Box Canyon muhly	<i>Muhlenbergia dubioides</i>
Weeping muhly	<i>Muhlenbergia xerophila</i>
Goodding onion	<i>Allium gooddingii</i>
Hohokam agave	<i>Agave murpheyi</i>
Thurber Indian mallow	<i>Abutilon thurberi</i>

which habitats were prime candidates for reintroduction and what would have to be done to eliminate the nonnative bullfrog so the native species could survive.

The Arizona Sonora Desert Museum did an in-depth study of the ironwood (*Olneya tesota*) community which helped persuade President Clinton to designate the Ragged Top Mountain area west of Marana as Ironwood National Monument. John Wiens's flora of the area was also important in justifying this designation.

Watercourse Studies

Julia Fonseca guided a series of studies that identified perennial and intermittent streams, springs, and shallow groundwater, and riparian areas. Barbara Tellman worked with engineering consultants to write a report on the physical features of the watercourses and the laws governing their use. These studies will be the basis for recommendations about land use near the most sensitive areas.

Historic Studies

County staff took a detailed look at archaeological and historic sites, cultural sites, and what would be needed to be proactive in preserving the most important sites. Because ancient peoples lived near water, many of the intact sites in need of preservation are in the same areas that should be protected as wildlife habitat.

Land Use Studies

A series of studies of land uses provided useful information as a basis for preservation of areas that would benefit wildlife. Ranchlands were studied and many in the Altar Valley (near Baboquivari Peak) and the San Pedro River section in northeast Pima County were found to provide excellent habitat.



*Goodding onion: Drawing
by Bill Singleton*

Other Studies

Other reports already issued discuss economics, infrastructure, and cost of growth. One study, for example, looked at “wildcat” development and its economic impacts on the county. Finally, each area of the county had its own report summarizing the results of the various studies and in some cases adding information peculiar to the area, sometimes produced by local stakeholders. Most of the reports are beautifully illustrated with maps, graphs and drawings by Pima County Graphics staff, examples of which are included here (originals in color). The entire process is led by Maeveen Behan, Assistant to County Administrator, Chuck Huckleberry.

Native Plant Society members are crucial parts of the SDCP team. Julia Fonseca has been the leader of the scientific aspects of the plan, especially those related to riparian areas. Julia described the early scientific phases of the SDCP in the winter 2000 issue of the *Plant Press*. Neva Connolly wrote reports on exotic species, mountain parks and other topics. Gary Bachman and Jeff Kreamer are instrumental in the native plant and exotic plant aspects of the plan (See pages 12 and 13). Barbara Tellman wrote three reports and will write another four on a variety of topics.

The Nature Conservancy, the Sonoran Desert Conservation Alliance, Native Plant Society, Audubon Society, Ironwood Alliance, Arizona Sonora Desert Museum, Tucson Botanical Gardens, the Herpetological Society and other groups are involved in various ways.

What Next?

Another two years will pass before the SDCP is ready to be fully implemented, although parts will be implemented earlier. The entire plan hinges on the U.S. Fish and Wildlife Service issuing the appropriate “take” permit. Before the permit can be issued, however, an Environmental

Impact Statement must be written and approved.

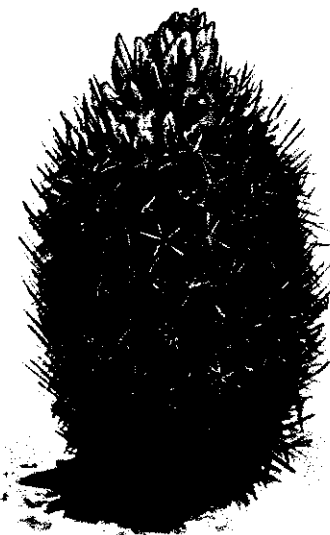
The plan involves both land acquisition and changes in land use regulation. Extensive changes are proposed to county ordinances dealing with riparian areas, buffer zones, grading, native plants, and hillside protection. These changes will be made in conjunction with the required updating of the Comprehensive Plan, required under the Growing Smarter Law. These changes should be implemented by Jan. 2002.

In order to protect the few existing and springs and riparian areas in and near private land, changes in state water laws and regulations are proposed to protect shallow groundwater supplies. Changes in tax laws and grazing regulations are proposed to encourage ranchers to improve their grazing practices.

More than one hundred more reports are due over the next two years on a great range of subjects, including economics, environmental justice, and land use, all directed towards either the Comprehensive Plan update or the SDCP and its Environmental Impact Statement. The U.S. Congress renewed financial support for the effort in the budget approved in fall 2000.

For much more information, see the Pima County web site www.co.pima.az.us/cmo/sdcp/index.html. Pima County sells the report *Overview of the Draft Preliminary SDCP* for \$15 (black and white version) or \$35 (color version).

Barbara Tellman is Editor of the Plant Press, a researcher at the UA Water Resources Research Center, and a member of the SDCP working team.



Acuna cactus: Drawing by Bill Singleton

THE PIMA COUNTY NATIVE PLANT NURSERY

GARY BACHMAN

The Screwbean Mesquite, Arrowweed, and Huachuca Water Umbel will once again grow on the Santa Cruz River in Pima County as part of a plan to return plants to habitats that have been altered by urbanization of the Tucson Basin. These species will be propagated in nurseries that will be established at wastewater treatment sites that are owned and operated by Pima County.

Recommendations to establish and operate the nurseries are contained a report written under the SDCP by four ANPS members (Julia Fonseca, Jeff Kreamer, Neva Connolly, and Gary Bachman). The report results from collaboration between the four, who are Pima County employees. It will be submitted to the Pima County Board of Supervisors in January 2001.

The nurseries will take advantage of two resources available to the county at the sewage treatment plants - the effluent and the buffer areas.

The report also recommends that the County adopt practices in its development and planning projects that are consistent with the intent of the Conservation Plan. These include incorporating the use of Arizona native plants in its designs, and continuing the refinement of its landscape preservation and development ordinances to better preserve habitat and individual plants. The report also outlines opportunities that exist to develop training and education programs that will further the purposes of the Conservation Plan.

The initial phase of the nursery will focus on the production of three or four species that will be included in plans for habitat restoration in Pima County - the Screwbean Mesquite (*Prosopis pubescens*), Arrowweed (*Pulchea sericea*), Huachuca water umbel (*Lilaeopsis schaffneriana ssp. recurva*) and



Screwbean mesquite

Ironwood (*Olnea tesota*). The former three species were once found along the Santa Cruz River in Pima County. The former two are readily found along the Colorado and Gila Rivers. The Water Umbel is on the endangered species list and would need to be propagated and grown in a controlled environment. The Ironwood tree is considered because of its importance as a key species.

The second phase of the nursery proposal considers expanding the inventory of plants that would be propagated and grown. The intention of this project is not to compete with local nurseries, but to provide a source of plants that are not easily grown or available in the commercial trade for county projects such as road improvements. Species could also be grown for education and conservation programs. Plants could be provided for various habitat restoration and revegetation projects.

The nurseries would be established at one or more of Pima County's Wastewater Treatment Plants. Buffer areas would provide space for nursery operations including propagation areas, offices, nursery rows, and would provide seed and cuttings for nursery stock as well as food and shelter for wildlife. Recommendations also include plans for the development of a seed bank, a native plant research center, areas for the cultivation of native grass seed, and areas for research on invasive exotics.

The Pima County Parks and Recreation Department will operate and manage the nursery, as part of its new mission that includes responsibility for oversight of the County's natural resources.

Implementation of this ambitious plan will require feasibility studies including cost estimates, hiring and training of staff, and alterations in permits that will allow the use of wastewater for a nursery program. Initiation of this program is subject to approval and funding by the Pima County Board of Supervisors.

Gary Bachman is field trip coordinator for the Tucson chapter of ANPS and works for Pima County in the Community Services Division.



The water umbel and screwbean mesquite (above) are two of the first species that will be grown in the nursery. Drawings by Bill Singleton.

INVASIVE EXOTIC SPECIES: A CONSERVATION CHALLENGE

JEFF KREAMER

SDCP and Invasive Species

The need to manage invasive exotic species is one of the top priorities of the Sonoran Desert Conservation Plan. One report identifies the most problematic invasive species of nonnative plants and animals. Another report outlines a plan for reintroduction of native frogs and fish which can only be done successfully if the invasive bullfrog and crayfish are eliminated. In order for this to work, natural streamflow processes need to be restored.

The next step is to develop a management strategy for invasive exotics on public and private land. The strategy will be a combination of new land management policies, educational programs, volunteer eradication projects, and possibly new regulation. The ANPS is one of many groups which have come together to help create educational programs, and support eradication efforts. Over the course of the next few months, members of the ANPS will be working with the Tucson Botanical Gardens, Herpetological Society, The Desert Museum, The Fish and Wildlife Service, The Tucson Mountain Weedwackers, and many other groups and agencies in the creation of posters, pamphlets, and other educational devices designed to inform the public about exotic invasive species. Exotics species information will be incorporated into Cooperative Extension's courses for landscapers, and into a host of other programs at the Botanical Garden and other places. These cooperative programs are critical to the success of region wide programs to limit the spread of exotics. In late February Pima County will sponsor a workshop for professionals on management of aquatic exotics.

Why is Exotics Management Important?

The term "Exotic Plant" is one we hear often in conservation discussions. What are exotic plants? Put simply, they are plants not native to our region. Exotic plant sales are the economic lifeblood of most area nurseries. Most of the grasses planted as lawns, and the orange trees so valued in many of our yards, are all exotic. Most of our agricultural and grazing businesses rely on introduced species for higher crop yields and increased grazing forage. Unfortunately, some of the species introduced in our region have proved to be highly adaptable to our climate, and are very invasive. Grasses like fountain grass and buffel grass have so invaded many of our natural areas, that ecological balance is severely impacted. While only a small fraction of exotic species become problematic invasives, it is often difficult to predict which ones will and thus care needs to be taken when introducing

any exotic species that might adapt either to the desert or to riparian environments.

Buffel grass can now be found nearly everywhere at lower elevations, ranging from urban areas, to well within our public reserves. Several of our state's parks and monuments are attempting to curb the spread of these invaders by developing volunteer assisted eradication programs such as the Tucson Weedwackers. This group has been actively working to evaluate and eradicate invasive species within Saguaro National Park, and Tucson Mountain Park. Sue Rutman has led the efforts to eliminate this grass at Organ Pipe National Monument.

Over the past several years, the Plant Press has had a series of articles on exotic plant issues in the Flagstaff area, the Colorado River, Sonora, and elsewhere. Readers have learned that some popular landscape plants have been found spreading into our natural areas. African sumac, lantana, and fountain grass are all popular landscaping plants with the apparent capacity to become serious invaders. People who prefer these plants in their landscaping should make an effort to prevent them from spreading, or consider their potential as a seed source prior to planting them, especially near our riparian areas where impacts could become severe.

Many of these bio-invaders can significantly impact habitat by crowding out native plants, creating damaging wildfire cycles by providing fuel loads where fires have normally never occurred, and impacting the food chain for native fauna. These are just a few of the reasons why invasive exotics issues are important to native plant enthusiasts. If we are to help preserve the integrity of our natural areas, then the threat from exotic invaders must be challenged. If the threat is from invasive exotic plants, harmful exotic insects, or aquatic invaders such as bull frogs and crayfish, the problem must be managed before the harm to native species becomes irreversible, as it has in many areas.

A few days in the field are all it takes to recognize the extent of the problem. Action plans should not be delayed if measurable successes are to be achieved. There is a great need for volunteers, and your help can make a difference. The next issue of the Plant Press will have an article about the Weedwackers, and provide contact information for those members interested in participating.

Jeff Kremer is ANPS Conservation Chair and works in Pima County's Wastewater Management Department where his surveying activities have made him aware that exotic species are all around us.

THE RESULTS OF VEGETATIVE PROPAGATION TRIALS OF NINE PLANTS OF THE SOUTHWESTERN PLATEAU

SUSAN HOLIDAY

Nine species of hardwood plants native to the Colorado Plateau were given rooting trials. Three species did not root during the trial, the other six rooted with varying results. Plants tended to root better under mist or with mist and heat treatment. Hormone treatment did increase rooting frequency, results varying with the species and the strength of the hormone.

Introduction

The rooting of cuttings is one way to propagate plants. Often with trees and bushes, starting a plant from seed may mean that a period of several years passes until the tree is ready to plant. Because of this, starting plants from seed is sometimes not feasible. Although much has been written on propagation of crops and common landscaping plants, there is very little written on methods of rooting plants native to the Colorado Plateau. The plants chosen for this study were from the southwestern area of the plateau on or near the Navajo reservation. The plants all grow at elevations near the 4000-foot level.

Materials and Methods

Nine species of woody plants were collected in the early summer of 2000 for rooting trials. *Poliomintha incana* (Torr.) Gray was collected along highway 160 north of Cow Springs June 16. *Forestiera pubescens* Nutt. and *Purshia mexicana* (D. Don) Welsh were collected June 17 at Canyon Diablo south of Leupp. *Artemisia tridentata* Nutt. was collected June 19 in Flagstaff by the intersection of Enterprise road and 4th street. *Sambucus caerulea* Raf., *Vitis arizonica* Engelm. *Salix exigua* Nutt., *Juglans major* (Torr.) Heller, and *Rhus aromatica* var. *trilobata* (Nutt.) Gray were collected June 29th near Canyon Diablo and the exit off Interstate 40. All cuttings, when possible, were taken of green stems that had not flowered, preferably off the main trunk or a sucker shoot as advised by Hartmann et. al (1997). The *Sambucus*, however, was already in fruit by the time the cuttings were taken. The plants were given twelve treatments. These controls consisted of mist only, mist and heat only, and no mist, no heat, and low sunlight. The remainder of the cuttings were treated with rooting hormone in talc at .1%, .3%, and .8% indole-3 butyric acid

and given mist, mist and heat, or no mist, no heat, low sunlight treatment. All of the plants were placed within two days of cutting. The rooting medium used was 1/3 vermiculite and 2/3 perlite. All of the plants were kept in the Northern Arizona University teaching greenhouse for the duration of the test.

Results

Over all there was an average of about 14% rooting, with the range from 0 to 100% rooting. The low average is a result of some of the species not rooting under any of the circumstances given in the time frame of this study. Of the species that did root, the overall success was about 27%. This is low compared to Howard's results of 61% average rooting of native plants of Colorado and Wyoming (1979). Possible explanations for the low percentage is that perhaps some of the species chosen were hard to root, some of the species may have been collected

Results of Rooting Trials

	No Hormone	# 1	# 3	# 8
<i>A. tridentata</i>	0%	0%	0%	0%
<i>A. tridentata</i> w/ mist	0%	0%	0%	0%
<i>A. tridentata</i> w./m & h	0%	0%	0%	0%
<i>J. major</i>	NA	NA	NA	NA
<i>J. major</i> w/ mist	0%	0%	0%	0%
<i>J. major</i> w/ m & h	NA	0 h	0%	0%
<i>F. pubescens</i>	0%	0%	0%	0%
<i>F. pubescens</i> w/ mist	0%	21%	0%	7%
<i>F. pubescens</i> w/ m & h	100%	50%	50%	100%
<i>P. incana</i>	0%	25%	0%	0%
<i>P. incana</i> w/ mist	0%	4%	40%	70%
<i>P. incana</i> w/ m & h	100%	100%	100%	66%
<i>P. mexicana</i>	0%	0%	0%	0%
<i>P. mexicana</i> w/ mist	0%	25%	0%	46%
<i>P. mexicana</i> w/ m & h	0%	100%	50%	50%
<i>R. aromatica</i>	NA	NA	NA	NA
<i>R. aromatica</i> w/ mist	0%	10%	0%	13%
<i>R. aromatica</i> w/ m & h	NA	0%	0%	66%
<i>S. exigua</i>	NA	NA	NA	NA
<i>S. exigua</i> w/ mist	0%	70%	0%	50%
<i>S. exigua</i> w/ m & h	NA	0%	0%	33%
<i>S. caerulea</i>	NA	NA	NA	NA
<i>S. caerulea</i> w/ mist	0%	0%	0%	0%
<i>S. caerulea</i> w/ m & h	NA	0%	0%	0%
<i>V. arizonica</i>	NA	NA	NA	NA
<i>V. arizonica</i> w/ mist	50%	50%	33%	50%
<i>V. arizonica</i> w/ m & h	NA	0%	0%	33%

too late in the growing season, or because during this experiment a variety of cutting types were used.

Not all species of plants have an equal ability to produce roots from cuttings (MacDonald, 1986). There are also differences in the ability of different cutting types from a single plant to root (Holloway, 1979; Hartmann, 1997). The age of the cutting, whether it has leaves and buds, and whether or not it is flowering all affect rooting ability (Hartmann, 1997). Of the plants used in this study, the *S. caerulea* was actively flowering and had fruit when it was cut, possibly affecting its rooting ability. The second group of plants used were two weeks older, which may have affected their rooting ability as they had a lower rate of rooting compared to the first group harvested.

For all the plants, a variety of cutting types were taken. The types most easily rooted in this study were the softer, newer growth branches. The mallet cut stems, with added hardwood, were the least likely to root. However, with the *F. pubescens*, hardwood branches with a straight wood cut rooted better than the smaller new growth did. There were some individual plants that were still green, but had not rooted in the medium by the end of the study. It is possible they needed more time to root. The *A. tridentata* however, all rotted before rooting could occur.

Of the various treatments, according to Graph 1, with *P. incarna*, heat and mist had the greatest effect on rooting with all hormone treatments. However, that did not occur with *V. arizonica* and *S. exigua*, both of which rooted better with mist only. None of the species rooted better without mist. All of the species that did root, rooted with any of the hormone treatments given, except for *R. aromatica* which only rooted with the .8% IBA powder. Graph 2 shows the

trends of the species that rooted in comparison to the hormone powder concentration used. The result seemed to differ with the plant species and physical treatment.

Conclusion

Species of native plants of the Colorado Plateau can be rooted from stem pieces, decreasing the time needed to prepare for landscaping use. The ability of species to root is variable. Age of stem, type of cut, hormone concentration and physical treatment of cuttings all affect the percentage that will root. However, since many of these plants are not readily available at commercial growers, rooting of native plants for low water use landscaping seems to be a worthwhile endeavor.

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Susan Holiday is a middle science teacher at Leupp Public School and recently completed a masters program with Tina Ayres at NAU.

PUBLICATIONS AWARDS FOR 2001

ANPS is now accepting applications for awards under the Publications Grants Program. These grants are made possible through proceeds from ANPS publications. Approximately \$3,000 is available for awards this year to help support projects that will result in publication of materials about native plants, plant conservation, and landscaping with native plants. This year for the first time all applications must be made on the official application forms. These may be downloaded from the ANPS web site along with additional information or requested by mail at the address on the last page of this newsletter. Applicants do not have to be members of the Society to qualify.

Some grants awarded in the past were to help support the journal *Desert Plants*, publication of a new version of the Big Trees Book (See page 17), Flora of Organ Pipe Cactus National Monument, Rare Plants of Arizona, and other publications. The Rare Plants book should be published in spring 2001. Watch the ANPS web site for information.



**NATIVE
LANDSCAPING
FROM EL
PASO TO L.A.**

by Sally
Wasowski with

Andy Wasowski 184 pages. Lincolnwood, Illinois: NTC/ Contemporary Publishing Group, 2000. \$22.95 (soft cover)

**THE LANDSCAPING REVOLUTION:
GARDEN WITH MOTHER NATURE NOT
AGAINST HER** by Andy Wasowski with Sally
Wasowski 166 pages. Lincolnwood, Illinois: NTC/
Contemporary Publishing Group, 2000. \$27.95

Sally and Andy Wasowski have been instrumental in promoting native plant gardening in the Southwest, including California and Texas during the past decade. They have published several books, always with beautiful photographs and filled with good information on planning, design, plant selection, and maintenance of native plant gardens. A firm philosophy is always woven through the text, gently reminding the reader of the virtues of native plant gardening.

Native Landscaping, which was previously published as **Native Gardens for Dry Climates**, is probably the most illustrative of this philosophy. It is well written, and the photographs are outstanding. A convincing advertisement to induce the “non-native gardener” or beginner over to the side of native plant gardening. The book continually emphasizes that the easiest to maintain gardens in arid climates (or any climate) are native plant gardens.

Part One of this two part book contains a chapter on the “envelope garden”, illustrating how a new house can be “dropped” into the natural landscape, disturbing only those areas closely adjacent to the building. The designed landscape is located in small courtyards and patios. The natural areas around the building are pre-served and become part of the home landscape. Plans and photographs for a variety of courtyard theme gardens are included. Each garden comes with a plan and a list of plants. The designs are simple enough for homeowners to install themselves. All of the gardens are appropriate for Tucson and Phoenix. Seasoned native plant gardeners will be interested in the way many of the

BOOK REVIEWS

PATSY WATERFALL

plants are used or how they are combined with other natives. There is even a Curandera Garden! Part Two contains a glossary of 146 native plants selected for landscape use in dry climates from “El Paso to L.A.”. A general description of each plant is included, with valuable information on distribution, regions of use, and soil requirements, as well as their ornamental value. At the end of the book are charts for several arid-climate areas, including Tucson and Phoenix, listing the most common plants indigenous to the area.

The **Landscaping Revolution** is a thought-provoking and humorous look at American landscaping practices. Particularly amusing are the descriptions and pictures of inappropriate lawns and pruning practices. Again, he makes a convincing argument that the easiest and most environmentally sensitive gardens are native plant gardens that require little irrigation, pest and disease control, fertilization, and pruning. Using photographs and illustrations to get his points across, he makes a case for abandoning the “life-supported” lawn and freeing ourselves from endless landscaping chores, many of which are damaging to the environment. The payoff is less work, less money, less water, avoidance of pesticides, and more wildlife in our gardens. He also speaks out against the standardization of the cultural landscape, the loss of a sense of place. This is cleverly demonstrated by a set of house photos, all with front lawns, that all look alike but were taken in different parts of the country. Clearly, Arizona with its very unique native landscapes has much to lose as the built landscape becomes homogenized.

The sophisticated native plant gardener may not learn much new from these books, although it is difficult to pass up some of the pictures. Rather, these are books for the novice gardener or the newly converted native plant gardener. Many of us take these messages for granted or may even feel smug when we see these books. However, there are thousands of people moving into the southwest who are not aware of these ideas, but would easily be converted to native plant gardening if they were given the right information. Buy one for a friend!

Patsy Waterfall is a Landscape Architect, Director of the Cooperative Extension Low-4 (low-water use landscaping) Program, and President of the Tucson Botanical Garden board.

BRIEF PUBLICATION NOTICES

Roadside Use of Native Plants.

Harper-Lore, Bonnie and Wilson, M. 2000. Island Press. Washington D.C. 665 pp. \$25.

This useful book begins with a series of interesting brief essays on roadside restoration and management, treating such topics as designing roadsides with native plants, implementing prescribed burns, choosing non-invasive plant materials, restoring grassland ecosystems, and working with succession. The heart of the book is a state by state listing of native plants appropriate for roadside use. Each state section has a vegetation map of the state, listing of dominant plant species for the vegetation type, references within the state, listing of threatened and endangered species, and a list of native species appropriate for local use. Finally, the book has appendices with resource information, including federal rules and regulations. For anyone interested in vegetation along our highway roadsides this book is extremely helpful.

This is a reprint of a Federal Highway Administration Publication designed to assist professionals interested in appropriate roadside vegetation. The primary author, Bonnie Harper-Lore, is the FHA's native plant specialist and as such has responsibility

for promoting the use of native plants on highways throughout the nation. She is also deeply committed to reduction of exotic species along highways. Maggie Wilson is a biologist with the Environmental Protection Agency.

The Arizona Register of Big Trees. 2000. This ten-page book lists the largest "national champion" trees found in Arizona of 72 species. It also has beautiful photos of some of winners. The largest tree by all measures (circumference, height and crown) is a non-native eucalyptus. \$5 from P.O. Box 222, Higley AZ 85236.

New University of Arizona Press Botanical Books
These new books will be reviewed in coming issues of the Plant Press.

Wendy Hodgson. 2001. *Food Plants of the Sonoran Desert* 410 p. \$75

Robert Robichaux and David Yetman. 2000. *The Tropical Deciduous Forest of Alamos*. 260 pp. \$50.

Richard Felger. 2000. *Flora of the Gran Desierto of Northwestern Mexico*. 673 pp. \$75.

Herbarium cont. from page 3

Herbarium include Richard Hevly and Jim Rominger, both retired professors in the Biological Sciences Department, Bob Mathiasen, an expert on dwarf mistletoe and professor from the CESM, Barbara Phillips, botanist for the Coconino and Kaibab National Forests, Nancy Brian, botanist for Grand Canyon National Park, and Phyllis Hogan, director of the Arizona Ethnobotanical Research

Association.

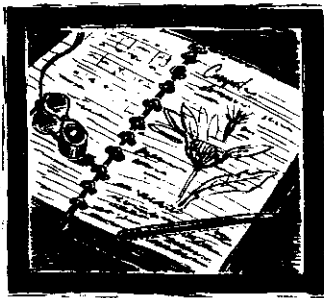
Perhaps the most exciting news this winter is that we are changing over to a new database. The conversion of our old Paradox database is being coordinated by Randy Scott of the Biological Sciences Department. Our UNIX workstation, fondly named "Herb", will be the star player in the conversion to Oracle. The database structure will be compatible with those being implemented at the University of

Arizona and Arizona State University herbaria so that we will be able to exchange or combine data. We hope to have the herbarium catalogued and web accessible in the next five years. To find out more about the herbarium call 520 523-7242 or visit our web site at www.nau.edu/~deaver.

Tina Ayers is a Professor of Botany at Northern Arizona University and Director of the Deaver Herbarium.



Deaver Herbarium Staff: from left to right: Tina Ayers, Daniela Roth, Susan Vogel, Glenn Rink, Robin Taylor, Marisa Howe, and David Hammond



OUTSTANDING ARIZONA BOTANISTS VI: ASA GRAY

BARBARA TELLMAN

Although Asa Gray did not live or work in Arizona, he played a vital role in the development of Arizona botany. Many of the collectors who discovered new plants in Arizona in the 1800s, sent their collections to Asa for identification and classification. Gray was well-known as the person who began systematic classification of plants of newly discovered parts of the American West.

Gray was born on a farm in Oneida County, New York in 1810. Gray's father operated a tannery and worked very hard feeding bark into the mill and driving the horse that furnished the power. Gray was precocious and quickly learned all that was available at the small country school. His schooling ended when he was 15, about halfway through high school. He followed the path that so many nineteenth century naturalists followed and trained to be a doctor, which was mainly an apprenticeship with a practicing physician. In 1827 he read the section on botany in the Edinburgh Encyclopedia and was so excited by it that he quickly turned his interests from medicine to botany, although in those days botany was not a paying profession.

In 1830 he left some plant specimens for John Torrey, the leading botanist of the day, to identify. This marked the beginning of a lifelong association. Torrey tried to find some paying work for Gray but was unsuccessful until 1836 when Gray was appointed curator of the collections in the New York Lyceum. Several years later Torrey asked him to collaborate on the Flora of North America. At that time chaos reigned in American botany with the continual discovery of new species brought back by western expeditions. The complete flora turned out to be an impossible task although they finished parts of volume one in 1838. In 1842 Gray was elected to the Fisher Professorship of Natural History at Harvard, a position he held to the end of his life. He was an inspiring teacher and botanist and later also became founder and director of the Harvard Botanical Garden. He trained many of the leading naturalists of the late nineteenth century, including many who collected in Arizona and northern Mexico. They in turn sent specimens to him for identification and for inclusion in the Harvard herbarium. Botanists familiar to Arizonans whom Gray trained or collaborated with include Charles Parry, Edward Palmer, John Coulter, and J.G. Lemmon.

In the 1840s and 1850s the great transcontinental surveys began and Gray played a major role in classifying materials collected on those surveys. W.H. Emory depended on Gray to classify many of the botanical specimens his survey team collected in the Southwest. When Gray traveled by train through the West late in life he tried to collect plants on the various long stops along the way. He remarked that the experience taught him that he did not have the soul of a collector, since when he arrived back home he found that he had labeled the sources so vaguely (i.e., "Utah-Colorado desert") that he had no idea where he had found them!

Many years after his first attempt to produce a flora of North America, Gray again embarked on a Synoptical Flora of North America, incorporating the voluminous materials brought to him in the intervening years, but this effort was too massive to be completed.

He was a prolific writer. His first scholarly publication, written at the age of 24, *North American Graminae and Cyperaceae* was highly praised by William Hooker, an important naturalist. He wrote several text books on botany, many articles for the American Journal of Science, articles for the Nation, and other journals. He was a pioneer of plant geography and wrote a significant work on the plants of Japan and their relation to North American plants. He was America's leading advocate of Darwin's theory of evolution and the letters between the two men have been preserved.

For more information on Gray

- Anon. 1939. Calendar of the Letters of Charles Darwin to Asa Gray. Massachusetts Historical Records Survey.
Bradford, Gamaliel. 1929. As God Made Them: Portraits of Some Nineteenth Century Americans. Houghton Mifflin.
Dupree, A. Hunter. 1959. Asa Gray 1810-1888. Harvard University Press.
Jordan, David. 1910. Leading American Men of Science. Houghton Mifflin.
Sargeant, Charles, Ed.. 1889. Scientific papers of Asa Gray. 2 vols Houghton Mifflin

The Plant Press welcomes contributions of articles, plant drawings, and book reviews. Please contact the editor, Barbara Tellman at bjt@ag.arizona.edu or 520 792-4515 with your ideas.

ABOUT THE ANPS BOARD

The ANPS Board has a new President as well as several new board members. The new members will be profiled in this and succeeding issues of the Plant Press.

Barb Skye - State President - Barb is Collections Manager of Botany at the Arizona-Sonora Desert Museum and leads the Botany Department (staff of ten) by coaching staff, managing the budget, and prioritizing projects. She earned her MS in Public Horticulture Administration in 1996 at the University of Delaware with her thesis: "An Approach for Planning Ethnobotanical Displays: Desert Southwest Plants and Peoples" She was Tucson Chapter President from 1996 to 1998. Her special interests are habitat conservation and restoration, ethnobotany, international plant exploration, volleyball, and whitewater canoeing.

Ken Morrow works as the propagation supervisor for Arid Zone Trees, a large tree farm in Queen Creek. He is especially interested in woody plants, and is involved in the Arizona Big Tree program. He has been a member of the ANPS for about eight years, but only recently decided to accept a more active role, first as conservation chair for the Phoenix chapter, and now as board member. He will be working along with Doug Green on membership and chapter development issues.

Joanne Basta moved to Arizona in 1994 and immediately became a member of the Tucson Chapter —seeing it as a good opportunity to learn about the region and its unique plants. She was particularly attracted to ANPS because of the free field trips and educational meetings. It was a fun, non-threatening way to learn about Arizona's plants with a range of people who have a passion for and scientific knowledge of the bio-region. She has volunteered for ANPS in educational outreach and joint conservation efforts with other organizations. This year she is co-facilitating the Tucson Chapter's field trips with her husband Gary Bachman. Her professional occupation is Director of Evaluation at LeCroy & Milligan Associates (research and evaluation of social welfare programs).

Correction to the Autumn 2000 Issue from Dave Bertelsen: Dave referred to two species: *Pectocarya platycarpa* and *P. recurvata*, giving the impression that *P. recurvata* is the rare species, while actually the rarer of the two species is *P. platycarpa*,

WILDFLOWER POSTER

The Native Plant Society's beautiful new wildflower poster is available for sale at Tucson Botanical Garden, Tohono Chul Park, Tucson Audubon Society, Arizona-Sonora Desert Museum, Boyce-Thompson Arboretum and other locations. It is also available from local chapters of ANPS. Individuals may order the poster from ANPS at the address on the last page of this newsletter. More information is available on the web site. Owners of stores such as bookstores, nurseries, and gift shops may order quantities at wholesale prices. For wholesale orders (10 or more) of the wildflower poster, call Barb Skye at the Desert Museum (520-883-3009.) Otherwise mail your orders to ANPS, P.O. Box 41206, Sun Station, Tucson, AZ 85717.

Three exhibitions are scheduled in 2001 to show Margaret Pope's original artwork for the poster: February 17 at Plants for the Southwest; March 10 and 11 at Desert Botanical Garden; and April 11 at a reception from 5-7 PM at Tucson Botanical Garden. During the month of April, originals will be on display in Tucson Botanical Garden's Porter Hall. Margaret will sell originals of the drawings, and note cards, and ANPS will be ANPS materials, including posters during some of these events.

NEW MEMBERS WELCOME

People interested in native plants are encouraged to become members. People may affiliate with chapters in Central Highlands (Prescott), Flagstaff, Phoenix, Tucson, and Yuma or may be members only of the state-wide organization. For more information, write to ANPS at the address below, visit the Web site www.azstarnet.com/~anps/ or contact one of the people below.

State President:	Barb Skye	520-883-3009
Central Highlands (Prescott):	Heidi Romppanen	520 427 9457
Flagstaff President:	Ana Novak-Goodman	520 525 3659
Phoenix President:	Kathy Rice	602 808 -9304
Tucson Co-Presidents:	Glenda and Bob Zahner	520 578 1639
Yuma President:	Pat Callahan	520 627 2773

Membership Form:

Name

Address

City

State

Zip

Phone Number

Chapter preferred: State Central Highlands Flagstaff
 Phoenix Tucson Yuma

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 \$ 50 Commercial/Sponsor \$!00 Patron

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