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THE IMPLICATIONS OF A LONG-TERM DROUGHT ON ARIZONA'S FLORA

Nancy Morin

Climatologists are seeing patterns of precipitation that suggest that southwestern U.S. and northern Mexico may be about five years into a return to more normal conditions. Intensifying the impact that such aridity might have on native plants and plant communities are global warming, greater demand on water resources, forest density issues, and fire regimes. This is an important time for ANPS members to consider what the implications of a "long term drought" might be for our wonderful flora.

Precipitation Patterns

Julio Betancourt and collaborators (Betancourt et al., 2003) at the New Mexico Drought Summit in Albuquerque, New Mexico, reported on precipitation patterns they observed in tree ring data and other indicators. They introduced their report with some caveats:

- Mega-droughts are multi-seasonal, multiyear, and sub-continental.
- Tree rings accurately depict climate variability in space and time.
- Precipitation variability has been non-stationary and non-cyclical, and therefore inherently unpredictable.

Furthermore, there are spatial variations between regions from year to year; precipitation patterns in southern Utah may be different from western New Mexico in a given year.

It is easier to say what has happened than to predict what will happen. The past 200 years in the Southwest have been abnormally wet, particularly the last 20 years. Since 1999, precipitation has decreased significantly. In northern Arizona, tree ring data showed that 2002 was the driest year in 1700 years. According to Betancourt (2003), major droughts in the southwest occurred in the late 1200s, called the Great Drought, the mid- to late 1400s when the Casas Grandes / Hohokam collapse occurred, and the late 16th Century, considered a Megadrought. Showing that there are ups and downs in aridity even within a larger wet pattern, there have been major droughts within the last 200 years: 1899-1904 and the 1950s. The Great Drought lasted nearly a century. The 16th Century Megadrought (based on a figure in Gray, Jackson, Betancourt & Eddy, 2003) appears to have been about a 20-year drought culminating a century of wet periods alternated with dry periods in 20-year cycles. This suggests that we could anticipate a return to severe aridity for at least several decades.

At the 2003 Southwest Drought Summit in Flagstaff, May 12-13, 2003 the following major conclusions were reached (http://www.mpcer.nau.edu/megadrought/drought_summit_report/index.htm):

- Droughts are normal. We need to incorporate this reality into management and policy plans.
- Wet periods can occur within a drought. These periods of normal to elevated precipitation can span more than a year and are typical of multi-year drought periods.
- Increased population growth. The Southwest is experiencing unprecedented

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PRESIDENT'S MESSAGE

Nancy Morin

It probably seems strange to be writing about drought after our Central Chapter received record-breaking downpours this spring. These late rains gave us wonderful wildflower blooms in the desert and nice shows in the mountains. There are indications, though, that we are in a long-term return to aridity (see accompanying article on drought), and ANPS is positioning itself to reduce negative impacts that humans might have on our native plants and plant communities that will already be highly stressed.

That Arizona's native plants are core to the mission of the Society was confirmed in responses to the survey of members last year. To reflect this, the Board voted to change the mission statement in the Bylaws to: "The mission of the Arizona Native Plant Society is to promote knowledge, appreciation, conservation, and restoration of Arizona native plants and their habitats." This mission will be our guiding light as we plan activities and projects for the Society.

For the past year we've been very lucky to have Board members working very hard on behalf of our native plants. Ken Morrow bravely stepped in as interim President to keep the momentum that President Barb Skye gave us. We owe our thanks to Ken for his steady leadership. Marilyn Hanson, who has finished a long stint as Recording Secretary, did a heroic job of getting all the Society's important papers in order, developing resources to help Board members operate more effectively, and keeping the Board on the right track with her knowledge of history and previous decisions. Thank you, Marilyn. You have been amazing! Erika Geiger has already begun a seamless transition as she takes on Recording Secretary responsibilities. Joanne Basta has done a similarly wonderful job by getting the Society's finances in professional order. We thank her and welcome Ken Morrow into the Treasurer's position to continue where she left off.

I would like to extend a big thank you to the many organizers of our Fall 2003 annual meeting. They enthusiastically embraced this formidable task and produced a terrific event in Oracle, Arizona for our society members.

Carianne Funicelli has made great progress on energizing ANPS's Conservation Committee. If you are interested in being involved, let Carianne know or email her at conservation@aznps.org.

Nancy Zierenberg, as the society's Administrative Assistant, has kept the society's activities moving forward smoothly. All of your Board members are working hard and thinking strategically to make ANPS effective in achieving its mission: to broaden knowledge and appreciation of plants and habitats native to Arizona, to work to protect those native plants and habitats, and to encourage landscaping with native plants.

Our chapters are the heart of our organization, and I'd like to encourage all of our members to be involved in chapter activities. We can use more help in almost every area. Would you like to lead a field trip? Do you have an area of expertise that might be helpful? Could you give a talk or do you know of someone who could? Chapters can always use help with articles for newsletters or in other public outreach. There are many, many ways you can be involved, so please let your chapter officers know of your interests.

"SON OF CAP" THREATENS GILA RIVER

Julia Fonseca

The Gila River in New Mexico is one of the few remaining major streams in the Southwest that hasn't been dammed or pumped dry for water supply. It provides life for native fish and wildlife, including endangered species such as the loach and spikedace minnows and the Southwestern willow flycatcher. The significance of the river has been recognized in Arizona upstream from Safford where Congress established the Gila Box National Conservation Area.

The New Mexico Interstate Stream Commission wants to capture and divert an additional 18,000 acre-feet of water per year from the Gila. New Mexico's delegation is negotiating with Senators Kyl and McCain to add an amendment to the Arizona Water Rights Settlements Act (S 437). Senators Domenici and Bingaman of New Mexico are holding the bill hostage in the committee they control. In return for releasing the bill from the committee, the New Mexico delegation wants $150 million in federal funding to capture Gila River water for export over the Continental Divide.

The diversion is the legacy of the 1968 Central Arizona Project (CAP) bill, which included a provision for the construction of Hooker Dam "or suitable alternative" on the Upper Gila River. The bill authorized the Secretary of the Interior to contract with New Mexico to divert additional water from the Upper Gila, its tributaries and underground water sources. In any period of ten consecutive years, the federal government could allow New Mexico to consume as much as 180,000 acre-feet.

Proposals now under discussion would use the money to pump and divert water along the Cliff Valley reach of the Gila, and possibly the San Francisco River as well as other locations. The Cliff reach has cottonwood-ash forests and wetlands dependent on river flows and shallow underground water. These forests are known to support some of the highest densities of non-colonial birds on the continent. The area includes large concentrations of the endangered Southwestern willow flycatcher.

The Cliff-Gila proposal would also involve a dam on a nearby tributary. A storage reservoir would impact the native fish habitat and withhold vital water flow into the Gila as it passes into national forest.

The need for this project has not been demonstrated. A 1987 Bureau of Reclamation study concluded that insufficient demand existed at that time to justify building the project. Population growth anticipated in 1987 has not materialized. Silver City, one of the potential users of water, actually lost population between 1990 and 2000. According to the more recent Southwestern New Mexico Regional Water Plan, the area's future water needs can be easily met by modest increases in efficiency and use of water rights that are expected to be idle.

Gila River flows are already diminished. The need for an Arizona Water Rights Settlement Act stems from diversions on the Gila that diminished the livelihood of Native Americans dependent on the river. Existing diversions already dry up the Gila downstream of San Carlos Reservoir and near Duncan, Arizona.

The 1968 legislation did not create more water, it merely created a sleight of hand allowing special exemption for additional diversions in New Mexico, if downstream users in Arizona were compensated with CAP water. The Colorado River system is already experiencing a severe drought. If funded, the New Mexico diversion would reduce the availability of CAP water for other uses, and it would diminish monies in the Lower Colorado River Basin Fund, which are needed to offset the declining power revenues resulting from the ongoing drought.

The diversion could have significant ecological impacts. By doubling the current quantity of water removed from the Cliff-Gila reach, New Mexico's most significant freshwater system would be harmed. Regardless of how the diversion is taken, the water for wildlife, riparian vegetation, nutrient cycling, and other river functions would be diminished. Assistant Secretary of Interior Bennett Raley has warned that, even without the New Mexico diversion, more extensive and frequent Gila River drying is likely to occur as a result of Senate Bill 437. Mr. Raley has indicated this "could lead to potential ESA conflicts," which would be exacerbated by more diversions.

The use of federal tax dollars is completely unjustified. No promise of federal funding was made in the 1968 legislation that authorized Hooker Dam or its alternatives. No subsequent Congress ever appropriated money for this project. To the contrary, a Presidential review of the project in 1977 recommended de-authorization. The New Mexico diversion project is pure pork-barrel spending. The diversion(s) would only be built if most of the costs are federalized, and that includes mitigation costs. Studies by the Bureau of Reclamation in 1987 showed poor cost-benefit ratios, which are worsened today by the lack of significant demand.

The diversion could create serious discord among competing users in New Mexico and Arizona. Old conflicts among junior and senior water rights holders and between tribes and Anglo irrigation districts could be renewed. New controversies over damage to in-stream flows would begin. Litigation will inevitably occur over water use, environmental protection, and downstream interstate delivery obligations.

Discussions of this proposal have largely occurred outside of the public eye. New Mexico diversions would affect Arizonans, but Arizona's congressional delegation hasn't even mentioned the ongoing negotiations to allow the Gila River diversion. The environmental community has been shut out of negotiations in both states.

What You Can Do

Contact Senators Kyl and McCain (U. S. Senate, Washington, DC, 20510; mccain@mccain.senate.gov). Tell them to oppose any federal funding for a Gila River diversion. The AWRSA (Senate Bill 437) must not injure another free-flowing river of the

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Son of CAP (cont'd. from page 3)

desert Southwest. Hooker Dam, Buttes Dam, and Charleston Dam, and their alternatives, should be de-authorized.

Contact your Congressmen and tell them to protect the Gila River. De-authorize dams and provide no federal funding for the Gila River diversion (U. S. House of Representatives, Washington, DC, 20515; www.house.gov/writerep regarding HR 885).

Contact Governor Bill Richardson and urge him to call off the New Mexico Interstate Stream Commission's fantasy of getting "free" federal money.

2003: A PRODUCTIVE YEAR FOR ANPS

Marilyn Hanson

Here are our notable accomplishments for 2003:

January
- Held a policy planning meeting, led by Mark Schleicher, at Central Arizona College in Coolidge, AZ, to define our organization's future mission and direction.

February
- Staffed a table at the Arizona Botanist's Conference held at the Desert Botanical Garden.
- UA committed to conducting a membership survey of ANPS.
- The Plant Press archive contains a copy of all issues from 1976 to the present.

March
- Held Board meeting at Central Arizona College, Coolidge, AZ.
- Staffed tables at the Wildflower Festival at DBG and at the Buenos Aires National Wildlife Refuge.

May
- Filed Corporation Commission Report and State and Federal Income Tax Reports.
- Hired new ANPS Accountant, Linda Wells.
- ANPS Board members are covered for liability; increased coverage for property damage and fraud though Chubb Insurance.
- Staffed tables at the Ironwood Festival in Tucson.
- With the Spring 2003 issue, began copyrighting The Plant Press.

- Held Board meeting at Triangle Y Camp in Oracle, Arizona, site of the future State Meeting.
- Appointed Carianne Funicelli as Conservation Chair for the state organization.

- Evaluated Publication Grants submissions.
- Awarded $1000 from the Horace Miller Publication Grant to the proposed book, Below the Rim: Plants of the Colorado River Country.
- Completed and reviewed the University of Arizona Membership Survey.
- Sent letter of support for Pima County acquisition of Davidson Canyon.

June
- Hired new Administrative Assistant, Nancy Zierenberg.

August
- Held third Board Meeting of 2003 at The Arboretum at Flagstaff.
- Arranged for State Meeting and sent announcements to membership.
- Defined goals and assigned tasks for ANPS Conservation Committee.

September
- Held the Chiricahua Workshop with 39 attendees. Tucson Chapter implemented the Chiricahua Workshop with State Board support. Financially broke even.
- Held State Meeting at the Triangle Y Camp in Oracle, AZ with 35 attendees.
- Produced new purple ANPS T-shirts featuring Margaret Pope's Datura drawing.
- Elected three new Board members at the State Meeting (Erika Geiger, Kevin Dahl, Lisa Floyd-Hanna).
- Printed new Sonoran Desert Weedwacker brochures.

October
- Sent ANPS letters to Rep. Raul Grijalva supporting the Wilderness designation for the Tumacacori Highlands.
- Signed on to the Native Plant Conservation Campaign.
- Staffed tables at a number of plant sales in the state.
- Board member gave presentation to the Tucson Watergardeners.

November
- Held fourth ANPS Board meeting at Desert Botanical Garden, Phoenix.
- Presented new contract for ANPS accountant to the Board.
- Conservation committee prioritized top three goals: invasives, educational outreach and restoration.
- Established the ANPS email discussion list.
- Under the auspices of ANPS, Pima Invasive Species Council increased communication between agencies.
- Sonoran Desert Weedwackers remove buffelgrass and fountaingrass on a monthly basis.

Drought *(cont'd. from page 1)*

population growth that will not only exacerbate drought effects but will create serious problems in the future even in the absence of droughts.
- Long-term perspective. We lack long-term data to develop the necessary long-term plans for water and land management that will ensure sustainability.
- Drought education. One of the most repeated statements made during the conference was a need to better educate researchers, managers, policy experts, and the public about drought.

At this conference, small groups met to discuss particular areas of concern. Some of the key issues identified by the Biodiversity Working Group were:

1) Species at risk - threatened and endangered species: we need to know the species that are impacted by drought, those that are at the southern end of their range, those that exploit temporary water sources and small springs, and those that utilize other species susceptible to drought. To understand the impact on native plants, we will need to know how pollinators, seed dispersers, herbivores, and pathogens might respond as well.

2) Habitat types at risk (fragmentation and conversion) along with keystone/dominant species
- There will be increasers and decreasers in response to drought. The proportion in each of these categories will likely depend on the length and severity of drought.
- Predictions are needed on the response of many species.

3) The problems of invasive species and diseases are likely to increase. Detection protocols are needed to reduce movement and colonization of invasive species in new areas. Monitoring programs need to provide early warning of the existing or emerging diseases.

4) The scale of studies and interactions affects perceptions on the importance of drought.

5) Long-term and short-term effects are important to understand.

6) The role of temperature as a factor explaining insect outbreaks and invasive species warrants consideration. Although we focus on precipitation during droughts, increased temperatures may play an important role in promoting pest outbreaks.

This workgroup made some predictions especially relevant to plants:

1) Sensitive species will go locally extinct, especially those most directly dependent on water resources such as springs.

2) Populations of most species will be more likely to move north in latitude or up elevation gradients to areas that fulfill needs for sufficient water and reduced temperatures.

3) Contraction of geographic range may be common as large areas become too stressful for reproduction and survival.

4) Drought-adapted species will increase in abundance and/or expand their range.

Generalist species will increase (including invasive plants), and specialists will decrease, including many threatened and endangered species. Death of dominant plants and fire will set plant community succession back to earlier stages, for example, from forest to weedy annuals. Drought may result in terrestrial plant succession succeeding aquatic habitats. Existing refugia may decline or be lost. Sky island habitat will shrink, and aquatic and moist habitats will decline, perhaps resulting in unsustainable populations. Bottlenecks develop in space and time. As size of populations decrease to critical levels, genetic bottlenecks result. Establishment of new and viable populations is greatly limited.

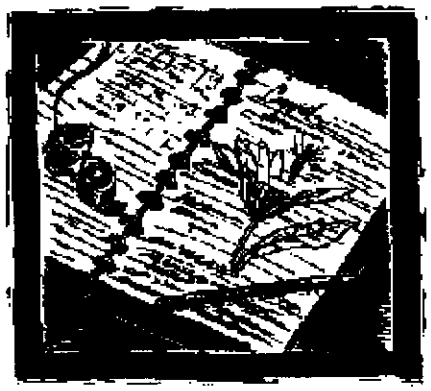
A Call to Action

These various reports and summits suggest that the need for active inventory and monitoring is greater than ever. Native plant societies, such as ANPS, can play many important roles in these efforts - the amount of work that needs to be done is tremendous. Activities that would be helpful include adopting specific areas in which native and non-native plants are inventoried and then monitored on a regular basis. We need to know which species or populations are declining and which are increasing. There may be a suite of species not yet considered rare that need conservation attention in the coming years as their populations decline. Invasive plants are likely to have an advantage in drought conditions. ANPS members can help eradicate these unwanted plants before they become truly overwhelming by participating in weed pulls. We are living in very interesting environmental times - a combination of natural phenomena and human-caused conditions. This is a great time to be learning about and protecting the plants of Arizona.

SAVE THE DATES!

The ANPS Annual Meeting is **October 1-3, 2004** at the Lake Pleasant Desert Outdoor Center in Peoria, Arizona. We'd love to see you! So please tell your friends . . . and plan on bringing yourself.

This year's theme is "Plants, Water, and People." You will learn the latest information about drought, invasive species, habitats, and how you can get involved. It is also a terrific opportunity to meet the experts and your fellow native plant lovers. More information will be sent to you as the event draws nearer. For questions or to help with this event, please call Doug Green, annual meeting chair, at 480.998.5638



SPRINGTIME OFFERINGS IN THE NORTHERN MAZATZAL WILDERNESS

Chris Trask

The spring of 2003 offered a lot of surprises for those of us who took advantage of the late and protracted wildflower season. In the middle elevations of Horse Mesa and the Mazatzals, January's late winter rains brought an unexpected abundance of flowers, eluding the more popular wildflower guides due to their scarcity. Among the reported sightings were Leopard Lily (*Fritilaria atropurpurea*) and Diamond Clarkia (*Clarkia rhomboidea*), reported earlier along the Barnhart and Deer Creek trails of the Mazatzal Wilderness. The highly-disjointed community of California Fremontia (*Fremontodendron californicum*) was also sighted, a possible remnant species that migrated here during the last ice age.

Both the Deer Creek and Barnhart trail systems are very popular with hikers from the Phoenix area. The variety of flora available throughout the year makes repeated visits worthwhile. Another, and less frequently visited trail on the eastern side of the range is the City Creek Trail (actually the northernmost portion of the Mazatzal Divide Trail #23), accessible by going to Payson and turning left at the first traffic light. The pavement ends near the western city limits, becoming Forest Route FR406 that descends rapidly to the eastern fork of the Verde River. We leave the Ponderosa forest behind for the more familiar juniper scrub, then into drainages dominated by cottonwood, sycamore and willow.

From the parking area at the trailhead, our trail crosses City Creek and from there we climb very slowly. On either side of the trail, we see numerous specimens of Antelope Horns (*Asclepias asperula*), Arizona Blue Eyes (*Evolvulus arizonicus*), and Slimflower Scurfpea (*Psoralidium tenuiflorum*). We also find a few specimens of New Mexico Yellow Flax (*Linum neomexicanus*, aka Yellow Pine Flax), known to be poisonous to livestock and easily misidentified as Arizona Caltrop (*Kallstroemia grandiflora*)

Acourtia wrightii

until we take the foliage and long stem into account. Closer inspection of the flower reveals that *L. neomexicanus* has five stamens whereas *K. grandiflora* has ten, thereby differentiating between the two.

Scarcely a mile up the trail, a small flash of yellow amongst some rocks gets my attention. The flower first appears to be a clover of sorts, but turns out to be a nice specimen of James

Fritilaria atropurpurea

Dalea (*Dalea jamesii*, aka James' Prairie Clover). Shortly after my discovery, the trail curves broadly and enters a juniper scrub forest densely carpeted with Western Blue Flax (*Linum lewisii*). Obviously, the drought that we're experiencing has had little effect here.

As the trail climbs further, we leave the junipers behind, replaced with oak scrub and an occasional piñon pine. After a distance of a mile, the trail breaks into an area of exposed rock. Downhill we find numerous specimens of Brownfoot (*Acourtia wrightii*). Our special find of the day is in the middle of the first switchback. Our trail climbs quickly and the heat of the late morning is taking its toll on me. Sitting down on a convenient rock, I pull out a water bottle and raise it to take a drink, but I stop short. Right in front of me is a very large species of Paintbrush, but unlike any that I have seen.

Our commonplace Desert Paintbrush (*Castilleja chromosa*) and Woolly Paintbrush (*Castilleja lanata*) very rarely attain heights of more than a foot, but this specimen is close to three feet high. Paintbrush flower clusters are, at most, four inches long and less than two inches across, but the ones on this plant are a foot in length and at least three inches across. Each flower has a two-inch long corolla that is greenish-yellow in color. Its appearance says that it is something more closely associated with the tropics, and certainly not a desert environment. Numerous photos of this unusual plant exhausted the film

Mazatzals *(cont'd. from page 6)*

Linum neomexicanum

that I had brought with me.

Later, a quick browsing through the pages of Rickett reveals that this plant is, indeed, a migrant species from Mexico known as Santa Catalina Paintbrush (*Castilleja tenuiflora*), considered a rare plant in the mountains of southeastern Arizona and southern New Mexico as far north as the Datil Mountains. The Santa Catalina Paintbrush is found throughout most of Mexico to the Sierra Madre del Sur. To find a specimen this far north is very unusual, and may indicate that its range is more extensive than previously known. I'll be interested in returning to this area this spring to look for other specimens.

The Mazatzal Mountains continue to provide a wide variety of flora, including rarely found species from Mexico and species resulting from migrations during the last ice age. We are fortunate that this area has been set aside as wilderness, because it means that this rich resource of biological diversity will continue to be left undisturbed, readily available to be discovered time and again.

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The area described in this article was a casualty of the recent WIllow Fire in the Mazatzal Wilderness in June/July 2004. Hopefully, the plants that have been obbserved here will be rejuvenated in the years to come. Chris Trask

Castilleja tenuiflora

WEEDWACKERS AT WORK

Barb and Doug Siegel are standing in back of the new snappy-looking road signs for the Weedwackers, a group dedicated to eradicating invasive species and sponsored by the ANPS Southern Chapter.

The signs were used for the first time on March 20 on Kinney Road. Now the group won't look like a bunch of convicts picking up trash!

The message reads:

Sonoran Desert
Weedwackers

Removing
Buffelgrass
For Healthy
Deserts

IN PRAISE OF CROSSOSOMA

Tony Burgess

In late February I hiked a short ways up Pima Canyon, and also up the Linda Vista trail on the opposite side of Pusch Ridge, on the western end of the Santa Catalina Mountains north of Tucson. Both places I met a favorite - *Crossosoma bigelovii.* It's this short, scraggly bush that grows out of cracks in the granite (and out of cracks in rhyolite in the Tucson Mountains). Not very noticeable most of the time, but that day they were in bloom. Fine flowers, about an inch across, white petals. When I smelled them, what fragrance! Like gardenias or orange blossoms. Crossosoma always gives me a brief, gracious interlude - yes, I'm a sucker for sweet scents. When I smell Crossosoma, I know in my gut that it's spring again.

How fitting an expression of life in desert mountains. Anchored securely in crevices or next to boulders, not in the deeper, richer soils of canyon bottoms. Some contorted forms dangle down from cliff cracks. Smallish, not aspiring to great stature or reach, yet tenacious survivors. They tough it out. What charms me is that almost every year this unpretentious little bush heralds the end of winter with exquisite fragrance. I know I'm just a bystanding voyeur enjoying their efforts to attract some pollinator for continuing their kind. What kinds of insects fly in the uncertain weather of February? Maybe that's why they have to smell so sweetly - there don't seem to be many airborne sexual brokers available in the early spring.

The flowers drop petals and grow two or three curved, swollen little follicles containing seeds. How do those seeds get into the rock cracks? Each bush probably throws out a lot of seeds over its lifetime, because I doubt many seedlings survive for long after they germinate. How old are these bushes? Since I read Bob Webb's Century Club list from the Grand Canyon, I've had to adjust considerably my desert bush-time perspective. He discovered that even some of the grass clumps were over 100 years old. When there is a drought, some desert plants don't die completely, they shrink from partial diebacks, then regrow when rains return. So these little bushes could be wizened veterans. I reckon that secure places for a Crossosoma are hard for seedlings to colonize. So once a plant becomes established in a good crack, it would want to live as long as possible, throwing out seeds over many, many years in order to win against the long odds of siring mature offspring.

I've met other cliff plants with similar growth habits: small stature, woody bases, securely anchored and highly perennial. It appears to me that for their size, cliff plants produce a lot of flowers, but perhaps that's because I remember the colorful ones better.

Once, I designed a cliff community for Biosphere 2. In the process, I realized that a concrete sculptor and cliff ecological horticulturist could create some enchanting habitat facades for skyscrapers that would make desolate urban canyons become truly alive. I hope someday that vertical buildings will be enlivened by climbing gardeners and artists, and that the walls of our desert cities will host bowers of February fragrance from Crossosoma growing amid niches and crevices sculptured to collect rainfall. Another hope is that our culture will evolve a celebratory inhabitation of the Sonoran Desert, and in the process, some naturalist will fall in love with this plant and make its ways known to us, so we can share stories about who pollinates it, how those seeds find their new home cracks, and how old these little bushes really are. Should the rising generations decide not to collaborate with this place, long after our current cities have crumbled, I'm sure that Crossosoma will be gracing the desert canyons.

In his Flora of the Gran Desierto, Felger calls it Ragged Rock-flower, but I think there ought to be a more fitting name, like Cliff Grace. There's a bunch of them on the canyon walls along the Linda Vista Trail, near the upper limit of saguaros. Go smell them whenever you get the chance!

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FIRE IN THE DESERT

Jon Titus

In the last three issues of the Plant Press, I discussed fire in ponderosa pine forest, piñon-pine juniper woodland, oak woodland, chaparral and grassland. In this installment, I will focus on fire in the Sonoran Desert. I describe a process in the Sonoran Desert that is similar to what is happening in other parts of the world. This process, called "grasslandification," is conversion of an area into grassland, be it desert, shrubland, or tropical rainforest. Grasslandification is one of the most significant ecological changes in the world today, as well as one of the world's greatest environmental problems. Every year, millions of hectares around the world convert to grassland. For example, grasslandification is occurring in Brazil where rainforests are converting into grasslands. The process of grasslandification also applies to efforts to restore grassland that has been desertified, outlined in the article "Fire in Arizona's Grasslands."

Let's start with some general ecology: 1) how do non-native species contribute to the consequences of fire in the desert? Why are non-native species an important part of the process of grasslandification? In the Sonoran Desert, certain species respond to one of two growing seasons - winter rains or summer rains. Cool season annual grasses respond to winter rainfall and warm season perennial grasses respond to summer monsoons. During cool conditions, soil moisture is available for a longer period of time but plant growth is slow. Grasses adapted to warm season rains are often unable to use winter moisture because they do not grow during cold weather. The predominant perennial grasses in the Sonoran desert are summer monsoon species, while 70% of herbaceous annuals respond to winter season rains. Others respond to summer monsoons or rains during both growing seasons. Many shrubs take advantage of moisture in both seasons.

Wet winters produce an abundance of annuals using available nutrients, suppressing the growth of warm-season grasses during the subsequent summer. A series of years with dry summers and wet winters favor winter species. Years of wet summers and dry winters favor warm-season grasses. Because desert rainfall varies greatly from year-to-year, both floras survive and prosper. Historically, the fuel load (flammable organic matter available to fire) was low in deserts and fire ran out of fuel to burn.

Non-native species in the Sonoran desert are rapidly increasing. Competition for resources occurs between invasive non-native and native species. In the spring, non-native annual grasses such as red brome (*Bromus rubens*), mouse barley (*Hordeum marinum*) and wild oats (*Avena fatua*) compete directly with native spring annual herbs for water, space and nutrients. Roots of these exotic annuals are active at cooler temperatures because their native range is the cold deserts of Central Asia. Non-native annuals have earlier seasonal growth than native annuals, preempting their resources. Non-native spring annual grasses are often so prolific that few nutrients remain for summer species.

In favorable years, annual non-native grass species dramatically alter fuel load conditions by creating a mat of dry vegetation that can carry a fire across the landscape. This impacts plant community structure and competition due to altered fire regimes. Sonoran Desert native species are not adapted to fire - even a cool fire can be totally deadly. Natives removed by fire further reduce competition; non-native annual grasses increase.

There are also non-native, warm-season perennial grasses. Buffelgrass (*Pennisetum ciliare*) is a good example of a virulent, perennial exotic initially introduced as cattle food. This species has important traits that promote invasion: genetic variability and the ability to reproduce asexually. Buffelgrass recovers quickly from fires and is heavily nurtured by humans. Fountain grass (*Pennisetum setaceum*) is a similar virulent, invasive ornamental that is spreading rapidly.

These non-native, warm-season perennial grasses do not out-compete natives by preemption, as do the annuals. For more than 10,000 years on African plains, they evolved by adapting to human activities. Their invasive nature is highly successful. They are adapted to fire and seem to benefit from herbivore release, although more research is needed on this subject in the Sonoran Desert. Herbivore release means that plants in their new location are free from being eaten by the herbivores that ate them in their land of origin because the herbivores didn't move with them. By being disturbance-adapted, these plant species are able to consume moisture, nutrients, and space, thereby preventing access to these resources by native summer species. As a result of fire-tolerance and fire promotion, non-native species prosper

cont'd. on page 10

Fire *(cont'd. from page 9)*

while native species are impacted deleteriously.

Grasslandification of the Sonoran Desert has two components: cool season annuals and warm season perennials. Both create fuel that promotes fire, transitioning a diverse and shrubby desert environment into species-poor grassland.

How is this similar to grasslandification in tropical rainforests? When I was in the Peace Corps in the Philippines, I lived in rolling grassland that was a lush and extremely diverse tropical monsoon forest only 40 years before. Fire was the cause of the monsoon forest's transition into grassland. The forest burned and burned again, trees were killed, and hundreds of species became extinct. Non-native grasses from South America responded to the fire by re-sprouting from their roots after every fire and became dominant. Soon, seeds of native species were no longer present, grasslands were torched every year, and the grassland was maintained. This phenomenon is taking place in myriad plant communities around the globe. Grasslandification is a major contributor to species extinction and human impoverishment.

I hope you have found this fire series interesting. If you would like a copy of all four articles as an email attachment, please write to me at jht52@columbia.edu.

UPCOMING CONFERENCES AND EVENTS

September 13-15, 2004. IV International Symposium on the Native Flora of Arid Areas. Cd. Delicias, Chihuahua, México.

Sessions are planned for the following disciplines: Taxonomy and Ethnobotany, Ecology and Conservation, Chemistry and Biochemistry, Agronomy of native species, and Xeriscaping. Questions concerning the Symposium and submission of papers may be directed to Dr. Miguel Olivas at jolivas@uach.mx or M.C. Magdalena Ortega at mortega@guayacan.uson.mx.

Registration, abstract submission, travel/lodging information, and contact information may all be found at the Symposium website: florasimposium.uach.mx or www.uach.mx/flosimposium

September 21-23, 2004. 12th Annual North American Weed Management Association Conference. Rushmore Plaza Holiday Inn, Rapid City, South Dakota. Visit www.nawma.org or call 970.887.1228 to register.

October 1-3, 2004. Arizona Native Plant Society's Annual Conference. Lake Pleasant Desert Outdoor Center, Peoria, Arizona. Please contact Doug Green at 480.998.5638.

October 13-16, 2004. 31st Annual Natural Areas Conference. Holiday Inn Chicago Mart Plaza, Chicago, Illinois. The theme of the conference is "Emerging Issues, Possibilities, and Perils" with an emphasis on the emerging issues that are facing persons trying to preserve or steward natural areas. Visit www.conferences.uiuc.edu/conferences/conference.asp?ID=303 for registration information.

October 26, 2004. Celebrating 10 Years of the Plant Conservation Alliance: Conservation and Restoration of Plant Communities 2004 Janet Meakin Poor Research Symposium. Chicago Botanic Garden, Chicago, Illinois. Visit www.chicagobotanic.org/symposia for more information about this event. Poster Submission Deadline is July 30, 2004. For more information, contact: Kayri Havens, Ph.D., Medard and Elizabeth Welch Director of the Institute for Plant Conservation at khavens@chicagobotanic.org or Beth Pinargote, Coordinator, Continuing Education bpinargote@chicagobotanic.org

ANPS ANNOUNCEMENTS

Horace Miller Publications Grant: The ANPS is soliciting proposals for the next Grant awards. The deadline for submissions is March 31, 2005. Awards will be announced on June 15, 2005. Please visit our website for more information at www.aznps.org

Volunteer Opportunities:

Legislative Watch: We need someone who can watch for ANPS legislative concerns at the county, state, and national level to alert an ANPS email list of members to solicit their concern or support. (e.g., listing buffelgrass on the Noxious Weed List.)

Grants Search: We need someone to search for grants that match the ANPS mission of education about natural environments. (e.g., workshops for school and community groups)

Outreach Opportunities: Because one of the primary charters of ANPS is education, we need members to notify us of events where we should be present with a staffed display.

ARIZONA NATIVE PLANT SOCIETY
P.O. Box 41206
Tucson AZ 85717

VELVET MESQUITE:
Sonoran Desert Tree of Major Importance

Matt Johnson

Prosopis velutina Wooton [= *P. juliflora* (Swartz) DC. var. *velutina* (Wooton) Sargent]

Prosopis (subfamily Mimosoideae) includes approximately 45 species of trees and shrubs in North and South America, Africa, and Asia. The center of diversity for the genus is Argentina, with 28 species. Some species thrive in arid regions while others occur in humid climates.

Velvet mesquites typically grow as small, spreading trees with several trunks. In favorable sites, however, they may grow to 15 meters (50 feet) tall with a well-developed trunk. In harsh sites, the plants often remain shrubby. The bark of younger limbs and branches is smooth and greenish gray, becoming dark brown and fissured on older limbs and trunks. The leaves are bipinnate, mostly with two pairs of pinnae, and are gray green in color. The numerous small hairs covering the herbage give velvet mesquite its name. Cream-colored flowers in dense spike-like racemes appear in spring and sparingly through summer. The pods are indehiscent, straw-colored and often marked with red, with a sweet-tasting pulpy mesocarp. Each seed is encased in a tough, leathery endocarp.

Velvet mesquite is distributed from central Arizona, U.S., to central Sonora, Mexico, from near sea level to 1370 meters (4500 feet) elevation. It is found in a variety of habitats in desertscrub, thornscrub, grassland, and lower elevations in oak woodland. The trees reach their best development in the deeper soils of floodplains along rivers and larger arroyos, and often form extensive woodlands in these situations.

Prosopis species have been important to people since prehistoric times, The pods and seeds were a major source of food and there is growing interest in developing mesquite as a food crop. High quality honey is produced from velvet mesquite and other species. In addition to fuelwood and charcoal, the wood has many uses including lumber, turnery, fence posts, furniture, and flooring. The pods are a nutritious forage for livestock; however, in upland areas, velvet mesquite can become weedy where cattle disperse the seeds and fires are controlled. Native peoples have used velvet mesquite for various medicinal purposes. Trees provide shade for both livestock and people. Velvet mesquite is a source of food and shelter for many species of wildlife and serves as a "nurse plant," providing protection to the seedlings of many other plant species in the Sonoran Desert.

Velvet mesquite makes an excellent landscape plant for areas to which it is adapted. In addition to shade, the trees can be quite sculptural in appearance. Considerable potential exists for economic development of velvet mesquite.

Velvet mesquite is easily grown from scarified seeds. The plants may also be propagated from cuttings and by air layering. These later techniques are useful for producing large numbers of plants with specific desirable characteristics of the mother plant, such as high yields of sweet-flavored pods. Velvet mesquite can grow one meter (3 feet) or more per year. Trees are successfully transplanted by side-boxing. Plants are hardy to about -15 degrees Centigrade (5 degrees Fahrenheit). Velvet mesquite is not as tolerant of saline soils as are many other members of the genus.

A century ago, great bosques or forests of large velvet mesquites covered the riverine floodplains from central Arizona to central Sonora. Extensive wood-cutting, clearing for agriculture, and lowering of the water table through pumping of groundwater has resulted in the destruction of most of these forests. While some areas in Arizona, such as the San Pedro National Riparian Conservation Area, are now protected and may in time begin to resemble their former grandeur, most of the remaining fragments of mesquite forest continue to decline.

Management plans for sustainable use of these remaining mesquite forests must be implemented if they are to survive. Ultimately, however, all natural ecosystems will continue to face increasing threats until human population growth is halted.

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This article was graciously donated to The Plant Press as a reprint by Matt Johnson, from his article of the same title in the November 1993 issue of Aridus 5(4): 3-4

WASHINGTONIA FILIFERA
Native Palms of Arizona

Richard Harris

Despite the highly diverse nature of the native flora of Arizona, only one member of the Arecaceae (Palm) family can be considered truly native: *Washingtonia filifera*, commonly known as California Fan Palm. In Arizona and California, it is generally found growing wild in a semi-riparian-to-riparian habitat such as the Hassayampa River in Arizona and Palm Canyon, near Palm Springs, California. It is also found as a native species in Baja Norte province, Mexico. Other native areas in Arizona include the Kofa Mountains of Yuma County and another area in western Maricopa County. It is also found growing in urban settings such as the much-discussed palms of Central Avenue in Phoenix and as a popular street tree in towns such as Litchfield Park, Arizona.

In many other towns and cities in the low desert areas of the southwest, *Washingtonia filifera* may commonly be found as a landscape tree, both in public areas and on private properties. It is often confused with a closely related species, *Washingtonia robusta*, or Mexican Fan Palm, which is native to northern Mexico. The California and Mexican Fan Palms frequently hybridize in urban areas, forming *Washingtonia filifera* var. *robusta*. Due to this extensive hybridization, many Washingtonias are mistakenly marketed in the nursery industry as either pure filifera or pure robusta when, in reality, they are actually hybrids. For anyone desiring to grow a pure *Washingtonia filifera*, it is recommended they contact a nursery that deals in native plants. Pure seeds may also sometimes be obtained through such organizations as the International Palm Society or individual members of the Arizona Native Plant Society.

The California Fan Palm makes a well-adapted plant for the urban environment. Although normally found in a riparian type of environment in its native habitat, it will withstand tremendous drought once well established, although during such extensive droughts as that of 2003, some supplemental irrigation will be required. It requires little fertilization or extra care other than pruning. If you desire to leave this palm in a completely natural state, the fronds may be left completely un-pruned, thereby forming a permanent "skirt" of dead fronds. However, in urban areas, this skirt is frequently considered undesirable, as it can be a fire hazard, trap for pests (scorpions and spiders), major source of difficult-to-control weed seedlings, and, for many, a visual eyesore. If pruning the fronds is done, it should be on a once-a-year regular basis. The best time for pruning is mid-to-late summer after the flower stalks have formed, but before extensive seed drop has occurred. All dead and dying fronds should be removed and a small-to-moderate amount of green foliage, usually two to three rows of growth. If excess removal of green foliage occurs over a number of successive years, it may, in the long term, lead to serious structural / health-related problems such as "hourglass effect." This problem results in a permanent serious trunk constriction that will never "heal" and may eventually result in early death of the palm caused by trunk breakage at the point of constriction. If planting a new palm, a site should be carefully selected that will not cause problems in later years from overhead utility lines, etc.

For anyone having mature California Fan or other large palms, a properly certified, licensed, and experienced arborist is highly recommended. Unfortunately, many homeowners and even some public officials choose to go the "low budget" route. This choice not only may result in damaged valuable specimen palms, but also has tragically resulted in the death of a number of unqualified tree workers (due to working too close to electrical lines, trying to remove *Washingtonia filifera* skirts in an unsafe manner, etc.).

Most of the morphological characteristics between the two Washingtonias are quite minute and difficult to discern even with a botanical key. It is exceptionally difficult to correctly key out young specimens if their species identification is uncertain. There is, however, one distinguishing characteristic that may be used in discerning the correct species between mature specimens - their trunk caliper. Pure *Washingtonia robusta* have very narrow, slender trunks - sometimes a foot and a half or less in diameter. Pure *Washingtonia filifera* have much larger diameter trunks - sometimes as much as three times or more the diameter of *robusta*. Hybrid Washingtonias have trunk diameters varying in size between the two species, depending upon the degree of hybridization.

Various Native American tribes such as the Coachella Indians have used various parts of the palm, both for shelter and basket making. Coyotes and foxes also reportedly eat the seeds. Some taxonomic authorities believe that some of the "native sites" such as that in western Maricopa County are actually naturalized locations as a result of seed dispersal by native peoples and / or animals rather than true native habitats. Many authorities, i.e. Henderson, Galeano & Bernal, believe that the genus is in need of a major taxonomic revision, as the last major study was done by Bailey in 1936. From my own personal experience, I believe that a revision would be greatly beneficial, as there are still unanswered questions regarding hybridization, possible sub-species, and native vs. naturalized habitat.

RESOURCES ON NATIVE PLANTS

Ex Situ Plant Conservation: supporting species survival in the wild, edited by Edward O. Guerrant Jr., Kayri Havens and Mike Maunder.

Faced with widespread and devastating loss of biodiversity in wild habitats, scientists have developed innovative strategies for studying and protecting targeted plant and animal species in "off-site" facilities such as botanic gardens and zoos. Such ex situ work is an increasingly important component of conservation and restoration efforts.

This the first book to address integrated plant conservation strategies and to examine the scientific, technical, and strategic bases of the ex situ approach. The book examines where and how ex situ investment can best support in situ conservation. **Ex Situ Plant Conservation** outlines the role, value, and limits of ex situ conservation as well as updating best management practices for the field, and is an invaluable resource for plant conservation practitioners at botanic gardens, zoos, and other conservation organizations; students and faculty in conservation biology and related fields; managers of protected areas and other public and private lands; and policymakers and members of the international community concerned with species conservation.

For more information or to link to this book: http://www.islandpress.org/books/detail.html?SKU=1-55963-875-3

Online Rare Plant Guide for Utah: The Utah Native Plant Society is pleased to announce the availability of an online rare plant guide for Utah that is in part intended to be an update to the 1991 Utah Endangered, Threatened and Sensitive Plant Field Guide. The URL is: http://www.utahrareplants.org

Genetics and Conservation: a reference manual for managing wild animal and plant populations, edited by Christine M. Schonewald, Steven M. Chambers, Bruce MacBryde and W. Lawrence Thomas.

Twenty years after its first publication, the book still stimulates research and information translation for conservation applications. It also contributes historical perspective regarding progress in the field of conservation genetics. Its use persists in college seminars, field courses and national and international ecological programs. It is also used as a major planning and application reference by managers of refuges, parks, forests, reserves, ranches, aquaria, zoological gardens and botanical gardens. For more information, please visit: http://www.blackburnpress.com/geandco.html

Mosses: Utah and the West, by Seville Flowers.
A classic of bryological literature, this book was first published in 1973 by Brigham Young University Press. The book made a substantial and original contribution to the knowledge of the mosses of the Western United States. A monumental work, it provides keys, illustrations, descriptions and information on geographical distribution and habitats and offers detailed observations by Flowers.

Before the author began his extensive bryological research, Utah was considered to have a relatively small and uninteresting moss flora because of its generally low rainfall. This book however, treats 256 species in 77 genera and 18 families a large proportion of which were discovered in Utah for the first time by Flowers. The author's skillful illustrations form one of the finest features of this book. Seville Flowers (1900 - 1968) was a researcher, writer and professor of botany at the University of Utah. He specialized in bryology and phycology and was President of the American Bryological Society. For more information, please visit: http://www.blackburnpress.com/moutandwe.html

The Natural Habitat Garden, by Ken Druse. Photographs by Ken Druse.

Now available in paperback, this classic book by award-winning photographer and naturalist, Ken Druse, shows American gardeners how to create beautiful native-plant gardens.

This book is a plea to give back to our environment some of the beauty and pleasure it has given us. It is intended to help gardeners create niches, however small, that considered together can expand the realm of the indigenous plant and animals. Instead of just making gardens that resemble the earth, the author is encouraging garden communities to help enlarge the earth's diminished domain by growing native-plant gardens modeled on nature's original communities.

Through 500 color photographs of 35 gardens across the country, Ken Druse introduces nature's original communities - grasslands, drylands, wetlands, and woodlands. Listings of plant sources, places to visit, and societies and organizations have been updated for this edition. This book is an inspiration to organic gardeners, conservationists, environmentalists, permaculture advocates, and landscape designers alike.

Ken Druse is an internationally recognized author, award-winning photographer, and acknowledged founder of the natural-gardening movement. He gardens in Brooklyn, New York and rural New Jersey.

For information about this book or the author, contact Melanie Platosh at mplatosh@timberpress.com. Visit your local retailer, or contact Timber Press, Inc. at 133 SW Second Ave., Suite 450, Portland, OR 97204-3527, by phone at (800) 327-5680, (503) 227-2878, or by e-mail at publicity@timberpress.com.

These resources were gleaned from the Plant Conservation Alliance discussion list.

AN ANPS FIELD TRIP WITH A "PRO"

C. Douglas Green

On Sunday, March 21, 2004, I was privileged to be with a group of 16 people from the ANPS Southern Chapter to take a field trip with an "old pro," Bob Zahner, "Mr. Big Trees of Arizona."

I left North Scottsdale at 5:30 a.m. and arrived outside Tucson at I-10 and Craycroft Road at about 8:15 a.m. Our group left Triple T Truck Stop at 9 a.m. in four vehicles to visit six Champion Big Trees in Santa Cruz County.

It was great having Bob Zahner in my 4-Runner, to ask about his botanical career in Arizona, North Carolina, and other states. Bob and I served together on the ANPS State Board of Directors, so we were already friends. By the time our trip was complete, Bob, no doubt, was brain fatigued from all of my questions. There were very few quiet periods between stops.

Bob Zahner was prepared for this "Big Tree" field trip with car assignments and a handout outlining the day's activities to which he attached a map plotting and marking routes for each of our six stops. The three "O's" for a successful field trip were evident - organization, organization, and more organization. Bob was indeed very well organized and prepared - and it showed.

Bob wanted our four vehicles to stay together, so no one got lost. (We all came back alive.)

We traveled south on AZ Hwy. 83 from I-10, then across Coronado National Forest roads towards Mexico, then up AZ Hwy. 82 and 83 to Tucson. Bob's map showed our routes, and various stops along the way. The round trip to view Big Trees was approximately 150 miles. Most stops were very close to the roads we traveled, except for stop #5, where we hiked about a half-mile to view Fremont Cottonwood and Velvet Ash, two magnificent Arizona beauties.

Our first stop took us right up to Arizona's largest Emory Oak (*Quercus emoryi*). At one time, this State Champion was the National Big Tree Champion as well. The leaves were a beautiful golden yellow color, while another nearby Emory Oak had dark green leaves. Bob says Emorys are that way - i.e., each one is an individual whose leaves turn color and fall off on their own schedules. Emory leaves have their own individual leaf size and configuration, as well. Under this huge, beautiful tree, a family was camping and picnicking. They must have figured, "What the heck? What a cool place to camp out and cook in the desert."

We, of course, were wondering, "Is this kind of activity going to somehow damage this wonderful Big Tree?" My best guess is that this kind of innocent behavior is indeed harmful to this beauty, particularly if this happens routinely! Perhaps the Coronado National Forest personnel should cordon off an area around this champion tree as a protective action, otherwise the tree could be lost. When this was private land, this problem didn't exist. If someone from the U.S. Forest Service reads this, please help us save this unique giant. On our way out, we again observed a newly turned-over vehicle, a number of 4-wheelers, and an orienteering contest. All the more reasons why the Forest Service should help to preserve this environment around our state champion Emory Oak.

Stop #2 was located on Arizona Hwy 83, where a gorgeous National Champion, Arizona White Oak (*Quercus arizonica*) stands on a hillside overlooking the highway. Right next to this oak is a house whose occupants are playing blaring punk rock. This tree has some interesting burls, with a beautiful whitish-gray bark and a rather low-slung crown, possibly due to this tree's unique position on this hillside. It is probably located on Coronado National Forest land, or the people next door would have been yelling at our large group to get off of their property, but their radio noise may have drowned out our group's possible encroachment. However, Bob Zahner says it best: "It's a bit noisy here, but this is truly a magnificent TREE," and it is!

Stop #3 is on a roadside next to a very large culvert that must supply a good amount of water, whenever it rains, to a group of Yewleaf Willows (*Salix taxifolia*) and a few adjacent Cottonwoods. This was one of my favorite stops, because I had never seen a Yewleaf Willow, nor will again soon. The Yewleaf is not a very abundant willow like some of its relatives. This tree is not widely distributed in the U.S., growing only in Trans-Pecos Texas and Southern Arizona areas along the Mexican border at 3500 - 6000 foot elevation. The National Champion stands amid a small grove of large Yewleafs. The needle-like leaves resemble the leaves of the Yew, although not evergreen. These very short leaves (½ - 1 ¼ inch length and less than 1/8 inch wide) are densely crowded onto its twigs. This species has the smallest leaves of any of the tree willows. Luckily for us, these Yewleafs were in bloom. Their blossoms are quite small, and form very short catkins of 3/8 - 3/4 inch in length. When I told Bob that this was my favorite, beyond the champion Fremont Cottonwood, he replied, "Sounds just like an ANPS member to me." This was indeed a great tree find for me-a first!

Stop #4 was again a roadside stop, but this huge Velvet Mesquite (*Prosopis velutina*) is on private property. This tree is worrisome because it may be on its last leg of life. It's difficult to tell until it "leaves out" in late spring -- or it doesn't. For 55 years it's been a featured Big Tree of Arizona, as well as National Champion. No one knows just how old this tree is but one thing is for sure, it's an old, old mesquite. Bob says that they already have another similar-sized tree "on hold," just in case this old timer goes down anytime soon. This shows how organized Bob and his group are: they have back-ups ready to become starters just in case they're needed in the immediate future. In the long haul, "Big Trees" are becoming harder and harder to locate due to wildfires, human encroachment, beetles and other diseases, etc.

We were able to visit two Big Trees on stop #5. First, we had to hike about one-quarter mile on private land to see the "monster-sized" Fremont

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NATIVE PLANT PROTECTION & THE LAW

Jon Titus and Eric Stanford

Native Arizona plants are protected by a variety of regulations. The Federal Endangered Species Act (ESA) protects threatened or endangered species on their list but provides much less protection for plants than it does for animals. ESA allows destruction of listed plants on private lands unless the activity is funded, permitted, or carried out by a Federal agency or; if someone knowingly violates state law; or when trespassing. The Lacey Act makes it illegal to import, export, transport, buy or sell fish, wildlife or plants taken in violation of federal, state or tribal law.

The Arizona Native Plant Law provides protection at the state level. Plants listed under this law cannot be removed from any lands without permission of the owner, and must hold a permit from the Arizona Department of Agriculture. Users of state or federal land must obtain specific authorization from the managing agency to remove protected plants. Landowners have the right to destroy or remove plants growing on their land but 20 to 60 days prior to the destruction of any protected plants, they must notify the Department. The landowner also has the right to sell or give away any plant growing on the land. However, protected native plants may not be legally possessed, taken or transported from the growing site without a permit from the Arizona Department of Agriculture. At the local level, many counties, cities, and towns have native plant protection ordinances as further means to conserve plant resources and preserve the unique character of natural areas.

One of the first, recent prosecutions for violation of native plant protection regulations was the case of Mary Darling, a Tucson biologist and environmental consultant, who was found guilty of violating Lacey Act. What did Darling do? In August 2001, Darling used a helicopter to ferry approximately 30 Pima pineapple cacti (a federally-listed endangered species) from a private property in Green Valley to Winterhaven Ranch, a 1700-acre private property about 35 miles southwest of Tucson. In doing so, she violated the Arizona Native Plant Law, the Endangered Species Act, and the Lacey Act. She was accompanied by real estate broker John Heim, representing the Florida owner of Winterhaven Ranch. After transplanting the cacti, Darling told Heim and real estate broker Phillip Aries, who had an option to buy the Winterhaven property, not tell anybody about the incident.

Why were the cacti moved? According to Darling's lawyer, the cacti were removed from the Green Valley property because they would have been bulldozed for development. Without a state permit, required for removal and transport of any cactus species, Darling removed them.

Why did Darling want to plant the cacti at Winterhaven ranch? In 2001, Darling conducted a biological assessment of Winterhaven Ranch and found no Pima pineapple cacti. If Pima pineapple cacti were present, the ranch's value would be greatly increased.

Why would the ranch's value be increased? Wouldn't the cacti just be bulldozed when the property is covered with thousands of new homes? Rather than being considered for development, the Winterhaven Ranch's owners wanted the land to be assessed as a mitigation site for Pima pineapple cacti. If the cacti were present on the property and the land qualified as a mitigation site, tax write-offs and other benefits could be applied.

For transporting about 30 federally-endangered Pima pineapple cactus plants without a state permit, Darling pleaded guilty to violating the Lacey Act. This case is, perhaps, the only one in which punishment was assessed in connection with endangered plant species. Her actions were not punishable under the ESA, even though the species is listed as endangered under that law.

Darling's punishment, under a plea agreement, included a five-year probation period, $5,000 fine, 90 days of home confinement, and 250 hours of community service. Darling also agreed not to use the title of "environmental consultant" and to cease environmental consulting services. She was ordered to write an article for an environmental publication, admitting her guilt and advising others to avoid violating species protection laws. She could not apply for any state or federal protected wildlife permits. In apparent violation of the plea agreement, Darling flaunts her Lacey Act violation in her company's advertisements aimed at the development community in order to increase business.

The Pima pineapple cactus is found only in southern Arizona and northern Sonora, primarily in Pima County. There are an estimated 1500 individuals remaining in the wild. Habitat loss, degradation resulting from development, and other land uses such as grazing and recreational use are the main causes for the decline of this species.

The ESA and other environmental regulations are complex, impeding easy interpretation and violation avoidance. In response to critics of the law's complexity, Craig Miller, southwest director for Defenders of Wildlife said, "The ESA is very straightforward in its attempt to balance wildlife with human activities. The complexity arises when people attempt to circumvent the law for profit or personal gain."

To address the shortcomings of the ESA, the Native Plant Conservation Campaign is leading a coalition of native plant societies, botanical gardens, and other plant conservation organizations societies. These groups are urging lawmakers to amend the Federal Endangered Species Act to provide the same protection for plants that it currently provides for animals. The language of the ESA should be clear in its policies, programs, and penalties and similarly applied to both animals and plants. Our Arizona Native Plant Society has recently affiliated with the Native Plant Conservation Campaign in order to effectively address this and other plant conservation priorities.

For information contained in this article, I am grateful to the November 2003 "Endangered Species & Wetlands Report," pages 14 and 15, and the December 18, 2003 issue of the Tucson Weekly "Get Out of Tucson" describing Darling's case.

For more information,: visit http://www.cnps.org/NPCC and http://agriculture.state.az.us/PSD/nativeplants.htm

OVERVIEW OF THE APRIL 2004 BOARD MEETING

Strategy Session Overview:

On April 24, 2004, the ANPS Board met prior to the quarterly board meeting for strategic planning at Prescott College, hosted by Board member, Lisa Floyd-Hanna, and chaired by Nancy Morin. The board set the following objectives:

1) Develop an overarching set of goals for ANPS that the entire organization could focus on and rally around.

2) Address board efficiency of operations, internal discipline, and housekeeping.

3) Discuss membership issues such as, a) increasing the number of active members; b) building a leadership pool; and c) building strong and active chapters focused on the organization's overarching goals.

Organization Goals:
To stimulate discussion of the organization's goals, Nancy Morin distributed a handout she had obtained from attending a recent international conference that laid out a global set of goals and targets to halt the loss of plant diversity. The Global Strategy for Plant Conservation (GSPC) has been adopted by the Conference of Parties of the Convention on Biological Diversity. (Please visit http://biodiv.org for more information and the full GSPC document.) As a starting point for synergies with domestic and international groups, Nancy believed this document would help ANPS focus on Arizona's specific issues and needs and how they fit into the global strategy.

The board discussion centered on the southwestern region rare and endangered plant task force that has met. While other state members of this group have developed their state plans, Arizona's group has not met recently to formulate its state plan. Nancy proposed that ANPS could be the organization triggering this state task force to meet. She then set a date for just before the state ANPS meeting October 1-3, 2004 and will coordinate the event. Hoped-for outcomes from this state task force include identifying targets that are important issues for Arizona.

For example, to bring focus to the membership, ANPS could:

1) Monitor plant communities, including establishing an initial baseline that would monitor the effects of the drought over time. It is early enough in the drought that, if it is a long one, data collection on plant communities will provide a good baseline for future monitoring.

2) Collect seeds for establishing banks, using them in restoration projects, etc.

3) Provide training that certifies participating volunteers in the skills needed to do accurate identification and collection work.

Board Efficiencies:
Board members reviewed their duties and responsibilities, such as nominations and attendance, and how chapter responsibilities fit in with the board. The board:

1) Agreed to create a set of operations and guidelines to quickly orient new board members to their responsibilities,

2) Obtained consensus on board roles and responsibilities.

3) Set attendance criteria.

4) Agreed on selection criteria for new board members based on the expertise needed by the organization.

Building Membership:
While board members brainstormed many ideas, they agreed that membership is built at the chapter level, so the renewal of chapters, and the energy and activities of the local chapters will be important in growing the organization. The board raised the topic of new chapter formation, and agreed that, per the organization's bylaws, any group of five people who wish to form a chapter can do so. These satellite chapters would meet independently, but project funding and board representation would be addressed by the appropriate ANPS regional chapter (Southern, Central, Northern).

Quarterly Board Meeting Overview:

Topics of the meeting centered on chapter renewal and putting teeth into the ANPS Board's responsibilities.

1) The ANPS mission was formally changed in the bylaws. It now reads, "To promote knowledge, appreciation, conservation, and restoration of Arizona native plants and their habitats." An ad hoc committee was formed to re-write the current publicity brochure and distribute it prior to the depletion of current stock.

2) The previous day's discussion of board efficiencies was reviewed and accepted.

3) Publication grant awardees were selected and recipients are:
- Nina Chambers, Yajaira Gray, and Stephen Buchmann of the Pollinators Project,
- Margaret Norem for the Desert Plant special issue on saguaros,
- Kristin Huisinga and Kate Watters of the Colorado River project, and
- Leigh Aultman and Lyn Chenier for Prescott Creeks.

4) The state annual meeting was discussed, a date and location was set, and the Central Region is now formed and meeting to address details, with Doug Green as chair.

Cottonwood (*Populus fremontii*). Bob had secured permission from the Circle Z Ranch for our group to come onto their property. This is an important courtesy tip when viewing Big Trees. Don't trespass onto anyone's private property! This giant of a tree was the high point of our field trip. Its trunk is 42 feet in circumference or 13 plus feet in diameter. Its height of 92 feet and crown spread of 108 feet are not to be dismissed. It's not your average-sized, run-of-the-mill tree! These dimensions are huge. That's why this champion is the largest known angiosperm (vascular plant having seeds in a closed ovary) in the U.S. WHAT A TREE!

While at stop #5, we walked a short distance to another National Champion tree (now Co-Champ) - the Velvet Ash (*Fraxinus velutina*). What a beauty this one is for Big Tree lovers. To have two National Champions of differing species within 70 yards of each other has to be another National record! WHAT A SIGHT!

Our last stop was a BONUS plant - i.e., the Mountain Yucca (*Yucca schottii*). This record yucca is replacing a burned out previous National Champion that was lost in last year's Catalina Mountains wildfire. This beautiful 15 plus foot tall yucca is located in downtown Patagonia, Arizona on Main Street. It is growing against an old adobe building that houses a leather accessories maker. Which is older - the Mountain Yucca or the adobe building? Who knows, but the combination of the two make for a very unusual comradeship, that's for sure. VERY UNIQUE!

At about 4:30 p.m., we ended our Big Tree day in Patagonia. By 5:30 p.m. or so, we were back at the Triple T Truck Stop, outside Tucson. By 7:45 p.m., I was back home in North Scottsdale. I drove about 450 miles that day and was not at all tired. Why? Because I'd been to the mountain top with an old pro, "Big Tree Man of Arizona" - Bob Zahner! We all thank you for your zeal and enthusiasm, and for showing us six of the great trees of Arizona and the U.S. It was a day I will not forget.

P.S. Here is Bob Zahner's handout covering the various Champion Trees seen in Santa Cruz County, along with their dimensions and other useful information. Good job, Bob!

ZAHNER HANDOUT FOR
ANPS "BIG TREE" FIELD TRIP
March 21, 2004

Stop 1. Emory Oak (*Quercus emoryi*). Empire Cieniga Ranch, in Oak Tree Canyon, 3 miles east of AZ Hwy 83, 6 miles north of Sonoita. A beautiful full crown tree, Arizona's largest Emory Oak. It was the National Champion from 1994 to 2002, when a larger Emory Oak was discovered in New Mexico.

Circumference: 190 inches or 16 feet [diameter 61 inches or 5 feet]
Height: 53 feet
Crown spread: 83 feet

Stop 2. Arizona White Oak (*Quercus arizonica*). Canelo Community, on AZ Hwy. 83, ½ mile east of Turkey Creek. New National Champion in 2003. A truly magnificent tree.

Circumference: 210 inches or 17.5 feet [diameter 67 inches or 5.6 feet]
Height: 42 feet
Crown spread: 65 feet

Stop 3. Yewleaf Willow (*Salix taxifolia*). San Raphael Valley, 150 yards west of Santa Cruz River, 7 miles north of Lochiel, on San Raphael Road. This National Champion is the largest in this unusual grove of large yewleaf willows. This species is normally a large shrub or small tree to 15 feet.

Circumference: 71 inches or 6 feet [diameter 23 inches or 2 feet]
Height: 33 feet
Crown spread: 102 feet

Stop 4. Velvet Mesquite (*Prosopis velutina*). Duquesne Rd., 2 miles east of Beyerville Community, 100 yards east of Santa Cruz River, 3 miles north of Mexican Border. National Champion since 1949, Arizona's first champion tree, featured in national magazines and big tree calendars for many years. Very old tree, now declining in health.

Circumference: 196 inches or 16 feet [diameter 62 inches or 5 feet plus]
Height: 46 feet
Crown spread: 60 feet

Stop 5. Fremont Cottonwood (*Populus fremontii*). Circle Z Ranch, 2 miles south of Patagonia, east of AZ Hwy. 82, 100 yards east of Sonoita Creek. National Champion since 1970, Arizona's largest tree. This awesome tree is also the largest known angiosperm tree in the U.S.

Circumference: 504 inches or 42 feet [diameter 161 inches or 13 feet plus]
Height: 92 feet
Crown spread: 108 feet

Also at Stop 5. Velvet Ash (*Fraxinus velutina*). Located 200 feet southwest of the cottonwood. National Champion from 1996 to 2002, now National Co-Champion (since another velvet ash of same size has been discovered in Fossil Springs Wilderness Area, AZ.

Circumference: 196 inches or 16 feet plus [diameter 62 inches or 5 feet plus]
Height: 76 feet
Crown spread: 88 feet

Stop 6. Bonus plant: Mountain Yucca (*Yucca schottii*). Patagonia.
This species is classed as a tree, as are several other species of yuccas. Arizona's previous National Champion Mountain Yucca was destroyed in the Catalina Mountains wildfires. We are currently nominating this Patagonia specimen as a new national champion.

BOOK REVIEWS

Plant Them Deep, by Aimee and David Thurlo, A Tom Doherty Associates Book, New York, 2003, 333 pages, $24.95.

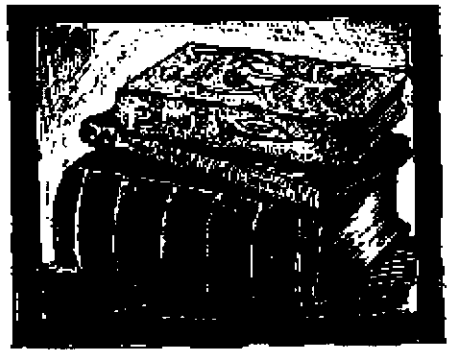
For a change of pace, here is a mystery with "the good guys" as native plants and plant thieves as the villains. One of the suspects is an expert who plans to re-vegetate mine tailings with non-native plants, including genetically-engineered varieties. Ninth in a series of mysteries by the Thurlos, the setting is Navajo country, primarily New Mexico. In previous books, the sleuth has been Navajo tribal policewoman Ella Klah, but here the sleuth is her mother, Rose, a Navajo traditionalist and member of the Plant Watchers' Society. Ella's brother is a *hataalii*, or a healer for whom certain native plants are essential medicine. When some kinds of native plants start to disappear in large numbers, Rose and her friends become concerned. It is clear that the villain cannot be a traditional Navajo because the plants were crudely dug out of the ground, destroying a high percentage of the plants. You will discover that the story involves murder and personal attacks. Rose maps plant disappearances and has insights that lead to the unexpected solution.

Thurlo's mysteries resemble Hillerman's because they weave a complex web of conflicts and relationships among traditional and modern Navajos and the non-Navajo people around them. Thurlo's character, Ella, skillfully straddles this boundary. If you are looking for a change from a book on botany or landscaping, this is a good read.

Submitted by Barbara Tellman

Plant Discoveries: A Botanist's Voyage Through Plant Exploration, by Sandra Knapp, Firefly Books, London, 2001, 336 oversized pages, $60.00.

If you enjoy looking at beautiful plant illustrations, be sure to take a look at this book. Filled with exquisite paintings and drawings from the Natural History Museum of London from the 15th to the 20th century, the book is organized by plant families and contains extensive information about the continuing European discovery of plants from all over the world. Descriptions of plant exploration are interwoven with fascinating information about the plant families and individual species as well as observations on their use by wildlife and humans. The chapter on cacti and succulents discusses divergent evolution of cacti and euphorbias. Occasionally, the author adds personal observations such as: "Poppies are a supreme example of the irony of nature - at once stately, delicate and fragile, their ephemeral beauty gives not a hint of their darker side." (p. 249).



Topics in the chapter on grasses and sedges include the basic structure of grasses, use of bamboo by pandas, grassland ecosystems, and rare species. Here is a description of the hunt for a mystery grass species:

"In the mid-nineteenth century, a French botanist described a most peculiar grass growing in the botanical garden, which was said to have been sent from Brazil. He named it *Anomochloa marantoidea* and it certainly is an anomalous grass. Anomochloa has wide leaves and a panicle with large bracts, and looks for all the world like a strange ginger, or prayer plant ... The search for the plant began in the 1960s with the deciphering of the labels on specimens held in the Paris herbarium ... [He] began to search for these grasses all over South America ... [several years later] near the town of Una, Bahia, 'Cleo felt a peculiar - or psychic, as she put it - urge to stop near a particular wooded area. Not far into the woods, which bordered a cultivated area of cacao on somewhat rocky slopes, they came across a colony of the grass.'" (p. 97).

The twenty chapters include information about and pictures of conifers, passion flowers, morning glories, gentians, hibiscus and many others. Also included are pages from beautifully hand-illustrated antique books. The final section contains brief biographies of significant plant explorers. I borrowed the book through Interlibrary Loan from the Phoenix Public Library and was most reluctant to return it. The book is definitely worth the cost, and can be obtained from Amazon.com at a lesser price.

Submitted by Barbara Tellman

The Flora of North America: North of Mexico, Volume 4, Magnoliophyta, Caryophyllidae, part 1 by the Flora of North America Editorial Committee, Oxford University Press, New York, 2003, 559 pages, $120.00.

The Flora of North America will be published in 30 volumes. Volumes 1 and 2 were published in 1993, Volume 3 in 1997, Volume 22 in 2000, Volumes 23 and 26 in 2002, Volume 25 in 2003, and now Volume 4 in late 2003. The series deals with plants in the continental U.S., Canada and Greenland.

cont'd. on page 19

Books (cont'd. from page 18)

Volume 4 covers 652 species in 117 genera from 10 families. For an Arizonan, the subject of Cactaceae would be of real interest but for an Arizona botanical nut, this volume is particularly interesting. About one third of the text is devoted to Cactaceae (pages 92 through 257). All 34 genera and 189 species of the Cactus Family for all of North America - excluding Mexico - is covered in detail.

I have several field guides and reference manuals that I use to identify Southwestern and Arizonan Cacti. Scanning through The Flora, I noted quite a few differences between my guides and manuals and this volume. It took me almost two days to plow through these differences, one by one.

Unbelievably, it appears that all of my books and references are out of date, not so much with cacti identifications but with genera and species revisions in the Cactaceae family. I had always thought that Earle's Cacti of the Southwest and Benson's Cacti of Arizona were dependable field guides and references.

Those opinions were tested by the time I had reached page 257 of The Flora. Almost everything listed in my two main guides had been reassigned in either genera or species. So many changes have taken place - probably more than a hundred. Here are several examples:

- The genus, *Escobaria*, is gone, and for the most part reverted back to *Coryphantha*.

- The genus, *Neolloydia*, is almost gone, and has for the most part reverted back to *Echinomastus*. One species of *Neolloydia* remains in The Flora. There are now 5 species of *Echinomastus*.

- A lot of species and/or variations in the various genera have been re-categorized or reverted back to species used in the past.

  - *Ferocactus acanthodes* (California Barrel Cactus) is now *F. cylindraceus*.

  - *Ferocactus acanthodes* var. *LeContei* (LeContes Barrel Cactus) is now *F. cylindraceus*.

  - *Sclerocactus whipplei* var. *roseus* (Whipple Rose Colored Devil Claw) is now *S. parviflorus*.

  - *Sclerocactus whipplei* var. *Heilii* (Heil Devil Claw) is now *S. cloverae*.

  - *Opuntia basilaris* var. *aurea* (Creeping Beavertail Prickly Pear) is now *O. aurea*.

  - *Opuntia erinacea* (Hedgehog Prickly Pear) is now *O. polyacantha* var. *erinacea*.

And on and on and on! These are just a few examples. I don't have the time or the paper required to show all of the changes. It could be that my publications are way out of date. No doubt cacti experts feel that they can justify all these changes. Most of these changes are probably a result of botanical DNA research. Another cause for some revisions may be that The Flora editors felt there were downright errors.

One example from Volume 4 is the following quote: "*Pediocactus simpsonii* (Mountain Cactus) is an exceedingly variable species. The segregation of the many forms, varieties, and subspecies on the basis of morphology, however is very difficult to support, given the continuous range of variation in stem size and flower color over its geographic range. The species has the widest distribution of any *Pediocactus*, and is found at the highest elevation." The result is that about ten varieties and subspecies were regrouped under the species, *Pediocactus simpsonii*. Simplification? Possibly. Time will tell in botany!

There are many more similar examples, but are too long to place here. All are interesting. Some are very critical of some of our finest botanists of the past.

If I had thoroughly reviewed Ted Anderson's The Cactus Family when it came out in 2001, I would have been better prepared to handle Volume 4, and its renaming revolution. That's my loss!

The total treatment of the 34 genera and 189 species of Cactaceae for The Flora is very well done. The remainder of Volume 4 deals with nine other families beyond Cactaceae. The major families treated are Nyctaginaceae (Four O'clock), Chenopodiaceae (Goosefoot), Amaranthaceae (Amaranth), and Portulacaceae (Purslane). For Arizonans, all four of the above families are important to us, as a number of these species appear in our Arizona flora.

Richard W. Spellenberg and others do a great job of contributing to the *Mirabilis* genus (Four O'clocks), the *Abronia* (Sand Verbena), the *Acleisanthes* (Trumpets) and the *Boerhavia* (Spiderlings, all favorites of wildflower enthusiasts throughout Arizona and the Southwest). This section of 13 genera and 88 species is very well done and includes several of Spellenberg's species discoveries. Arizona has 11 of these genera and almost 40 of the species depicted here. It is a very representative member of our state.

The Goosefoot family is completely dealt with here, although there is some discord within certain botanical circles that Chenopodiaceae should morphologically be a part of Amaranthaceae. Economically important species such as spinach, chard and beets are examined, along with

cont'd. on page 20

species introduced from Europe and Asia, called "weeds" in the North American flora. (One man's weed is another man's flower.) In "Weeds of the West," the editors deal with lambsquarters, goosefoot, salt lover/halogeton, common kochia, and of course, Russian thistle. The most extensive coverage is on the genus *Atriplex*, very prevalent in Arizona with its species of orach, saltbush, and desert holly. *Atriplex* is a very important genus in our southwestern deserts. In total, Arizona has 16 of the genera and 57 of the species that are covered in this Flora volume.

The Amaranth family is fully represented in this Flora and is well represented in our Grand Canyon State. The family contains its share of "weeds" that are examined: pigweeds, amaranths, and khakiweed. In all, a total of 12 genera and 80 species are reviewed extensively. A number of these genera/species make their homes in southwestern North America and, of these, 8 genera and 30-plus species reside in Arizona.

Lastly, the Portulaca/Purslane family is shown with 9 genera and 91 species in The Flora. Arizona has 8 of these genera and 26 species. Several of my personal favorite wildflowers are in this grouping - i.e., *Claytonia perfoliata* (Miners lettuce), *C. rosea* (Rocky Mountain Spring Beauty), several of the *Phemeranthus* species (formerly *Talinum*) - Flameflowers and *Lewisia rediviva* var. *rediviva* (Bitter Root). A beautiful Bitter Root is depicted by Barbara Alongi in the frontispiece, the only color painting in the entire Volume 4. Everything else is in black and white, although all of these depictions are very well done by The Flora illustrators.

The people who have contributed to Volume 4 of The Flora of North America are to be commended for an outstanding effort. The list of contributors reads like a "Who's Who of Botanists for North America" - including our own ANPS President, Nancy Morin of The Arboretum at Flagstaff, Flagstaff, Arizona, who was the lead editor of this volume. Nancy, you make us proud!

Submitted by C. Douglas Green

Agaves of North America, by Howard Scott Gentry, University of Arizona Press, Tucson, 1982, 670 pages, $49.95 paperback.

Desert people cultivated vast fields of agave plants. The remnants of their fields throughout central Arizona are virtually invisible to the untrained eye: small piles of rock mulch, lines of rocks used to concentrate rainwater, and an occasional harvesting tool. Agaves were carefully planted and tended as an important food crop. Agave's tough and thorn-tipped rosette of leaves makes it difficult to imagine how some species of this plant can produce a delicious meal - but they do! Agave hearts, dug just before the flowering stalk would normally start reaching skyward, were stripped of leaves and baked in pits. Stripped of leaves, they were baked in pits. The resulting sweet flesh could be eaten at once or dried for future use.

The strongest connection I personally share with agaves (except for the time I stumbled into a well-named shin-dagger, *Agave schottii*) is the same for many people - tequila. Whether a straight shot, in a Margarita or Tequila Sunrise, the allure and power of these drinks comes from macerating the cooked hearts, then fermenting and distilling the juice. Teetotalers and alcoholics alike can enjoy agaves as a delightful part of their desert landscape. Varied colors, sizes and patterns of rosette are available for the desert landscaper to use.

Agave lovers will be pleased that the $110 hardback, considered a classic reference work, recently was reprinted in paperback by the University of Arizona Press. The author, Howard Scott Gentry, studied agaves as his life's work. His book is a loving overview of the species. He describes in detail 136 species (197 taxa), including habitat and economic uses. Rich with photos, illustrations, maps and charts, the new paperback will be welcomed by every collector of books about desert plants or succulents.

Here is a sample from one entry on *Agave difformis*:

"The population by Rio Tula and highway 85 in Hidalgo is particularly rich with leaf variability ... However, I did not observe the toothless form there. Such populations in the state Hidalgo must have been visited by earlier European collectors, and their collections may have provided materials for some of the earlier names, but for which no herbarium specimens were prepared ... By the Rio Tula there is also a form with sinuous leaves, suggesting a gathering of snakes, with their heads stuck in common feeding jug with spiny tail stuck out in a vegetable discipline, as though to say, 'Don't bother us, we're busy!'"

Howard Scott Gentry, the world's leading authority on agaves, died in 1993 at the age of 90. Agave afficionados still grieve his absence, but we are fortunate to have this book as guide and inspiration.

Submitted by Kevin Dahl

CONSERVATION COMMITTEE REPORT

Carianne Funicelli

Our newly re-formed Conservation Committee has been busy! Here are our accomplishments so far:

1. Identified and prioritized conservation goals: invasive species, education/outreach, and restoration
- Brainstormed associated tasks and projects to support our top three goals
- Developed a spreadsheet to track our accomplishments
- Apply concerted efforts to get chapter committees up and running throughout the state.

2. Formally affiliated with the Native Plant Conservation Campaign (NPCC), a national coalition of botanical gardens and native plant societies that addresses plant-related conservation issues on a national scale. Visit the NPCC website at http://cnps.org/NPCC

3. Provided our comments on an Environmental Assessment for an Animal and Plant Health Inspection Service (APHIS) proposal to biologically control tamarisk in 14 western states.

4. Re-vegetated 0.1 mile of old road at Saguaro National Park to discourage any further use as a trail.

Our most exciting current project is inspired by conservation super-star, Julia Fonseca. She provided impetus to raise funds aimed at issues surrounding invasive species by donating $100 and challenging others to contribute as well. The Conservation Committee identified two projects that will be supported with funds raised through this challenge:

1. Purchase two sandwich board signs for the Sonoran Desert Weedwackers to educate passers-by about the importance of buffelgrass removal while the group is working along roads.

2. Support a collaborative project with The Nature Conservancy to produce a brochure modeled after one produced by the California Invasive Species Council called "Don't Plant a Pest." The idea is to present native landscaping alternatives serving the same visual and physical function as popular invasive species.

We have already accumulated several hundred dollars in donations! If you are interested in contributing, please contact Nancy Zierenberg at anps@aznps.org

The Conservation Committee is a fun and productive way to connect with other ANPS members and to contribute to conserving the places that are important to us. We meet monthly in Tucson. If you can't come to Tucson, join in by email or meet with others in your region. Please contact Carianne Funicelli for details about meetings or other ways to be involved at CFunicelli@heg-inc.com.

OF TREES AND MAN

The tree that never had to fight
For sun and sky and air and light,
That stood out in the open plain
And always had its share of rain,
Never became a forest king
But lived and died a scrubby thing.

The man who never had to toil
To rise above the common soil,
Who never had to win his share
Of sun and sky and light and air,
Never became a manly man
But lived and died as he began.

Good timber does not grow in ease;
The stronger wind, the tougher trees,
The farther sky, the greater length,
The more the storm, the more the strength;
By sun and cold, by rains and snows,
In tree or man good timber grows.

Where thickest stands of forest growth
We find the patriarchs of both,
And they hold converse with the starts
Whose broken branches show the scars
Of many storms and much of strife --
This is the common law of life.

Author unknown
(presented by C. Douglas Green)

ANPS MERCHANDISE

You can purchase ANPS T-shirts, booklets, and posters from our local chapters or by mail order.

In addition, you can find posters at Saguaro Park - East and West, Tohono Chul Park, the Audubon Society, Arizona-Sonora Desert Museum, Organ Pipe National Monument, Boyce Thompson Arboretum, Desert Botanical Garden (obtain through Kathy Rice, Phoenix Chapter President, who works there), and The Arboretum at Flagstaff.

ANPS T-shirts

Sacred Datura: Dark Purple only (Gildan Ultra, 100% cotton) in S, M, L, XL, and XXL
$16.00 each (members), $18.00 (non-members) plus $3.00 shipping / handling.
Please add $1.00 for each additional T-shirt mailed to U.S. addresses. For international orders, please contact Nancy Zierenberg.

ANPS Booklets

Desert Butterfly Gardening, Desert Bird Gardening, Desert Grasses, Desert Ground Covers and Vines, Desert Shrubs, Desert Wildflowers, Desert Accent Plants (out of print), Desert Trees (available Fall 2004)

Prices per booklet ordered:

Quantity	
1-9	$2.25 each (any combination of titles)
10-49	$1.75 each (any combination of titles)
50+	$1.25 each (any combination of titles)

Price per booklet ordered includes postage for U.S. addresses only.

Non-U.S. Prices (shipped via airmail; no quantity discounts)

Canada/Mexico:	$2.75 each (price includes postage)
All others:	$4.25 each (price includes postage)

ANPS Posters

Wildflowers of Northern Arizona, Sonoran Desert Wildflowers

Retail:
$12.00 each (non-members)
$10.00 each (ANPS members)

Shipping and Handling:
$2.50 for first poster & $.50 each additional poster mailed to the same address (U.S. addresses only)

Wholesale:

10-49	$6.00 each
50+	$5.00 each

Shipping and handling are an additional charge depending on the size of the order. Please contact ANPS for specifics on shipping costs.

Please send your order to:

Arizona Native Plant Society
P.O. Box 41206
Tucson AZ 85717

For order forms, please visit the ANPS website at www.aznps.org

Don't forget people on your gift list. Thank you for your order!

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The Plant Press is a benefit of membership in the Arizona Native Plant Society.

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NEW MEMBERS WELCOME

People interested in native plants are encouraged to become members. People may join chapters in Central, Northern, or Southern Arizona, or may be members only of the statewide organization. For more information, please write to ANPS at the address below, visit the ANPS website at www.aznps.org, or contact one of the people below.

State President	Nancy Morin	928.774.1442
Northern AZ Chapter President	Nancy Morin	928.774.1442
Central AZ Chapter President	Kathy Rice	602.808.9304
Southern AZ Chapter Interim President	Rod Mondt	520.882.7663

Membership Form

Name
Address
City **State** **Zip**
Phone Number

Chapter preferred: __ State __ Central __ Northern __ Southern

Enclosed:

__ $ 15 Senior (65+)/Student
__ $ 35 Organization
__ $ 75 Sponsor
__ $1,000 Lifetime
__ $ 20 Family/Individual
__ $ 50 Commercial
__ $100 Patron

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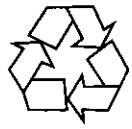

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