



The Arizona
Native Plant
Society

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The Plant Press

THE ARIZONA NATIVE PLANT SOCIETY

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Tucson Audubon Society's Habitat at Home is a new program to encourage the use of native plants and rainwater harvesting to create wildlife habitat (see article, page 9). *Photo courtesy Tucson Audubon Society.*

Grow Native!

by Ries Lindley¹

Forty years ago when the Arizona Native Plant Society was founded, the sound of a Saturday in summer for many urban Arizonans was the power mower of the nearest neighbor, and it was usually under the bedroom window. A responsible homeowner spent many hours each summer watering, weeding, mowing, trimming, and fertilizing the lawn. The lawn might consist of any number of exotic grasses, all of which needed five or six feet of water per year to stay healthy. Yes, five or six feet; not five or six inches. Imagine the homes or apartments in your town with a wall six feet high around the entire boundary and filled to the brim with water.

A lot has changed. The early adopters of this change will remember when the sunny blooms of desert marigolds were just a patch of yellow calling attention to themselves as unsightly weeds, and having a mesquite tree in the yard was disgustingly messy. (Oh my! They leak sap and drop pods!) The new consciousness has been largely driven by water use, yet there have always been those who thought living within the local environment was the right thing to do. The rest of us have also picked up on the need to be one with Mother

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President's Note by Douglas Ripley jdougripley@gmail.com

Welcome to the Summer issue of *The Plant Press*. As I write this in mid-June from my home on the western edge of the Dragoon Mountains, in Cochise County, I'm still reveling in the two inches of rain, the first in four months, that we received three days ago. My 3,000 gallon rainwater cistern is overflowing as are my several rainwater collection barrels. From my study window I have a beautiful view of the Dragoon Mountains framed by several large ocotillo plants. Until this rain, the spiny, dull, gray-green ocotillo stems were leafless. But with the abundant rain, they immediately started to grow leaves and are now completely leafed out in brilliant green splendor — just two days since the arrival of the rain! The ability of this beautiful and endlessly interesting plant to respond so quickly to environmental change is truly remarkable and for me is a powerful reason to cultivate, wherever possible, native plants in our gardens.

In this issue of *The Plant Press* we explore and describe the many advantages and benefits of using native plants for gardening, landscaping, and restoration projects. This topic perfectly supports the mission of the Arizona Native Plant Society, which is to promote knowledge, appreciation, conservation, and restoration of Arizona native plants and their habitats. Composed mainly of articles by our members, we hope the information presented will reinforce your interest in, and conservation efforts for, Arizona's native plants and the habitats upon which they depend.

Since the start of the year, our Society has continued to offer a number of interesting programs in support of native plants, such as funding research grants, undertaking various restoration projects, offering plant identification workshops, and providing ongoing education through our monthly chapter meetings and periodic field trips. Another project we will soon begin is a complete overhaul of the Society's website, which will greatly increase our ability to communicate — both to our members as well as the general public — details on our various activities and other useful background information on Arizona's native flora.

Our next big event will be the Botany 2018 Conference, which the Society has sponsored for the past 15 years. It will be held on 28–29 July 2018 at the Cochise College campus in Sierra Vista. The theme for this year's conference is

“Exploring the Botanical Diversity and Ecology of the Madrean Sky Islands of Southern Arizona and Northern Mexico.” We have obtained an impressive lineup of conference speakers to address this topic. Other native plant topics will be presented via a poster session during the conference. The events of the first day will conclude with dinner and an entertaining presentation/performance by long-time Arizona “botanical raconteur” Petey Mesquitey (aka Peter Gierlach). On the following day, we will offer several interesting field trips in the San Pedro Valley, the Huachuca Mountains, and the Dragoon Mountains. More information on the conference, including registration instructions, can be found on the Arizona Native Plant Society website.

Finally, I would like to announce that after a one-year absence, we will again offer a three-day botanical workshop in the Chiricahua Mountains on 15–17 September 2018. Accommodations, to include all meals, will be provided at the beautiful Southwestern Research Station in Portal. The program will consist of field trips, lectures, and plant identification laboratory workshops. More details and registration information are in the *Happenings* newsletter and on the AZNPS website.

All best wishes for a great summer and an “above average” monsoon season!



From Karen LeMay's article, beginning on page 4, the hummingbird garden, with a living Ocotillo fence and other native plants with red tubular flowers, bordered by mowed native bunch grasses. Photo courtesy Karen LeMay.

Grow Native! *continued from page 1*

Nature, even if it was under the threat of duress. This issue of *The Plant Press* is devoted to exploring the many benefits, both real and intangible, that can be realized by using native plants for gardening, landscaping, and restoration projects.

Native gardening is an attitude, and even those who work hard at it still have epiphanies. Karen LeMay's inspirational article "The Evolution of a Native Plant Garden (and Gardener)," is a lesson in self-awareness for us all. To be comfortable in our environment we must live within it, not in a bubble attached to it. Today, we are fortunate to have some good resources to help achieve that goal. Tucson Audubon's Jonathan Horst and LaNella Gains offer us "Habitat at Home," an article about a program that can guide desert dwellers in considering the whole of garden, environment, and habitat. Val Morrill's article describes a similar program, sponsored by the Arizona Wildlife Foundation in cooperation with the National Wildlife Foundation, which is available to all Arizonans. If you don't live in the desert, then take some time to enjoy "Celebrating Native Gardens" by Jennifer Temkin of the Highlands Center for Natural History in Prescott.

Some projects require a bigger hammer. Restoring damaged native habitat can be expensive if it involves a lot of acreage. For some excellent advice on restoration, take a look at John

Scheuring's "Using Native Succession Plants for Restoration Projects." With a little care and forethought, nature will provide her own palette of native plants. If there's no time to wait on nature's natural succession, read Bill Thornton's "Tucson Cactus and Succulent Society to the Rescue."

Arizona's awareness of native plants, their ecology, and the habitat they create has improved a lot in forty years. However, there is still room for growth. Whether you are a virtuous all-native gardener, a recalcitrant backslider, or just plain curious, this issue of *The Plant Press* is for you. The resources discussed here are not necessarily all accessible to everyone, but most of them were developed by ordinary people with a keen interest in creating a tool box. The article describing the Desert Survivors Native Plant Nursery in Tucson suggests one outstanding source of native plants in Southern Arizona. It is followed by a listing, by county, of other nurseries that carry at least some native Arizona plants.

Native gardening has room for ambitions great and small. You can start a restoration project, volunteer to help with one, or just ask your landlord if you can hang some native-bee houses in the shrubs outside. Every little contribution is a drop of water in the river that flows through time. Grow Native!



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Annual and perennial native plants during the monsoon months. *Photo courtesy Karen LeMay.*

The Evolution of a Native Plant Garden (*and Gardener*) by Karen LeMay¹

Natural habitat loss is said to be the biggest threat facing wildlife. So it only makes sense for gardeners, who have access to land, water, and a desire to surround their home with plants, to create natural habitat. But how does a gardener begin to plan a “habitat”? As I had no background in botany, my journey began with developing a visually beautiful cottage garden and led me to create a nonprofit to support native plant habitats and their pollinators.

I lived in California for most of my life, so owning a home with land was financially out of reach. Once my biologist partner, Bob, and I moved to rural southeastern Arizona, bordering the Coronado National Forest and one of the Sky Islands, we had two acres of land to dig in. Bob was a bird guide for many years and already knew a lot about the floral and faunal diversity of this beautiful part of the country. His love of birds, butterflies, and dragonflies influenced my gardening activities, encouraging me to lure in these creatures. We were successful in attracting birds and butterflies, and my lifelong dream of having a colorful cottage garden was fulfilled, but I wouldn't say a natural habitat was created because the focus was more on beauty.

One of my favorite gardening books is *Insects and Gardens — In Pursuit of a Garden Ecology*. Author Eric Grissell writes that a garden is “a humanly contrived, artificial construct of plants from all over the world that is usually assembled with little regard for ecological or biological principles. What a garden is not, by any means, is natural.” I flinched reading these words, knowing many of the plants in my garden were being forced to live in an environment so foreign to where they evolved, let alone lacking the interactions of the pollinators found in their native ecosystems.

Our neighbor, Noel McFarland, used to come over for what he called “salad” for the moth caterpillars he was rearing. His eyes would light up when he would see a caterpillar chewing on a plant (while I was cringing). It was Noel's enthusiasm that inspired me to look at my garden through the eyes of wildlife. I learned that butterfly gardens do provide nourishment for butterflies; however, they do not always include native plants, nor do they create a sustaining ecosystem. By focusing on the larval stages of butterflies and moths and the needs of native bees, I began to understand the concept of an ecosystem and gained a greater understanding of natural habitats.

continued next page

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Above Monoculture of Bermuda grass.
Photo courtesy Robert A. Behrstock.



Right Eleven years later.
Photo courtesy Karen LeMay.

Evolution of a Native Plant Garden *continued*

Yet there were several hurdles between understanding what makes a natural habitat and creating one. The first issue was to know which plants are locally native. I recall a natural history field trip to the Coronado National Memorial (a few miles south of our home) where I saw a small bush with many insects hovering over the tiny white flowers. After some research, I identified the plant as the composite *Guardiola platyphylla* (Apache Plant). It was this personal interaction and effort to identify this plant that has endeared it to me. What better plant for a native habitat garden than one that grows in the same soil with the same rainfall and with the same pollinators visiting? Granted, the blossoms are white and small. But once I saw the number of native bees, wasps, flies, and butterflies feeding in the flowers, beauty had a different meaning.

When designing any native plant garden or restoration area, one of the planning issues is to provide a definition of a “native

plant.” A quick web search yields many different definitions. Wikipedia’s concept of natives is: “plants that have developed, occur naturally, or existed for many years in an area.” By this definition, Russian thistle would be considered a “native plant” in Arizona. Other commonly accepted definitions of “native plant” are species that historically grew in North America, or are simply in the same U.S. hardiness zone. In contrast to these definitions is the discussion in Doug Tallamy’s *Bringing Nature Home — How You Can Sustain Wildlife with Native Plants* in which he states that the function of a plant within its natural ecosystem is far more important than its geographic location.

For my garden, I define a “native” plant as one that grows in the nearby Chihuahuan Desert, which extends from southeastern Arizona to west Texas and northern Mexico. This habitat is high-elevation desert land with limestone soil, up to 20” of

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Butterfly gardens of mostly non-native high-water plants from all parts of the world. Photos courtesy Karen LeMay.

Remembering Donald J. Pinkava

29 August 1933 — 25 July 2017

*by Elizabeth Makings, Collections Manager,
Arizona State University Herbarium, Tempe,
Arizona*

I was a graduate student at ASU in 2000 when I first met Dr. Pinkava. As he had just retired, I missed out on his talents as a teacher but I was lucky to get to know him as a mentor, colleague, and friend.

Dr. Pinkava had a heart of gold, a mind like a trap, and a delightful collection of idiosyncrasies that was perfectly suited to his career. He was hired at ASU in 1964 after completing his Ph.D. at Ohio State University and was immediately responsible for teaching a 300-level botany class called “Flora of Arizona.” He undertook this responsibility with a meticulousness and attention to detail that can only be described as “Pinkavesque” — collecting the plants, learning the flora, and scouring the state for the best field trip sites. To his students, he was simultaneously feared and adored. His exams turned men into boys and triggered anxiety attacks, even among the best. He did not *give* you grades; you *earned* them. There was no one more demanding, no one more thorough, yet no one more caring and helpful.

Dr. Pinkava’s gentle personality, sage advice, patience, and quiet strength were traits that many former students and colleagues consistently and fondly recall. And when it came to instruction, he didn’t just teach classes, he lived them and devoted an enormous amount of time and energy to their preparation. In addition to the Flora of Arizona class, he taught upper division courses in cytogenetics, herbarium techniques, and taxonomy of southwestern desert plants. In “Experimental Plant Systematics” (Botany 598), students were greeted with nine pages of his handwritten notes and diagrams on the first day! Dr. Pinkava’s knowledge of the plant world was encyclopedic, gained through decades of hard work — yet it was never about him. He was unassuming and humble, and never made anyone feel beholden. You couldn’t ask for a better mentor. Dr. Pinkava began accepting graduate students early in his career and managed them effectively and effortlessly, giving them their autonomy to explore and create, yet being appropriately hands-on when needed. He was so tolerant and open-minded that he probably never took notice of the fact that, in his lab, he had more female graduate students than male,



Dr. Pinkava in his ASU Herbarium office in 2012 with his faithful 1970’s era computer.

a non-trivial detail during times of gender discrimination, and the diversity in his lab continued until he retired.

He was the academic father to many and there is an impressive list of students that paid him the ultimate compliment by going on to important academic and/or applied botanical careers such as at the University of Alaska, the University of Arkansas, Augusta College, Cal Poly San Luis Obispo, Clemson University, the University of Maryland, the University of Michigan Flint, the San Diego Natural History Museum, San Juan College, the University of Wyoming, and more. Other Pinkava students pursued careers as agency scientists in the U.S. Forest Service, Bureau of Land Management, National Park Service, and local municipalities. And some are botanical consultants, administrators, and, especially notable, a superstar entourage at the Desert Botanical Garden in Phoenix. And yes, a fair share of anarchists, of which he would be equally proud.

Dr. Pinkava contributed to some of the most important floristic studies in the Southwest and devoted a significant portion of his research life to the Cuatro Ciénegas flora in Chihuahua, Mexico. He was one of the founding editors of the Vascular Plants of Arizona project (canotia.org/vpa_project.html). Dr. Pinkava and his students have amassed one of the best collections of Cactaceae in the

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Evolution of a Native Plant Garden continued from page 5

rainfall, and is home to many of the same migrating birds and animals that inhabit my garden. Under this definition, *Salvia greggii* is “native” in my yard as it grows in the Big Bend region of Texas.

Another issue with creating a natural habitat is finding locally native plants to purchase. Many native plants do not grow well in pots and are difficult to propagate. That is one reason nurseries sell the same tried-and-true plants, as they have figured out which species, wherever their native habitat is, are easy to grow and maintain in pots. And unfortunately for habitat gardens, nurseries have figured out which plants do not attract insects, or they apply long-lasting pesticides to keep the plants in perfect condition for sale. On top of that, the nursery trade creates cultivars (also called nativars, which is an oxymoron) — giving descriptive names in quotes after the common name. These plants have longer blooming periods and showier flowers but often sacrifice the amount of nectar and/or pollen that is a food source for pollinators and other wildlife.

There are very few native plant nurseries selling locally native plants. And the plants they sell generally do not have much information provided with them, so the gardener must do research beforehand. Since you are reading this article, I will assume you have an appreciation of, and knowledge about, native plants. However, growing these plants in a garden requires another skill set. Desert Survivors Native Plant Nursery in Tucson (see page 25), specializing in Sonoran Desert natives, is one of the few native plant nurseries with information on their website that addresses specialty gardens, such as hummingbird, butterfly, larval, and medicinal gardens with their suggested plants (www.desertsurvivors.org/plant-lists.html). Borderlands Restoration in Patagonia also sells native plants grown from locally obtained seeds (<http://www.borderlandsrestoration.org/native-plant-materials>). Peter Gierlach of Spadefoot Nursery (aka radio storyteller “Petey Mesquitey”) has sold plants for many years at the Bisbee Farmers Market on Saturdays (www.spadefootnursery.com). The Xerces Society, a nonprofit devoted to protecting native habitats for invertebrates, has combined their long-term research into books and pamphlets written for the general public (xerces.org).

As my retirement approached, I wanted to continue habitat gardening beyond my own yard. Since restoring habitat for pollinators can be effective on a small scale (unlike mammals that need many contiguous acres), I decided to focus on habitat for migrating hummingbirds, butterflies, bats, and pollinating insects. In 2015, Bob and I, along with others, formed Pollinator Corridors Southwest, a nonprofit with a mission of supporting southwest native plant habitats and their pollinators (www.pocosouthwest.org). A recent highlight of this effort has been working with Borderlands Restoration on a joint Research Access Permit awarded by the U.S. Army, as part of their Sentinel Landscapes Initiative, to collect seeds and take herbarium plant specimens in Fort Huachuca’s pristine canyons. Specimens collected for the project will be deposited at the University of Arizona Herbarium and the seeds will be grown out in Borderlands’ propagation nursery for local restoration projects after wildfires, floods, or other disturbances.



My requirement for any new plant in my garden is that the plant provides nectar, pollen, berries, is a larval host plant, and/or provides shelter/nesting for migrating birds and pollinators.

Some of the plants in my garden are:



**POLLINATOR
CORRIDORS
SOUTHWEST**

Existing mature oak trees

(*Quercus emoryi*, *Q. arizonica* and *Q. oblongifolia*)

Existing mature cactus and succulents

(*Yucca elata*, *Agave palmeri*, and prickly pear)

Desert Willow (*Chilopsis linearis*)

Mountain Mahogany

(*Cercocarpus montanus*)

Ocotillo (*Fouquieria splendens*)

Salvias (*Salvia greggii*, *S. microphylla*, *S. lemmonii*, *S. regla*, *S. coahuilensis*, *S. serpyllifolia* and *S. parryi*)

Manzanita (*Arctostaphylos pungens*)

Kidneywood (*Eysenhardtia orthocarpa* and *E. texana*)

Whiteball Acacia (*Acaciella angustissima*)

Apache Plant (*Guardiola platyphylla*)

Firecracker-Bush (*Bouvardia ternifolia*)

Beebalm (*Monarda fistulosa*)

Gregg’s Mist flower (*Conoclinium greggii*)

Milkweeds (*Asclepias angustifolia*, *A. linaria*, *A. tuberosa*, *A. lemmonii*, *A. nyctaginifolia*, *A. asperula*, *A. subverticillata*, and *A. speciosa*)

Blanketflowers (*Gaillardia pulchella* and *G. pinnatifida*)

Sennas (*Senna wislizeni*, *S. leptocarpa*, and *S. lindheimeriana*)

Sumacs (*Rhus virens* and *R. glabra*)

Beebrush (*Aloysia gratissima* and *A. wrightii*)

Remembering Dr. Pinkava *continued from page 6*

world, including over 1,500 specimens that are vouchered with chromosome counts.

Dr. Pinkava was a notetaking fiend. I have yet to come across reference material in the herbarium lacking his comments and annotations including a falling-apart yet priceless edition of our *Arizona Flora*, laced throughout with his beautiful handwriting. Dr. Pinkava could be described as suffering from Obsessive-compulsive Disorder before the condition was even in the vernacular, and thank goodness for those tendencies because we have many things to show for it — a reprint library with thousands of documents and manuscripts that are not available on the web; a treasury of teaching notes; a priceless collection of textbooks, journals, and rare books; and an herbarium that went from a few thousand specimens in 1964 to over a quarter of a million by the time he retired.

Yes, he was a collector and keen observer — postage stamps and birding were major hobbies for him — but his passion was plants. There are many tales of Dr. Pinkava’s plant-collecting pursuits that need no embellishment to qualify as legendary. He collected everything everywhere. Death Valley? Kino Bay? Top of Mount Baldy? Been there, done that, and got the herbarium specimens. Ah, but these are natural areas. That’s easy; everybody does that. Dr. Pinkava was the king of unconventional collecting, grabbing plants from everywhere he went — farms, lumberyards, mine tailings, gas stations, and all manner of roadsides. He snuck specimens from botanical gardens, zoos, and arboreta; he took flowers from vases on restaurant tables, and pressed centerpieces at weddings; he collected landscape plants from hotel parking lots, private yards, and college campuses; he snatched specimens from highway rest stops, campgrounds, ruins, irrigation ditches, and even bridges. He once collected 26 species while touring on the “Jungle Jim Boat Tour” along Rio San Cristobal in Nayarit, Mexico.

I generated a SEINet map (swbiodiversity.org/seinet/index.php) of his collection sites (which took an extremely long 49 seconds to load) which documents his extensive travels in the Southwest — a complete traverse of Baja and the Mexican mainland, as well as significant collections from California, Colorado, New Mexico, Utah, and if Arizona is your BINGO card, you have a complete blackout.

It is impossible to condense such a remarkable and colorful life of nearly 84 years into a few pages and I don’t pretend to know even a fraction of the details of his life. His wife Mary asked me to deliver a eulogy at his funeral services last July. A eulogy, “a speech or piece of writing that praises someone highly,” could have been written by anyone who knew him since praise was a unanimous sentiment for Dr. Pinkava. He was one of those special people who really did seem to get along with everybody, was sincere and generous with all, and had the utmost integrity in everything he did. He was as committed to his family as he was to his botanical community — a devoted husband, father, and grandfather. On the desk where he typed away DOS commands on a ca. 1977 IBM computer, sat photos of his beloved grandchildren (while the umpteenth ‘Botanist of the Millennium’ plaques were tucked away in boxes). It is a special person who stays married to the same person his whole life, and begins and ends

his career in the same institution. Dr. Pinkava embodied the very best of what it means to be a family man, colleague, teacher, and mentor.

Dr. Pinkava, Don, Donny, Grand papa, will be missed, but he will always be close to our hearts. His spirit remains a tangible presence in the herbarium and his legacy will be honored at the dedication of the “Donald J. Pinkava Herbarium” planned for fall 2018.



Inset 1975 ASU Herbarium specimen of the fern *Acrosticum aureum* collected by Dr. Pinkava during the “Jungle Jim Boat Tour” in Mexico. *Photo courtesy ASU Herbarium.*





Habitat at Home: *Your Opportunity to Bring Birds and Wildlife Up Close and Personal*

by LaNella Gains¹ and Jonathan Horst² Photos courtesy Tucson Audubon Society.

Imagine you're a drop of rain falling in Tucson. Chances are about 30% that you'll land on a road, a roof, or some other impermeable surface, and then, unless you're really lucky, you'll either instantly evaporate or be shunted along a road to a storm drain, into a wash or the river, and out of the region entirely, without having had the chance to make your mark. With the increase of hardscape, the average 12" of annual rainfall is doing less and less to grow the plants which create habitats that keep birds and wildlife in the urban area.

But this story isn't just doom and gloom — hardscape also creates the opportunity to increase the effective rainfall on a property, sometimes to nearly double it! Why is that exciting? It allows for the creation of habitat pockets that have much higher productivity, even if they are less ubiquitous. All that is

required is making sure the available rainfall soaks in, where possible, instead of running off; well, that and getting the appropriate habitat-generating native plants growing to provide food and shelter.

Plants aren't the only components that make for habitat, though. Bats, native solitary bees, and a variety of bird species can benefit from nest boxes. Frequently, lack of nesting locations, especially for species that nest in cavities, is the primary limiting component, especially in recently developed environments that lack large overstory trees and dead snags. How the ground itself is treated can also make a difference as to whether birds and wildlife will show up. Practices that encourage a healthy soil community, that add organic material

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Tucson Audubon Society, 300 E. University Blvd #120, Tucson, AZ 85705, tucsonaudubon.org/habitat.

¹Community Outreach & Program Director. ²Director of Conservation and Research.

BOOK REVIEW *Doug Ripley, Arizona Native Plant Society*

A New Garden Ethic — Cultivating Defiant Compassion for an Uncertain Future

by Benjamin Vogt, 179 pp. New Society Publishers, 2017.

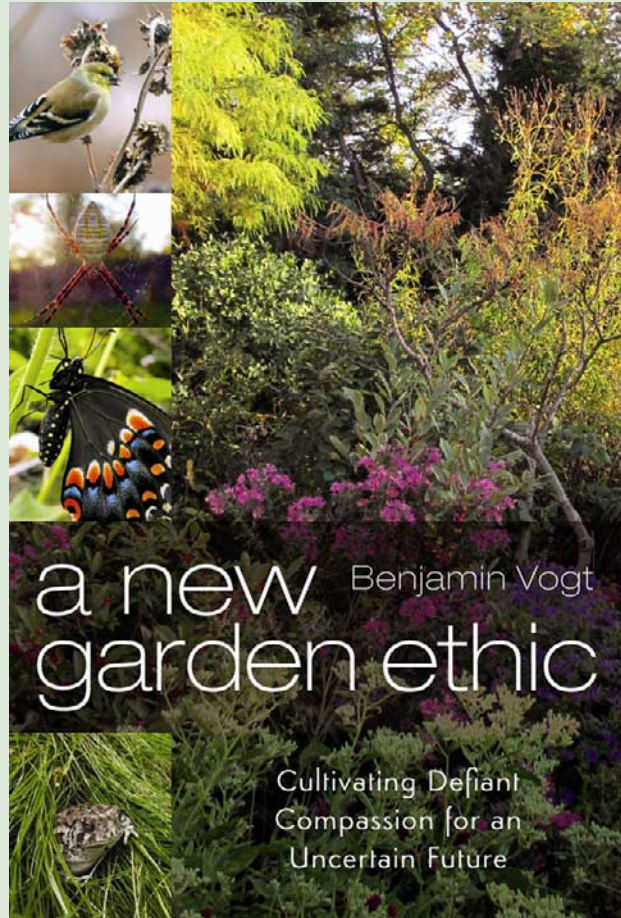
ISBN: 978-0-86571-855-5 (softcover). \$12.78 (Amazon), \$9.99 (Kindle Edition), New Society Publishers: www.newsociety.com

This thought-provoking book presents enlightened arguments for the establishment of native plant gardens in the larger context of addressing major environmental conservation issues. Building on the eloquent “Land Ethic” espoused by Aldo Leopold in his book *A Sand County Almanac* (1948), Vogt proposes the establishment of a new “Landscape Ethic” for open areas and a “Garden Ethic” for our cities and urban gardens.

Vogt argues that the establishment of personal gardens and rural landscapes composed strictly of native plants is crucial for humankind to cope with an often unrecognized, albeit very real, mental suffering from the loss of innumerable species, pristine ecosystems, and general human-caused environmental degradation.

Citing many interesting and convincing references, Vogt explains why strictly planting only native plants, adapted to their environment, is far more responsible and environmentally beneficial than gardening with non-native, poorly adapted species, which offer little or no benefits to the myriad of other ecosystem components and functions. He downplays the notion commonly held by many gardeners and landscapers that gardens are mainly aesthetic constructs, desired mainly for their visual effects. Rather, he argues that gardens provide much more profound benefits such as enhancing biodiversity and ecosystem stability.

A very moving and touching aspect of the book is Vogt’s description of his own evolution as a proponent for native plants. Born in Oklahoma and raised in Minnesota, he eventually settled in Nebraska where he fell in love with the surprisingly important remnants of native prairie that he found. There he established a prairie garden firm to encourage his vision of the “Landscape and Garden Ethics.”



Vogt writes with a clear and lovely eloquence. His book offers an important perspective on gardening with native plants, useful scientific facts about the ecology of native ecosystems, and how native plant gardening may contribute to the salvation of the Earth’s threatened environment. But in a larger sense, this book offers a profound and inspiring look at nature in general and how we can better appreciate and defend it in our lifetimes.



Habitat at Home continued from page 9

into the soil to maintain soil moisture, and that don't poison components of the food web, can all make a big difference.

The Tucson Audubon Society has long advocated the use of native plants and rainwater harvesting to create wildlife habitat in the spaces around people's homes. The recently launched Habitat at Home program supports Tucson residents who want their yards to be a part of something bigger and also provides them the tools to get there. Habitat enthusiasts can create a beautiful, water-saving landscape that helps birds and other wildlife while lowering utility bills and reducing yard maintenance. The program is flexible and allows participants to transform their yards into the habitat that works best for them. One can create a simple hummingbird patio with a few native plants and a bird feeder for ongoing nectar supply, or can go all out with a full plan to maximize habitat creation and value by fully harvesting all available water from hardscapes on the property.

Habitat at Home offers participants basic knowledge on sustainable living practices, which involve the power of choice in what we plant and how we care for our yards. Tucson Audubon Society protects birds, supports birding recreation, and values education involving these areas. Habitat at Home

demonstrates how people, birds, plants, and other wildlife are connected and empowers Tucson residents to take environmental action right in their own backyards. Home-ownership is not required to participate in Habitat at Home, and being a member of the Tucson Audubon Society is encouraged but not necessary.

Registration can be completed on the Tucson Audubon Society website. There is a one-time registration fee of \$35 for members and \$45 for non-members. The registration fee covers the cost of a Habitat at Home sign you can proudly display in your yard, the program workbook, and stickers to display each program level attained on your sign. The curriculum is self-guided and additional resources are available on the Tucson Audubon Society website. Program participants who desire assistance in planning or creating their Habitat at Home can also utilize Tucson Audubon's ecological restoration crew.

For more information on Habitat at Home, please visit www.tucsonaudubon.org/habitat, call 520.209.1808, or email habitat@tucsonaudubon.org.



Top 10 Native Plants for Creating Habitat Around Tucson (and the species they attract)

Trees

Velvet Mesquite, *Prosopis velutina* — Lucy's Warblers and many others

Desert Willow, *Chilopsis linearis* — Hummingbirds

Shrubs

Desert Hackberry, *Celtis pallida* — a wide variety!

Fragrant Beebush, *Aloysia gratissima* — Lesser Goldfinches

Wolfberry, *Lycium* species — Hummingbirds and others

Sub-shrubs

Chuparosa, *Justicia californica* — Hummingbirds

Mexican Honeysuckle, *Justicia spicigera* — Hummingbirds

Penstemon, *Penstemon* species — Hummingbirds

Blanketflower, *Gaillardia* species — Pollinators, Finches

Agave, *Agave* species — Bats, Pollinators



The Arizona Wildlife Federation's Wildlife Habitat Enhancement and Certification Program

by Val Morrill¹ Photos courtesy National Wildlife Federation.

Similar to that offered by the Tucson Audubon Society, but statewide in scope, the Arizona Wildlife Federation (AWF) is teaming with the National Wildlife Federation (NWF) to certify your “garden for wildlife” habitat. With NWF’s Certified Wildlife Habitat program, folks are encouraged to plant native shrubs, flowers, and trees that produce berries, seeds, and sap, to create an eco-friendly environment for birds and wildlife.

NWF and AWF will certify your yard, balcony container garden, schoolyard, work landscape, or roadside greenspace as a Certified Wildlife Habitat. Entire Arizona communities — Ajo and the neighborhood of Sweetwater outside Tucson — have certified. It is fun, easy, and makes a big difference for neighborhood wildlife!

Habitat loss is one of the leading causes of species decline today. When you certify your habitat, a portion of your application processing fee supports AWF’s and NWF’s programs to help stop the decline of habitat for bees, butterflies, birds, amphibians, and other wildlife. [Note: the application fee is waived for schools Pre-K to Grade 12.]

Providing a sustainable habitat for wildlife begins with your plants. That’s why we call it a wildlife habitat garden. When you plant the native species that wildlife depend on, you create habitat and begin to restore your local environment. Adding water sources, nesting boxes and other habitat features enhances the habitat value of your habitat garden for wildlife. By choosing natural gardening practices, you make your yard a safe place for

wildlife and help reverse some of the human-caused habitat destruction that is hurting wildlife everywhere.

The NWF offers the Garden Certification Walk-through Checklist as a tool to help prepare before you certify online. Certification requires elements from the following categories:

Food: Native plants provide nectar, seeds, nuts, fruits, berries, foliage, pollen and insects eaten by an exciting variety of wildlife. Plant shrubs that flower and produce berries. Plants with colorful flowers will especially attract butterflies and hummingbirds. Bird and squirrel feeders can supplement natural food sources. Leaving the seed pods on plants as long as possible helps winter wildlife.

Water: All animals need water to survive and some need it for bathing or breeding as well. Create a water bath by hollowing out the top 2 or 3 inches of a tree stump or placing pebbles or small rocks in a plant saucer, garbage can lid, or other saucer-shaped object.

Cover: Wildlife need places to find shelter from bad weather and to hide from predators. Create a rock garden or strategically place a broken flower pot or roofing tile as a “toad abode.” Leave dead trees or tree branches, which often have hollows birds and wildlife can nest or hide in, and also attract good food sources such as insects, mosses, lichens, and fungi. Native plants that can withstand full sun offer butterflies a place to warm up.

Places to Raise Young: Wildlife need secure places to raise their young, such as nests for birds. Inspect your yard for nooks and

¹Arizona Native Plant Society, Yuma Chapter, bebbia@hotmail.com.

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BOOK REVIEW *Richard Stephen Felger and Susan Davis Carnahan, Herbarium, University of Arizona Tucson, and Arizona Native Plant Society, Tucson Chapter*

Annotated Flora of the Santa Catalina Mountains, Pima and Pinal Counties, Southeastern Arizona

by James T. Verrier, *Desert Plants*, Vol. 33 Number 2: 1–290, January 2018.

Available at the Boyce Thompson Arboretum, \$35 (\$25/10 or more copies) and at select Tucson retail outlets including Desert Survivors Nursery (1020 W. Starr Pass Blvd., Tucson), Plants for the Southwest (50 E. Blacklidge Dr., Tucson), and B & B Cactus Farm (11550 E. Speedway Blvd., Tucson).

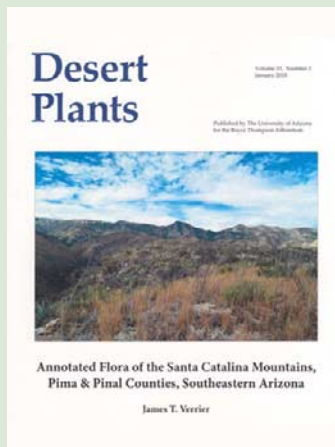
Jim Verrier's flora of the Santa Catalina Mountains is a treasure trove of information and a joy to peruse. History, geology, vegetative communities, and environmental threats pack the introduction. Color photos bring art to a science-based *opus magnum*. We are treated to custom-drawn map overlays and landscape and plant portraits throughout the volume, an annotated checklist of vascular plants, and a grand finale: a 40-page gallery featuring 600 flower photos. The Santa Catalina vascular plant flora, including 1360 taxa in 127 families, is the largest of any southern Arizona range and comprises one-third of the total state flora. Also included is a checklist of 69 non-vascular plants: mosses, hornworts, and liverworts.

The extensive introduction contains analyses of the habitat and vegetation from Sonoran Desert at 2,700 feet to

conifer forests over 9,100 feet: desert scrub, riparian scrub, scrub grassland, oak woodland, riparian woodland, oak-pine woodland, oak-juniper-*Cercocarpus* woodland, pine forest, and mixed conifer forest. There are five topographic maps of the study area with clearly labeled landforms, canyons, and natural springs. Descriptions of the climate, geology, and collection history and collectors are original and succinct, along with analyses of floristic diversity, plants at the edge of their ranges, rare plants, and invasive plants. The Santa Catalina flora is compared to that of neighboring ranges, with discussion of floristic affinities and overlaps among these sky islands.

This is a specimen-based flora, with herbarium vouchers cited for every plant.

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AWF's Wildlife Habitat Enhancement and Certification Program *continued*

crannies that you can enhance as places for bird or bunny nests. Build a bird or bat house. Leave a brush pile or plant dense shrubs to provide cover.

Sustainable Practices: How you manage your garden can have an effect on the health of the soil, air, water, and habitat. These are important for the human community as well as for wildlife! Limit water use by mulching, planting native species, not overwatering, watering early and late in the day, and using drip or soaker



hoses. Avoid use of chemicals such as pesticides. Get rid of invasive non-native plants that crowd out the natives. Use compost rather than inorganic fertilizers. Capture rainwater from the roof.

To get started with your certification program visit: azwildlife.org, click on the *Get Involved* menu, and select *Garden for Wildlife*.





Seasonal stream flow has eroded pink sandstone in Lower Buehman Canyon (2,950 ft) with *Populus fremontii* and *Salix gooddingii*. A grayish layer of limestone can be seen upslope. Invasive fountain grass has colonized the riparian area and is spreading upslope. Photo courtesy Jim Verrier.

Review of *Annotated Flora* continued

The checklist of vascular plants is alphabetical by family, genus, and species within the major plant groups (ferns, gymnosperms, magnoliids, eudicots, monocots). Information about life form, elevational range, distribution, and flowering time is included. You will find information seldom included elsewhere, such as fragrance and flower color, as well as conservation status. About *Vitis arizonica* flowers, Jim writes, “fragrant, complex smell like a blend of sweet soap and lotion, or sometimes highly pungent” (page 188). About *Rumex hymenosepalus*: “Flowers (fragrant in the mid-morning, pungent)... Standing too close to plants in bloom in the late morning can result in a light-headed feeling” (page 165).

Invasive plants are discussed in detail. Information on non-native grasses is extensive, including when first

introduced to the range and how and where they spread. Verrier documents the misguided role of the Soil Conservation Service in introducing non-natives that have become invasive, e.g., buffelgrass (*Cenchrus ciliaris*), Lehmann lovegrass (*Eragrostis lehmanniana*), and Boer lovegrass (*E. curvula*).

Type specimens and publication information are provided for taxa based on specimens from the Santa Catalinas and conservation status is provided for rare or threatened species. Also given are distributions of plants limited to only a few mountain ranges. For example, Rio Grande butterfly-bush (*Buddleja sessiliflora*) is endangered and seriously declining in Arizona where it occurs at only a few sites. (It is common in Mexico.) Verrier tells us the

continued next page

Review of *Annotated Flora* *continued*

yellowish flowers produce strong fragrance like vinegar and chocolate. At Gibbons Springs, “this once thriving population is now represented by a single small plant” (page 161). Some of the 11 orchid taxa have exceptionally narrow distributions, leading to conservation concerns. The stream orchid (*Epipactis gigantea*) was collected in upper Sabino Canyon in 1907 but has not been seen there since, although it was found and documented by Verrier elsewhere on the mountain.

Verrier celebrates botanical explorers. The first were Sara Lemmon and her husband John Gill Lemmon in 1881. Sara A. Plummer married John in 1880 and instead of the usual honeymoon, she elected to go on an expedition west to botanize on the mountain (Mount Lemmon), which was named in her honor by their muleteer, Emerson Oliver Stratton, who commented that John rode a female burro and Sara walked behind. Rather demeaningly, the herbarium labels give “J.G. Lemmon and wife” as collectors, or they omit Sara altogether, although she collected and prepared most of the specimens.

Cyrus Guernsey Pringle collected in the Santa Catalinas from 1881 to 1884. Verrier provides information on botanists who followed. He traces their paths of ascent and describes their camps. Forrest Shreve, and his publications featuring the Santa Catalinas, provide insight to conditions and fieldwork on the mountain. Shreve’s first trip to the mountain was in 1908. He was often accompanied by his wife, Edith Shreve, and other researchers and personnel from the newly established Desert Laboratory on Tumamoc Hill in nearby Tucson. They were intrigued to find the Santa Catalinas rising above their desert backyard. Incredible as it seems today, Daniel T. MacDougal and Shreve introduced the non-native mullein (*Verbascum thapsus*) to the mountain in the name of scientific research. (It has become an invasive species.) Other early collectors include David Griffiths, Daniel T. MacDougal, John James Thornber, and James W. Toumey.

In the early 1960s Robert Harding Whittaker and William Albert Niering initiated their ecological research in the range. Their important contributions are expertly presented. Robert Whittaker and his wife met untimely deaths from cancer due to reckless and deceitful government dealings with radiation at the Hanford Nuclear facility in Washington state.

In 1984, C. David Bertelsen “began the most ambitious botanical project in the range... Finger Rock Trail to Mount Kimball” (page 17). Over 37 years, Dave ascended the trail 1,600 times, documenting plant life and collecting select specimens. Another longtime collector, Joan Tedford, made more than 1,000 collections in the range. Verrier dedicated the flora to Joan, writing, “I consider her to be the inspiration for this study” (page 17). Other recent collectors are also acknowledged.

We see Jim’s incredible knowledge of all 1,360 vascular plants. It’s amazing to watch him identify a few pieces of a dried-up plant in the field as something new for the area. During ten-plus years of fieldwork he hiked, climbed, and crawled to nearly every canyon, nook, cliff, and cranny. Jim drove 25,000 miles to reach trailheads and access points for off-trail hikes, including remote canyons and other sites that had never been inventoried. He acknowledges the mechanics who kept his Jeep running. And he did all of this with a full-time job managing the Desert Survivors Native Plant Nursery in Tucson.

There are a few goofs and typos. A minor quibble is that the plant families are arranged taxonomically in the checklist but alphabetically in the photo gallery. In any flora, there will be taxonomic changes starting the day of publication; science marches on, even botany. This flora is as up-to-date as possible. In addition to exhaustive fieldwork, Verrier also conducted comprehensive studies of specimens from the earliest historic records at the University of Arizona Herbarium.

Congratulations to Kirsten Lake, editor of *Desert Plants*, for producing an expertly designed, professional publication. Quality paper, fine color reproduction for photographs, and a solid binding add up to a handsome volume. Special thanks to underwriters and supporters of *Desert Plants*. Since this work will be sought after for many years, there will be an opportunity for a revised edition as well as a supplement. An index and table of genera and families would be helpful. Online, digital access will soon be available.

The Annotated Flora of the Santa Catalina Mountains is an essential work for anyone interested in the regional plant life and environment. Congratulations, Jim, on a magnificent flora.





Celebrating Native Gardens *by Jennifer Temkin¹ Photos ©Nancy L. Maurer.*

Have you ever noticed the graceful seedheads of Indian ricegrass, backlit by the sun, glowing and shimmering as they are caught by the wind? Or, spied a Black-chinned Hummingbird visiting each individual scarlet flower of a Firecracker penstemon? Or, brushed past a blooming Cliffrose and delighted in its sweet fragrance? There is much to appreciate with the diverse flora of Arizona.

Our native plants are rich in color, texture, structure, form, and fragrance. Native species are sometimes thought of as too wild or difficult, and thus overlooked for the home garden, but there are native plants suitable for all garden design styles. The key is selecting the appropriate species for your home and placing them where they will thrive with little attention once established. If you are looking for inspiration, there is a new botanical garden in Prescott where you can see how native plants may be utilized in a garden setting.

In June 2017, The James Family Discovery Gardens at the Highlands Center for Natural History opened its gates after two

years of construction and four years of design and planning. The intimate eight-acre garden in the Prescott National Forest celebrates the beauty and diversity of plants native to the Central Arizona Highlands. The varied topography of the region contains many distinct habitats — from desert grasslands to montane forests — which are demonstrated throughout the gardens with native plant communities and explained with interpretive signs that communicate the ecological intricacies of each habitat.

A paved path meanders through the gardens, leading visitors past five plant communities, an ethnobotanical area, a children's forest play area, a secret nook, a water harvesting area, and a home landscape demonstration garden. The path is American with Disabilities Act (ADA) compliant and allows nature to be fully accessible to visitors with limited mobility. The garden setting, with benches placed at viewpoints throughout, is a safe environment for a walk by those who may not feel comfortable or adequately experienced to hike the surrounding forest trails.

As an extension of the Highlands Center, The Discovery Gardens carries out the mission to connect people with the wonders of

¹Operations Director, Highlands Center for Natural History, 1375 S. Walker Rd, Prescott, AZ 86303, www.highlandscenter.org.

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Celebrating Native Gardens *continued*

nature through environmental education and to create wise caretakers of the land. The beauty of native wildflowers, grasses, shrubs, vines, and trees are highlighted, which allows the natural design to complement the landscape and inspires visitors to incorporate the use of native plant species in their own gardens. With over 100 species planted in the first season, the Discovery Gardens will grow and evolve over time. Wild seed will be collected each year to be grown out and plants propagated by local nurseries will be purchased to increase the biodiversity of the plant communities represented in the gardens.

Gardening in Arizona is a challenge with our harsh sun, limited precipitation, extreme temperatures, and difficult soils. Many of the non-native ornamental landscape plants commonly sold in commercial nurseries and big box stores do not thrive in these conditions and require large amounts of fertilizer and water to survive. Using the proper native species instead of non-native ornamentals for your home will significantly reduce water, fertilizer, and maintenance requirements. Learning the native species and understanding your local ecology will lead to informed plant choices and design plans that work with nature enabling you to create a resilient, sustainable garden.

While the beauty of flowers is valued by humans for aesthetic appeal, native plants also perform important ecological functions. They hold soils together preventing erosion from wind and rain, filter water percolating into the ground, sequester carbon, and provide food and shelter for a wide range of insects, birds, and other animals. Many homeowners are unaware of the potential in playing an active role by recreating vital habitats in

their own backyards which support the environment. The use of native plants creates a visually dynamic garden for you and your neighbors to enjoy, and establishes a life-sustaining habitat that benefits local wildlife that coevolved with native plant communities.

Often there is a perceived disconnect between people and nature. Our home landscapes are viewed as separate from the wilderness that surrounds the towns and cities in which we live. The increase in urbanization perpetuates this misconception. Urban and suburban development has displaced large patches of native vegetation. Our homes and communities should be considered as part of the patchwork of the natural world. By returning native plants to the home landscape, we can bridge the disconnect and create green corridors throughout our communities, linking fragmented ecosystems while preserving biodiversity.

Public gardens and nature centers are valuable resources in developing a connection with the natural world and learning about the ecology of your region. The Highlands Center for Natural History is a non-profit organization 501(c)(3) offering educational programming for all ages with field trips, nature camps, art classes, naturalist certification classes, an annual native plant sale, and seasonal family festivals. The 80-acre campus in the Prescott National Forest features a native plant botanical garden and miles of hiking trails through a beautiful ponderosa pine woodland.



Using Native Succession Plants for Restoration Projects

by John Scheuring¹

Our gardening and landscaping efforts in the Sonoran Desert area often include the objective of establishing sustainable native plant communities on private and public properties and along roadsides. The transition from disturbed land to native plant communities takes many years and informed and sustained care to “keep the good guys and weed out the bad guys.” The key to success is knowing the plant species that promote long-term native plant establishment.

The Healers

A few native species establish early and actually help heal disturbed soils and facilitate subsequent plant establishment and succession. They establish on poor and sometimes eroded soil, grow prolifically depending on available moisture, and leave behind abundant surface and root tissue after they die. Dead plant tissue serves to cool soil temperatures, diminish evaporation, promote soil wetting of even small rainfall moisture, and provide mulch for both annual and perennial plant germination and establishment.

Notable native healer species are Trailing Four O'clock (*Allionia incarnata*), Fluffgrass (*Dasyochloa pulchella*), Needle Grama grass (*Bouteloua aristidoides*), Sixweeks and Purple Threeawn grasses (*Aristida adscensionis* and *A. purpurea*), and Triangleleaf Bursage (*Ambrosia deltoidea*).

Trailing Four o'clock is a common short-lived perennial species occurring on Sonora Desert bajadas and slopes. It can grow prostrate runners up to 15 feet long when there is adequate moisture in the early fall. Aboveground plant parts wither and die during droughty periods. Although most of its growth occurs in September-October, it has been observed growing, and flowering every month of the year in Finger Rock Canyon in the Santa Catalina Mountains. Trailing Four o'clock readily establishes after dense buffelgrass has been suppressed on slopes and in areas undergoing restoration following landscape disturbance. Its prostrate growth allows unimpeded growth of young perennials, including woody trees and bushes.

¹Tucson Chapter, Arizona Native Plant Society, Chair, AZ Native Plant Society Conservation Committee, jfscheuring@hotmail.com.



Trailing Four o'clock (*Allionia incarnata*). Photos courtesy Max Licher.



Fluffgrass (*Dasyochloa pulchella*). Photos courtesy Max Licher.

Fluffgrass is a bunchgrass occurring extensively across the southern southwestern United States and into central Mexico on sandy and rocky soils up to 6,000 feet elevation. Although it is common, it is largely overlooked due to its diminutive size (less than 15 cm) and modest appearance. Fluffgrass readily establishes on poor and disturbed soils and can thrive with very little rainfall, due to its rapid growth and development. Fluffgrass propagates itself by seed and stolons. After going to seed, aboveground plant parts wither and die but plants quickly recover following even scant rains occurring anytime during the year. Fluffgrass provides considerable mulch for more robust plants, especially the threeawn grasses.

Needle Grama grass is a fast-growing summer annual that commonly appears in the southwestern United States and northern Mexico below 3,000 feet elevation. It germinates abundantly in August and prefers growing on exposed bare soil

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Using Native Succession Plants *continued*

of disturbed or sparsely vegetated landscapes. Rarely does it grow taller than 30 cm. The ground coverage during monsoon rains helps prevent erosion and promotes the germination and growth of other native plants.

Sixweeks and Purple threeawn grasses often occur together during early plant succession, with the dead annual Sixweeks threeawn plants commonly providing mulch and umbrage for the growth of the perennial and taller Purple threeawn grass. Both species are bunch grasses. The Sixweeks threeawn has shallow roots and is usually limited to 40 cm. Purple threeawn is often taller than 80 cm and develops extensive fibrous roots that serve to discourage rainwater runoff, thus retaining moisture, and increasing moisture infiltration in the soil.

Triangleleaf Bursage (*Ambrosia deltoidea*) is the climax subbrush of bajadas of the Sonoran Desert, wherever saguaros grow. It is also abundant in desert grasslands and creosote flats, along with its more drought-hearty related species White Bursage (*Ambrosia dumosa*). It occurs on elevations of 1,000–3,000 ft. Its extensive roots grow up to 3 feet deep. During plant succession, its roots outcompete other species such as Brittlebush (*Encelia farinosa*) for moisture. Triangleleaf Bursage can live over 50 years and is drought deciduous, sloughing off leaves and stems during



Needle Gramma (*Bouteloua aristidoides*).

dry periods and putting on lush growth during periods of adequate moisture. Triangleleaf bursage serves as nurse plants to various cacti, especially Mammallaria species. Its accumulation of litter softens nearby soil, which in turn attracts insect and rodent dwellers. With enhanced soil water infiltration, soil erosion rarely occurs in landscapes well-populated with Triangleleaf Bursage.

Discussion and Conclusions

While hundreds of plant species are found in the Sonoran Desert, there is a handful of very common keystone species that “make the music for the dance,” healing damaged landscapes, and enabling other plant species to establish and thrive. Any

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Above Sixweeks threeawn (*Aristida adgcensionis*).
Photo courtesy Max Licher.

Right Purple threeawn (*A. purpurea*). Photos courtesy Max Licher (landscape) and National Park Service (inset).



SPOTLIGHT ON A NATIVE PLANT *by Bob Herrmann, Arizona Native Plant Society, Cochise Chapter. Photos courtesy the author.*

Pinyon Evening Primrose (*Oenothera podocarpa*, formerly *Gaura hexandra* ssp. *gracilis*)

Oenothera podocarpa is a small shrub that can be easily overlooked when not flowering. I have walked by the plant several times in the Huachuca Mountains not paying any attention to it. That was last year in 2017, a very dry year which made blooms somewhat scarce. Later that year, in November, a small bloom on the plant caught my eye. So I stopped and started photographing the plant. It was challenging to photograph the blooms because of their small size, but well worth the effort. It turned out that this plant had beautiful blooms. This particular plant was approximately 30 inches high by 24 inches wide. The flowers were white to pink and approximately one inch in length. They had four sepals



and four petals with six to eight stamens. The pistil was a beautiful bright red and was longer than the stamens.

Some of the stems were slightly hairy. The leaves were mostly on the lower half of the stem, linear, and finely serrated. Once I viewed the photos on my laptop I had to go back and take more! At that time I observed and photographed several insects pollinating the flowers, including Mexican Yellow Butterfly, two species of Hoverflies, and a day-flying moth.

A member of the Evening Primrose family (Onagraceae), the species was described by E. O. Wooten and P.C. Standley in their *Flora of New Mexico* (1915). It has a fairly limited distribution,

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Pinyon Evening Primrose *continued*

having been collected from a few locations in southeastern Arizona, southern New Mexico, and northern Sonora, Mexico. I photographed the plant illustrated here in the Huachuca Mountains at about 6,500 feet elevation from November 11 through December 12, 2017.

This plant has taught me to take a little closer look at seemingly uninteresting plants not worthy of

photographing. I won't pass by this plant again without a nod and a slight smile on my face.



Reference

Wooten, E.O. and P.C. Standley. 1915. *Flora of New Mexico*. Contributions from the United States National Herbarium (Vol. 19). United States National Museum, Smithsonian Institution, Washington, DC



Using Native Succession Plants

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effort to harmonize landscapes with surrounding desert needs to encourage these and similar “healer” species to thrive. The best approach is to recognize the key healer species and favor their growth by excluding invasive species and weedy natives. Given a chance, these native healers will do their job!

Due to seed collection and production difficulty, neither Trailing Four O'clock nor Fluffgrass are available from desert seed providers. Seed of all the other above mentioned species can be obtained from large commercial seed businesses.



Triangleleaf Bursage (*Ambrosia deltoidea*).

Frank Rose

In Arizona, the plant community is an especially complex concept. It may be due to the plants around us that make up the natural environment, or it may be due to a special subset of those plants, or it may be due to the people who love, grow, or study those plants. There are a lot of interconnections. In southern Arizona, it's hard to imagine someone more hard-wired to that plant community than Frank Rose.

Frank and his wife Louise moved to Arizona in 1982 where Frank served for 21 years as the pastor of Sunrise Chapel on the east side of Tucson. He retired in 2003, and has been incredibly busy ever since. As a retiree, he has authored three field guides to Arizona plants, has a fourth guide in publication, and will be releasing a 5th field guide at the end of this year. In addition, his newest project is a visual guide to the Santa Catalina Mountains, which includes many of his beautiful paintings of the range along with short essays about each location/painting. Frank has also authored eight books on spirituality. He continues to photograph and paint plants and landscapes. His paintings may be seen at various galleries and shows in the southwest.

In his retirement, Frank became interested in macro-flower photography of plants in the Santa Catalina Mountains. This provided an ideal opportunity for him to learn the taxonomic identities of all the plants on the mountain, while having fun exploring this beautiful range. One day while exploring Molino Basin, he had a random encounter with Joan Tedford. She was searching for a historic population of *Clitoria mariana* (an elusive plant in the Santa Catalinas), and found Frank hunched over a subject-flower trying to get both the focus and the light right for his photograph. Joan had spent the past decade learning plants on the mountain and had already generated checklists for the Mt. Lemmon Highway and Sabino Canyon. This new friendship proved mutually beneficial, as Joan collected and identified the specimens, and Frank was constantly exploring the mountain finding plants that looked different to him. They became a dynamic botanical team. Over a decade later, he had collected photos of a substantial portion of the common plants of the Santa Catalinas in the process. A book was born: *Mountain Wildflowers of Southern Arizona*. A few years later, he released a follow-up book, entitled *Mountain Trees of Southern Arizona — A Field Guide*.

I remember that Joan Tedford told me that I needed to meet her friend, Frank, and that he had wanted to meet me.



Photo courtesy Doug Ripley.

Excited to make his acquaintance, I took a day off of work and went to Joan's Thursday plant hike on the mountain. That day, we were wandering in an old-growth forest in upper Sabino Canyon. Frank made the first parasitic orchid sighting of the day and was so excited that he literally jumped up and down. The image of a young and vital 80-year old man expressing such excitement over a parasitic orchid was striking, and I knew that I had just met an amazing new friend.

It is fitting that Frank became interested in botany as his whole retirement has developed organically. From the first chance meeting with Joan, he developed into a co-leader of Joan's Thursday plant hikes on "the mountain," leading a cadre of plant lovers through various plant hikes during the good-weather seasons of the Santa Catalinas. This didn't so much distract him from photography as inspire him. He purchased a more powerful macro-lens, and came to love it almost as much as he did the tiny flowers he photographed with it. From that came the idea for an "invisible flowers" field guide, and later a grasses field guide, both currently in press with his son Owen's new self-publishing company.

Frank's roots in the plant community run so deep he has even performed a marriage ceremony for two botanists (my wife Iris and me!) in a beautiful conifer and aspen grove on Mount Lemmon in the Santa Catalina Mountains. He is both a resource for and a student of plants. And beyond his love and knowledge of the plants of the Santa Catalinas, Frank's youthful joy, positivity, and passion are contagious to all who are privileged to spend time with him.





Tucson Cactus & Succulent Society to the Rescue

by Bill Thornton¹ Photos courtesy Tucson Cactus and Succulent Society.

Southern Arizona conservationists have worked tirelessly to protect our biologically rich Sonoran Desert from the relentless march of sprawl development. We've scored some notable successes, including the landmark Sonoran Desert Conservation Plan that brought developers and conservationists together to set aside lands deemed worthy of long-term protection and steer new development toward less environmentally sensitive areas.

Even so, development continues, albeit at a slower pace than at the peak of the building boom. Like it or not, desert plants will still be cleared for new homes, schools, roads, commercial developments, pipelines, and powerlines.

Recognizing this reality, the Tucson Cactus and Succulent Society (TCSS) conducted its first cactus rescue in 1999. Since then, 392 volunteers have salvaged nearly 84,000 cacti, agaves, ocotillos, and yuccas from more than 100 sites throughout the extended Tucson area. Through this program, they have served as a wonderful source of native plants for local gardeners and landscapers.

The 1,000+ TCSS members are ever-watchful for signs of new development that could provide rescue opportunities. Rescue planners are notified and contact project managers to secure permission to salvage plants before construction begins.

Prior to each rescue, project coordinators visit the site to mark boundaries and determine which plants if any are to be left in place. A site-specific permit is then obtained from the Arizona Department of Agriculture along with a sufficient number of native plant tags for the plants to be salvaged. Volunteers are notified by email of the time and location of the next rescue.

After a safety briefing, rescue crew members, equipped with picks shovels and wheelbarrows, fan out across the site in search of salvageable plants. Prior to digging, the south side of each plant is marked to ensure proper directional orientation when replanting. Saguaros are wrapped with carpet scraps to protect plants and rescuers' hands.

After digging, plants are moved to a staging area to be tagged and loaded for transport to our holding area. Unless destined for a public park, each plant must bear the proper Arizona Native Plant tag before leaving the site.

When sufficient inventory is available, rescue plant sales are conducted at our holding area. Plants are priced to recover the cost of permit tags with a small markup added to fund our education and conservation programs.

The TCSS cactus rescue program is a win for all. Plants that would otherwise be destroyed are given a new lease on life. Low

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¹Tucson Cactus and Succulent Society, P.O. Box 64759, Tucson AZ 85728-4759, tcss@tucsoncactus.org.



Tucson Cactus and Succulent Society to the Rescue *continued*

water use plants are made available to the public at reasonable cost. Instruction sheets are provided with each sale. With proper care, survival rates are high.

The cactus rescue program could not exist without the support of the development community. Project managers are becoming aware that desert plant salvage is good business and keep us in the loop for future rescue opportunities.

Tips for buyers:

Beware of Arizona native plants offered for sale bare root without native plant tags. An increased emphasis on conserving our dwindling water supply has created a strong demand for desert plants, and opportunities for plant poachers. Risks are small and potential profits large. Poachers are in it for the quick buck and may not know or care about proper transplanting

techniques. Unsuspecting buyers can face prosecution for violations of the native plant law, and be left with dead plants and empty wallets.

Many reputable nurserymen offer high-quality desert plants and good advice on selection and care. In southern Arizona, refer to the member business directory on the TCSS website and the Arizona Native Plant Society website. In the Phoenix area, see the Central Arizona Cactus and Succulent Society website. Other good sources include the Desert Botanical Garden, the Tucson Botanical Garden, and the Arizona Sonora Desert Museum.

Check the TCSS website (www.tucsoncactus.org) for news of future sales.





Desert Survivors Native Plant Nursery — An Outstanding Source of Native Plants for Arizona Gardeners and Landscapers

by Jim Verrier¹ Photos courtesy Doug Ripley.

Introduction

Locating sources for native plant gardening and landscaping can sometimes be a challenge, especially when looking for local varieties, subspecies, or genotypes. Fortunately, there are a number of nurseries throughout the state that sell at least some native plants as part of their overall inventory. Other sources, such as the Tucson Cactus and Succulent Society plant rescue program (see previous article), botanical gardens, and nature centers are also available. A listing of nurseries and other retail establishments throughout Arizona offering native plants compiled by the Arizona Native Plant Society is provided at the end of this article.

The Desert Survivors Story

Perhaps the very best source of native Arizona plants is Tucson's Desert Survivors Native Plant Nursery. The nursery was founded in 1981 by Dr. Joseph Patterson, a Tucson

psychologist who worked with disabled adults who lived in institutions during the 1970s. He recognized the need for meaningful activities and occupations to provide dignity and purpose in their lives. In the late 1970s, Tucson residents became interested in native plants that were both attractive and had low water needs. Starting with just five employees with disabilities, seeds were collected from the desert, grown out, and sold from a Grant Road storefront. The concept was to create a work program for adults with developmental disabilities in a horticultural therapy setting involving native plants and ultimately, to get these individuals out of the institutions to which they were confined.

In the early 1990s, Peter Gierlach (aka Petey Mesquitey and the lead singer for the famed Dusty Chaps Band) was hired as nursery manager. He played a major role in moving the nursery's vision towards a dedicated and specialized native plant operation. By the early 2000s, Desert Survivors had stopped selling non-native plants altogether and began to focus solely on growing bioregional plants found within an

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Desert Survivors Native Plant Nursery *continued*

approximate 500-mile radius of Tucson. Today, Desert Survivors is the most botanically diverse native plant nursery in the state, and cultivates well over 800 species of native plants, mainly on a small four-acre lot.

The nursery provides jobs for over 45 adults with developmental disabilities and also has several “mobile work crews.” In recent years, Desert Survivors has been working with the Pima County Natural Resources Parks and Recreation Department to maintain the Santa Cruz River Park. One of the newer jobs has been working with the Tucson Downtown Alliance to maintain containers of native plants throughout downtown Tucson.

Plant Nursery

Desert Survivors Native Plant Nursery is located on the banks of the Santa Cruz River in Tucson. Our plants are native to the Sonoran, Chihuahuan, and Mohave deserts and adjacent mountain ranges. Our primary focus is growing plants that are native to southeastern Arizona. Over the years, plants of various desert origins have been offered at Desert Survivors, but more recently we have decided to grow only plants indigenous to our region. Native plants give us a sense of place, and are important in supporting native pollinator populations and other fauna.

Arizona is the third most biodiverse state in the United States with over 4,500 species of vascular plants. This gives us a huge number of plants to grow and offer to our customers. In fact, over 600 species are native to the Tucson Mountains, over 1,000 species are native to the Rincon Mountains, over 1,350

species are native to the Santa Catalina Mountains, and over 1,100 species are native to the Santa Rita Mountains. And this is just the diversity found within 50 miles of the Nursery. The plant diversity in southeastern Arizona alone is estimated at 2,200 species.

The nursery’s inventory includes a wide selection of trees, shrubs, subshrubs, grasses and vines, all of which are presented in our online plant list. www.desertsurvivors.org/plant-lists.html. This database is an overall look at the plants we grow and offer seasonally; meaning not everything on the list is available year-round. It is challenging to grow over 800 species on a small piece of property, but the challenge is half of the fun.

Desert Survivors is also starting a small research arm. Some of our current projects include an experimental water harvesting project, production and experimentation with biochar (en.wikipedia.org/wiki/Biochar), biological soil crusts, cultivation experiments with native soil microbiome inoculations, and some novel buffelgrass research.

Conclusion

Desert Survivors Native Plant Nursery is a unique and extremely valuable source of native plants for southeastern Arizonans. Our hope is to set a trend that will make it easier for gardeners to find good native plant choices to fit their needs. We are located at 1020 W. Starr Pass Blvd., Tucson, AZ 85713. If you want to “Grow Native,” come see us!



Sources for Native Plants in Arizona

The Arizona Native Plant Society has compiled the following directory of nurseries that offer at least some native plants.

Cochise County

Spadefoot Nursery Currently offering native plants at the Bisbee Farmer's Market and pop-up sales sites announced via spadefootnursery.com. Chihuahuan Office serving Cochise County, email only at SpadefootNursery@gmail.com

Coconino County

The Arboretum at Flagstaff 4001 S. Woody Mountain Rd., Gila, AZ 86001. 928.774.1442, thearb.org

Flagstaff Native Plant and Seed 400 E. Butler Ave., Flagstaff, AZ 86001. 928.773.9406, nativeplantandseed.com

Warner's Nursery & Garden Center 1101 E. Butler Ave., Flagstaff, AZ 86001. 928.774.1983, warnernursery.com

Gila County

Plant Fair Nursery 3497 AZ-260, Star Valley, AZ 85541. 928.474.6556, plantfairnursery.com

Graham County

Gila Native Plant Nursery 1651 Discovery Park Blvd., Safford, AZ 85552. 928.348.4462, gwpaz.org/nursery

Maricopa County

Arid Zone Trees 9750 E. Germann Rd., Mesa, AZ 85212. 480.987.9094, aridzonetrees.com

Arizona Cactus Sales 1619 S. Arizona Ave., Chandler, AZ 85248. 480.963.1061

Desert Botanical Gardens 1201 N. Galvin Parkway, Phoenix, AZ 85008. 480.941.1225, dbg.org

Desert Foothills Gardens Nursery 33840 N. Cave Creek Rd., Cave Creek, AZ 85331. 480.488.9455, desertfoothillsgardens.com

Desert Tree Farms 2744 E. Utopia Road, Phoenix, AZ 85050. 602.569.6604. Wholesale only.

Granite Seed and Erosion Control 6682 S. Dateland Dr., Tempe, AZ 85283. 480.355.1695, graniteseed.com

Mountain States Wholesale Nursery 13803 W. Northern Ave., Glendale, AZ 85307. mswn.com

Native Resources International, Inc. 1540 W. Happy Valley Rd., Phoenix, AZ 85085. 623.869.6757, nativeresources.com

Phoenix Desert Nursery 3525 E. Southern Ave., Phoenix, AZ 85040. 602.305.9275, phoenixdesertnursery.com

Shady Way Garden 566 W. Superstition Blvd., Apache Junction, AZ 85220. 480.288.9655

Western Tree Company 3401 E. Southern Ave., Phoenix AZ 85040. 602.243.6125, westerntree.com

Wild Seed, Inc. PO Box 27751, Tempe, AZ 85282. 602.276.3536

Pima County

Arid Adaptations 10931 W. Mars Rd., Tucson, AZ 85743. 520.289.4083

B&B Cactus Farm, Inc. 11550 E. Speedway Blvd., Tucson, AZ 85748. 520.721.4687, bandbcactus.com

Bach's Greenhouse Cactus Nursery 8602 N. Thornydale Rd., Tucson, AZ 85742. 520.744.3333, bachscactus.com

Civano Nursery 5301 S. Houghton Rd., Tucson, AZ 85747. 520.546.9200 x16, civanonursery.com

Desert Survivors Native Plant Nursery 1020 W. Starr Pass Blvd., Tucson, AZ 85713. 520.884.8806, www.desertsurvivors.org

Harlow Gardens 5620 E. Pima St., Tucson, AZ 85712. 520.298.3303, harlowgardens.com

Kelly Green Trees 14399 N. Wentz Rd., Marana, AZ 85653. 520.682.2616

Landscape Cacti 7711 W. Bopp Rd., Tucson, AZ 85735. 520.883.0020, landscapecacti.com

Magic Garden Nursery 7909 E. 22nd St., Tucson, AZ 85710. 520.885.7466, magicgardennursery.com

Nighthawk Natives Nursery 2944 N. Castro Ave., Tucson, AZ 85705. 520.981.7136, Nighthawknatives@gmail.com

Plants for the Southwest 50 E. Blacklidge Dr., Tucson, AZ 85705. 520.628.8773, lithops.net

Rillito Nursery & Garden Center 6303 N. La Cholla Blvd., Tucson, AZ 85741. 520.575.0995, rillitonursery.com

Silverbell Nursery 2730 N. Silverbell Rd., Tucson, AZ 85745. 520.622.3894, silverbellnursery.com

Spadefoot Nursery Currently offering native plants at farmer's markets and pop-up sales sites announced via spadefootnursery.com. Sonoran Office serving Pima County, 520.909.3619, SpadefootNursery@gmail.com

Starr Nursery 3340 W. Ruthann Rd., Tucson, AZ 85745. 520.743.7052, starr-nursery.com

Tohono Chul Park 7366 N. Paseo del Norte, Tucson, AZ 85704. 520.742.6455, tohonochulpark.org

Tucson Botanical Gardens Nursery 2150 N. Alvernon Way, Tucson, AZ 85712. 520.326.9686, tucsonbotanical.org

Tucson Cactus and Succulent Society PO Box 64759, Tucson, AZ 85728. 520.256.2447, tucsoncactus.org

Tucson Plant Materials Center 3241 North Romero Rd., Tucson, AZ 85705. 520.292.2999, nrcs.usda.gov/wps/portal/nrcs/main/plantmaterials/pmc/west/azpmc

Wildlands Restoration 2944 N. Castro Ave., Tucson, AZ 85705. 520.882.0969, garyberni@aol.com

Pinal County

Boyce-Thompson Arboretum 37615 U.S. Highway 60, Superior, AZ 85273. 520.689.2723, arboretum.ag.arizona.edu

Santa Cruz County

Borderlands Restoration Network 42 San Antonio Road, Patagonia, AZ 85624. borderlandsrestoration.org/native-plant-materials.html

Yavapai County

Arizona Botanical Gardens 1011 Wildhorse Ln., Clarkdale, AZ 86324. 928.634.2166, azbotanicalgardens.com

Highlands Center for Natural History 1375 Walker Rd., Prescott, AZ 86303. 928.776.9550, highlandscenter.org

Native Garden 602 Montezuma St., Prescott, AZ 86303. 928.237.5560. nativegardenprescott.com

Watters Garden Center 1815 W. Iron Springs Rd., Prescott, AZ 86305. 928.445.4159, wattersgardencenter.com



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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 Flagstaff, Phoenix, Prescott, Cochise County (Sierra Vista), Tucson, or Yuma, or may choose not to be active at a chapter level and simply support the statewide organization.

For more information, please drop us a line, visit www.aznativeplantsociety.org, or get in touch with one of the chapter contacts below:

Cochise: Doug Ripley, 520.909.3132,
jdougripley@gmail.com

Flagstaff: Dorothy Lamm, 928.779.7296

Phoenix: Kara Barron and Steve Blackwell,
kbarron@dbg.org, sblackwell@dbg.org,
480.941.1225

Prescott: Vacant

Tucson: Anthony Baniaga, 858.822.8548,
abaniaga@email.arizona.edu

Yuma: Valerie Morrill, aznpsyuma@yahoo.com

Membership Form

Name:

Address:

City/State/Zip:

Phone/Email:

Chapter preferred: State only Cochise County Flagstaff
 Phoenix Prescott Tucson Yuma

Enclosed: \$15 Student \$75 Commercial
 \$30 Individual \$100 Plant Lover
 \$35 Family \$500 Patron
 \$50 Organization \$1,000 Lifetime

Mail to:

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