

MARCH 2018

Plants of
MARICOPA COUNTY

An Introductory Guide to Common, Unusual,
and Problematic Species of the Sonoran Desert

CAZCA
CENTRAL ARIZONA CONSERVATION ALLIANCE



**DESERT
BOTANICAL**
garden



COMPILED AND EDITED BY

Carolyn Flower

Conservation Alliance Outreach Coordinator
Desert Botanical Garden

Stacie Beute

Conservation Alliance Program Director
Desert Botanical Garden

ACKNOWLEDGEMENTS

Thanks to the following Desert Botanical Garden staff and volunteers for their guidance and expertise

Kim McCue, PhD

*Director of Research,
Conservation and Collections*

Wendy Hodgson, M.S.

Senior Research Botanist

Andrew Salywon, PhD

Research Botanist

Kara Barron, M.S. student

Restoration Specialist

Cass Blodgett

Volunteer Field Botanist

ABOUT DESERT BOTANICAL GARDEN

For more than 70 years, Desert Botanical Garden has been teaching and inspiring visitors from the local community and around the world, providing research, exhibits and more designed to help us understand, protect and preserve the desert's natural beauty. Its commitment is to advance excellence in education, research, exhibition and conservation of desert plants of the world with emphasis on the Southwestern United States.

ABOUT THE CENTRAL ARIZONA CONSERVATION ALLIANCE

Comprised of more than sixty partnering and collaborating organizations, the Central Arizona Conservation Alliance (CAZCA) is a public-private-community partnership leading community engagement, coordination, and strategy to protect, restore, and promote desert open spaces in the Central Arizona region. It is an initiative of Desert Botanical Garden supported by the Nina Mason Pulliam Charitable Trust and CAZCA partners.

Photo by Osha Gray Davidson

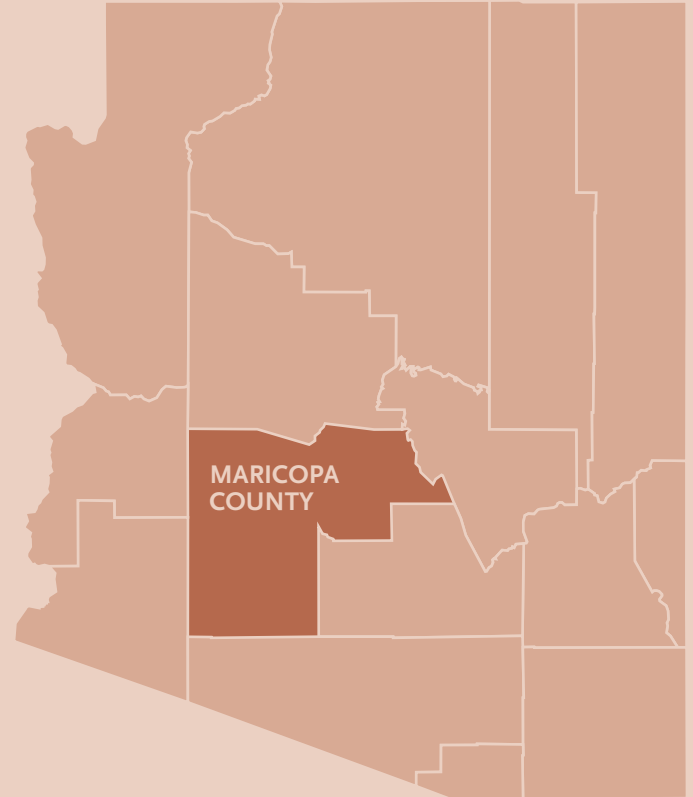




Photo by Steve Jones

TABLE OF CONTENTS

Map	7
Introduction	8
Pollinator Plant Species	10
Ten Rare Species	42
of Maricopa County	
Invasive Species.....	64



INTRODUCTION

This pocket guide introduces novice and expert naturalists alike to a diverse variety of native and non-native plant species that occur within Maricopa County. Spanning nearly 6,000,000 miles, Maricopa County sits in the northeastern reaches of the Sonoran Desert, a singular and fascinating place on the planet, rich in diversity of people, landscapes, flora, and fauna.

A transition region between tropic and temperate zones, between the Sierra Madre and Rocky Mountains, and between the Gulf and Pacific coasts, the Sonoran Desert is thought to have the greatest biological diversity of any desert in North America, and perhaps even the globe.

In this guide, plants are grouped as **pollinator plants**, **rare plants**, and **invasive plants**. The first section highlights a small selection of pollinator plants that though common, are crucial to sustaining Sonoran Desert ecosystems and human life. The second section highlights ten of the thirteen of the rarest plants found in Maricopa County. Rare plants are species found in low numbers, have few populations, and/or live in a small range of habitat. Last, but certainly not least, the third section of this guide focuses on non-native invasive found in Maricopa County. With one exception (*Oncosiphon pilulifer*), the invasive species listed here are some of the region's most concerning to natural resources managers and conservation scientists as they are known to produce severe or substantial ecological

impacts in Sonoran Desert ecosystems. Invasive plants outcompete native plants for resources, alter plant community structure, and potentially increase fire frequency and intensity.

A Note About *Oncosiphon Pilulifer*

O. pilulifer was selected for inclusion in this guide because it exemplifies a common challenge for land managers and decision-makers in rapidly changing landscapes—that is, what do we do when we are presented with uncertainty?

Although the *O. pilulifer* has naturalized in disturbed areas throughout Maricopa County and other regions, it has yet to be officially classified as invasive. Scientists lack critical information on the plant's reproductive strategies, seed dispersal mechanisms, and distribution. Researchers also know very little about its impact to fire regime.

O. pilulifer presents a conundrum—do we dedicate our very limited financial and human resources to managing for this plant now? Do we wait for the science? Do we monitor the situation? These are the challenges managers and decision-makers grapple with in a rapidly changing region on a rapidly changing planet.

POLLINATOR PLANT SPECIES

At more than 4,000 species, the Sonoran Desert is one of the richest places on the planet for native flowering plants. Most of those plants depend upon pollination by native bees, but some have adaptations that attract other animals such as beetles, flies, wasps, butterflies, moths, birds, and bats.

The coevolution of plants and their pollinators is one of nature's most incredible stories of adaptation and specialization. Some plants and pollinators have intimate, sometimes obligate associations (for example, many native bees are specialists that pollinate a single plant species or genus) while others are less picky generalist species (honeybees and lots of Sonoran Desert plants).

Regardless of just how dependent a given relationship is, by and large, plants and pollinators depend on one another. If we were to lose a pollinator species, we stand to lose its associated plant(s). And the reverse is also true—if we lose a plant species we stand to lose pollinator(s). Take milkweed as an example. Once ubiquitous across the landscape, milkweed declined 21% from 1995 to 2013 due to extensive use of herbicides in roadside management practices and agriculture. Milkweed is the only plant on which the iconic monarch butterflies will lay their eggs, and it



Photo by Liz Makings

is the primary food source for monarch caterpillars. The loss of milkweed and monarch habitat became so severe that by 2014, monarchs had declined by 90%.

In addition to protecting rare, unusual, or threatened species, comprehensive conservation efforts aim to “keep common species common.” These abundant plants, animals, and microbes play crucial roles in ecosystems, impacting and interacting with large numbers of other species. Some are even considered “keystone species,” species on which other species largely depend, and whose decline or absence would drastically impact the entire ecosystem.

Many of the pollinator plant species featured in this guide are plants we see every day, while others are more unusual. Either way, pollinator plants are crucial to baseline functioning and processes of Sonoran Desert ecosystems.

WHITESTEM MILKWEED

Asclepias albicans

Dogbane Family (*Apocynaceae*)

Perennial subshrub, to 10 ft. tall. A reed-like, erect plant that branches at its base with nearly leafless stems. Umbels of flowers are pale cream to white. Leaves are long and thread-like.

The plant's pale, waxy coating reflects light and heat, a feature that helps to conserve water. Tarantula hawks and other wasps are important pollinators. Female monarchs search for milkweed to lay their eggs, and monarch caterpillars feed on *Asclepias*. There are twenty-nine species of *Asclepias* in Arizona.

BLOOMS September to June

HABITAT/ELEVATION To 2500', prefers dry, rocky places, grows in southern and western part of Arizona (from Lake Havasu to Yuma), but can grow as far east as the Estrella Mountains



Photos by Steve Blackwell

DESERT MILKWEED

Asclepias subulata

Dogbane Family (*Apocynaceae*)

Perennial, slender twiggy subshrub to 4 ft. tall with erect, wand-like stems in clusters branching above. Plants produce umbels of flowers that are yellowish to cream, in clusters, followed by a smooth, tapered seed pod. Mostly leafless on mature plants. New growth has 2 in. long leaves, opposite, linear.

Largely a plant of the low desert, *A. subulata* has numerous, erect gray-green stems that produce a milky sap. Tarantula hawks and other wasps are important pollinators. Female monarchs search for milkweed to lay their eggs, and monarch caterpillars feed on *Asclepias*. There are twenty-nine species of *Asclepias* in Arizona.

BLOOMS April to October

HABITAT/ELEVATION Dry mesas, slopes, flats, and sandy washes, below 3000'



Photos by Steve Jones

DESERT BROOM

Baccharis sarothroides

Sunflower Family (*Asteraceae*)

Perennial shrub distinguished by its broomlike growth. *B. sarothroides* grows to about 6.5–8 ft. tall. Stems are numerous, green and often nearly leafless. Leaves are alternate and few. Male and female flowers occur on separate plants (dioecious). Flowers are solitary on branch tips, and they are white/yellowish-green in the middle, with yellowish slightly thin margins and rounded tips.

B. sarothroides is important for erosion control. Gila River Pimas also made the branches into brooms. The flowers attract hordes of butterflies and other insects such as bees, flies, and wasps, making it an essential pollinator plant. The branches also create ideal shade to protect young cacti and other plants from the full desert sun. There are ten species of *Baccharis* in Arizona.

BLOOMS September to December

HABITAT/ELEVATION *B. sarothroides* is found in sandy-gravelly washes, watercourses, shallow drainages, flats, low hills, roadsides, and sometimes in saline soil; 1000' to 3500'



Photos by Steve Jones

PINK FAIRYDUSTER

Calliandra eriophylla

Pea Family (*Fabaceae*)

Perennial deciduous shrub to 4 ft. tall with low-growing, intricate branches. Flowers are quite showy, each puff containing several flowers with pronounced stamens, white at base and tipped with pink. “Calliandra” means “beautiful-stamens.” Leaves are dark green and fern-like.

Like nearly all plants in the legume families, *C. eriophylla* fixes nitrogen in the soil through symbiotic actions of bacteria harbored in the root tissue. The plant has several pollinators, including bees, flies, and butterflies thanks to its copious production of nectar. There are two species of *Calliandra* in Arizona.

BLOOMS Any time, but primarily October to May

HABITAT/ELEVATION Open hillsides, washes, washes, and arid grasslands below 5000’



Photos by Steve Jones

BRITTLEBUSH

Encelia farinosa

Sunflower Family (*Asteraceae*)

Perennial, round, shrubby plant, to 4 ft. tall. Flowers are 2–3 in. across, bright yellow, sunflower-like, and bloom in branched clusters well above the foliage. When in full-flower, brittlebush is a solid hemisphere of brilliant yellow. Leaves are greenish-gray to silvery gray, wooly, alternate, and clustered near stem tips.

Brittlebush exudes compounds that when washed from the leaves and deposited in the soil, inhibit germination of other plants (allelopathy). This helps to ensure adequate resource availability. Stems were chewed by Native Americans and used as incense in the churches of Baja California. It is an important butterfly nectar plant and heavily used by a myriad of bees, beetles, and other species. Brittlebush is one of the Sonoran Desert's most dependable pollinator plants. There are four species of *Encelia* in Arizona.

BLOOMS November to May (in frost-free areas)

HABITAT/ELEVATION Below 3000' in slopes, along washes, and on flats



Photos by Steve Jones

SPREADING FLEABANE

Erigeron divergens

Sunflower Family (*Asteraceae*)

Annual to short-lived perennial, to 2 ft. tall. It has a highly variable growth form, ranging from bushy and dense, to upright with few stems, to decumbent. Flower heads are showy with white to purple rays and yellow discs, usually numerous and located on the ends of long leafy stalks. Leaves alternate along the stem, often with a cluster of basal leaves.

Used by butterflies, bees, and beetles alike. *E. divergens* is possibly the most common *Erigeron* species in the southwest. There are over two dozen species of *Erigeron* in Arizona.

BLOOMS February to September

HABITAT/ELEVATION Dry places, common on roadsides, 1000' to 9000'



Photos by Steve Jones

CALIFORNIA BUCKWHEAT

Eriogonum fasciculatum

Buckwheat Family (*Polygonaceae*)

Low, spreading perennial shrub to 3 ft. tall and 6 ft. wide with multiple, compact branches. Grayish in color and hairy. Flowers rise from a tiny stalk, are very small white to pink, umbel-shaped, in round heads. Leafy stems and shredding bark, stems and leaves are velvety-hairy.

California buckwheat is a keystone species for sagebrush scrub ecosystems and is a favorite of native bees, honeybees, and butterflies. It is a great pollen source when other resources are low and is a butterfly larval host plant.

Beekeepers plant buckwheat because it produces a dark and distinctively flavored honey. *E. fasciculatum* is the most common shrubby buckwheat in the region, but there are over fifty species of *Eriogonum* in Arizona.

BLOOMS Late spring and sometimes again in late summer and fall

HABITAT/ELEVATION Rocky, dry slopes, flats, and along washes 1000' to 4500'



Photos by Steve Jones

DESERT LAVENDER

Hyptis emoryi

Mint Family (*Lamiaceae*)

Aromatic, evergreen, perennial shrub to 15 ft. tall, a silvery mat of soft velvet fuzz covers new leaves and stems. Leaves are gray-green, oval, and opposite. Stems are square in cross section. Common to the mint family, desert lavender emits a pleasant aroma from crushed leaves. The flowers are violet-blue, in clusters at the leaf axils.

Desert lavender is an important butterfly larval host plant and nectar source for many butterflies especially the small blues, hairstreaks (*Lycaenidae*) and metalmarks (*Riodinidae*). It is also a valuable bee plant, dependable even in drought. People use desert lavender to create tinctures and tea. There is only one species of *Hyptis* in Arizona.

BLOOMS Year-round

HABITAT/ELEVATION Desert washes and dry, rocky slopes below 5000'



Photos by Steve Jones



CHUPAROSA

Justicia californica

Acanthus Family (Acanthaceae)

Small, grayish-green, perennial shrub to 6 ft. tall, generally leafless. When leaves are present, they are broad, egg-shaped, and covered with short downy hair. Leaves drop during drought or cold. The flowers are bright red to orange or sometimes yellow, to 1.5 in. long, and tubular, flaring at the tip.

A favorite with hummingbirds ("chuparosa" is Spanish for "hummingbird") the plant is also attractive to bees, butterflies, and other birds. Hummingbirds are particularly drawn to chuparosa's color (known in ecology as its "pollination syndrome"), and their beaks are perfectly suited for drawing nectar and pollinating the plant's tubular blossoms. There are three species of *Justicia* in Arizona.

BLOOMS Spring blooming and intermittent during summer and fall

HABITAT/ELEVATION Rocky slopes and along washes
1000' to 2500'



Photos by Steve Jones

LITTLELEAF RATANY

Krameria erecta

Ratany Family (*Krameriaceae*)

Perennial, low shrub often to 1.5 ft. tall, with short, crowded, branches that taper to a sharp thorny point. Upper branches are knotty, stems are tough and woody with gray bark. Flowers are showy, bright pinkish to fuchsia with five supportive sepals and five triangular petals. Fruits are small, heart-shaped, and bur-like with barbs along length of spines (it can be distinguished from *K. grayi* by the barbs along the spines). Leaves are small, grayish, fuzzy, and linear.

Krameria erecta is a root parasite, invading root tissue of other plants to capture nutrients and water. Female *Centris* bees are adapted to harvest oil from *K. erecta*'s flowers which they mix with pollen to feed their larvae. The plant is a butterfly larval host plant. There are three species of *Krameria* in Arizona.

BLOOMS April to October

HABITAT/ELEVATION Dry plains and mesas below 5000'



Photos by Max Licher

CREOSOTE BUSH

Larrea tridentata

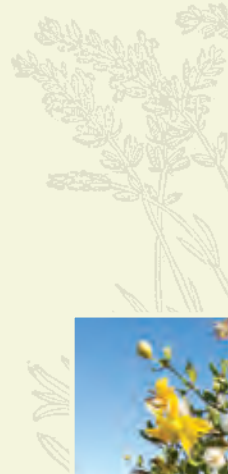
Caltrop Family (*Zygophyllaceae*)

Perennial, evergreen, aromatic shrub up to 10 ft. tall with multiple branches and densely leafy toward the end of the branches. Leaves are dark green to yellowish green, waxy, and produce a distinctive scent locals recognize as “desert rain” when wet.

Creosote is the most common and widespread shrub in deserts in North America. At 11,700 years old, the King Clone creosote ring in the Mojave Desert is thought to be one of the oldest living organisms on the planet. Creosote can be an important part of the desert tortoise’s diet, is a butterfly nectar plant, and is used by numerous Sonoran Desert pollinator species and insects. When pollinated, petals twist 90°. There is one species of *Larrea* in Arizona.

BLOOMS March to April and November to December

HABITAT/ELEVATION Dry plains and mesas, below 4500’



Photos by Steve Jones

SHRUBBY DEERVETCH, DESERT ROCKPEA

Lotus rigidus

Pea Family (*Fabaceae*)

Perennial, upright shrub-like plant with wiry stems to 5 ft. tall. Leaves are at widely spaced intervals along the stem, grayish green, covered lightly with flat-lying hair, and pinnate (feather-shaped). Each stalk has 1–3 yellow “pea” flowers, some colored rusty-red on back. Seed pods are long, narrow, nearly hairless.

Shrubby deervetch is the most drought-resistant lotus in Arizona. Recognizable by wide spacing on stems between leaves, and by its very gray stems and foliage. It is a butterfly nectar and larval host plant, and attracts many native bee species. There are fifteen species of *Lotus* in Arizona.

BLOOMS February to May

HABITAT/ELEVATION Dry, rocky slopes in canyons and in deserts, below 5000'



Top: Photo by Steve Jones, Bottom: Photo by Max Licher

FREMONT'S THORNBUSH, WOLFBERRY

Lycium fremontii

Nightshade Family (*Solanaceae*)

Perennial, compact, intricately branched shrub to 10 ft. tall. Despite its name, *L. fremontii* has few to no thorns. Bark is tan to dark gray or brown. The flowers are purplish to lavender, tubular, and erect with five lobes. Fruits are large, orangish red to black, egg-shaped, fleshy, and juicy. Leaves are light green, spatula-shaped, succulent, glandular-hairy; occurring all along branches

Common and often in colonies, *L. fremontii* is an abundant fruit producer in the desert. Berries are eaten fresh or dried. Indigenous peoples have used the plant for food and to make hunting and fishing gear. It is a favorite of honeybees and an important butterfly nectar plant. There are eleven species of *Lycium* in Arizona.

BLOOMS Primarily January to March, but flowers on and off much of the year

HABITAT/ELEVATION Found in desert washes and flats, often in saline soils, below 4500'



Top: Photo by Steve Jones, Bottom: Photo by Phillip Rutenbur

CHIA

Salvia columbariae

Mint Family (*Lamiaceae*)

Annual, erect plants to 20 in. tall, with dense, prickly clusters of dark purplish flowers often stacked on top of each other on the upper part of stem. Like most mint family plants, chia has square stems, and opposite leaves. Leaves are mostly basal, green, oblong, feather-shaped, with a crinkled surface.

Native Americans used seeds for food and certain beverages. Seeds are comprised largely of protein (20%) and oil (31–34%) and rich in essential fatty acids and antioxidants. Chia seeds are considered highly nutritious containing nearly twice the protein and 3–10x the oil of most grains. Several bee and butterfly species use chia though the plant self-pollinates readily in the absence of insect visitors. There are fifteen species of *Salvia* in Arizona.

BLOOMS March to July

HABITAT/ELEVATION Sandy washes and desert slopes, below 3500'



Photos by Steve Jones

DESERT GLOBEMALLOW

Sphaeralcea ambigua

Mallow Family (*Malvaceae*)

Shrubby, woolly, grayish plant 1–3 ft. tall with many stems and flowers in wand-like clusters near the tips of weak, rangy stems. Flowers have five petals, up to 1.5 in. wide, and are often bright orange, though sometimes white, pink, purplish, or reddish-maroon. The broad leaves are maple-like, have three lobes, and rounded, scalloped edges.

Desert globemallow is one of the most drought-tolerant species of globemallows and a dependable resource for Sonoran Desert pollinators and other animals. A great plant to see common checkered skipper butterflies (*Pygus communis*) and sweat bees (Halictidae family), it is also a favored native forage for desert tortoise. In wet years, it forms spectacular displays in the low, hot southwestern deserts. Yavapai peoples used the stems to make drying trays for Saguaro fruit. There are sixteen species of *Sphaeralcea* in Arizona.

BLOOMS Year-round

HABITAT/ELEVATION Roadsides, banks of sandy washes and flats, below 3500'



Photos by Steve Jones



TEN RARE SPECIES OF MARICOPA COUNTY

According to the *Arizona Rare Plant Field Guide*, a broad definition of a “rare species” is one with low numbers, few populations, and/or a small range. There are many types of rarity and many factors influencing rarity in plants. Alone or in combination, the following factors are known to contribute to plant rarity:

- Evolutionary age
- Genotypic heterogeneity of the species or populations
- Evolutionary history
- Taxonomic position
- Ecology
- Habitat, and present environmental conditions
- Population biology
- Reproductive success
- Land-use history
- Recent human land uses

This list illustrates that many plants are naturally rare while others have become rare and/or threatened through human activities.



Photo by Frank Reichenbacher, M.S.

Rare plants can be categorized as *endemic*, *disjunct*, or *peripheral*:

- Endemic species are species unique to a defined geographic location.
- Disjunct populations are widely separated (severed) from the main distribution range of the species.
- Peripheral populations are at the edge of the species' range and usually not widely separated from the main body of the species.

The rare plants featured in this guide give readers a glimpse into the more unusual side of Maricopa County's flora. Consider yourself very lucky if you find one—and please share your find with staff at Desert Botanical Garden!

PIMA INDIAN MALLOW

Abutilon parishii

Globemallow Family (*Malvaceae*)

Herbaceous perennial that can grow up to 3 ft. from a woody rootstock. Flowers are light orange, positioned on a small stalk-like structure and open only in the mid-afternoon, in full sun, if at all. Leaves are thick and velvety, dark green above, nearly white below, egg-shaped, with soft, downy hairs beneath.

This species has been documented from eighty-four populations in seventeen mountain ranges. The majority of Arizona populations are in the Santa Catalina Mountains. Threats to the species include mining and related activities, recreation, and habitat degradation due to livestock trampling and overgrazing. The introduction of buffelgrass (*Pennisetum ciliare*) is also a threat.

BLOOMS April to August

HABITAT/ELEVATION Steep, rocky slopes, canyon bottoms in desertscrub, semidesert grassland, 2477' to 4856'



Photos by Steve Blackwell

TONTO BASIN AGAVE

Agave delamateri

Agave Family (Agaveaceae)

Perennial succulent with a very tall, open, branched flower stalk, 15–20 ft., but without fruits. Flowers mature from the bottom up along the stalk. The lateral branches of the flowering stem (inflorescence) are perpendicular to the stalk, and the flowers are large and cream-colored. The leaves are gray-green, tinged with maroon, erect, and conspicuously incurved at tips, with marginal teeth.

A. delamateri was cultivated for food and fiber by the Hohokam, Salado and Mogollon cultures. Plants are found near agave knives, potshards, and multi-room foundations above drainages. Only ~90 individual clones are known to exist and always in association with Mogollon or Salado settlement features. The greatest concentration of sites occurs along the south end of Tonto Creek near the northwest end of Roosevelt Lake in Tonto Basin.

BLOOMS June to July

HABITAT/ELEVATION Occupies cobbly and gravelly, deep and well-drained soils; 2350' to 5100'



Top: Photo by Max Licher, Bottom: Photo by Carolyn Flower

HOHOKAM AGAVE

Agave murpheyi

Agave Family (Agavaceae)

Perennial succulent that has a dense rosette with a short terminal spine. It has a branched flower stalk, but flowers abort and small bulbs develop at the nodes. The stalk is 10–13ft. tall. This species differs from *A. delmateri* in several ways including spoon-shaped, deep green leaves that also curl inward slightly.

There are about 60 known sites in Arizona. *A. delmateri* and *A. murpheyi* are both threatened partly due to their small range and few individuals. They are threatened by extensive agriculture development, reservoir expansion and urban sprawl. *A. murpheyi* represents first documented confirmation that the Hohokam grew a particular agave for food and fiber. Clones are living archaeological assemblages preserved in their cultural landscape

BLOOMS March to July

HABITAT/ELEVATION Requires well-drained soil, it is found on gentle bajada slopes, benches or terraces above major drainages with prehistoric habitations and/or agricultural sites, 1350' to 2950'



Top: Photo by Keoki Stender, Bottom: Photo by Carolyn Flower

ARIZONA AGAVE

Agave x arizonica

Agave Family (Agavaceae)

A perennial succulent with a small, dense rosette. The flower stalk is 10–13 ft. tall with short lateral branches. The flowers are urn-shaped, 1–1.2 in. long. The leaves are deep green with a reddish-brown to light gray hardened or thickened margin, extending nearly to the base, 5–12 in. long, about 1 in. wide, and broadest at the middle of the leaf.

As of 1990, 65 clones were evident, most found in the New River Mountains of Central Arizona. This species is likely a hybrid between *A. chrysantha* and *A. toumeyana* var. *bella*. It has poor reproduction success in wild, probably due to low population numbers and herbivory.

BLOOMS May to July

HABITAT/ELEVATION Occupies open, rocky slopes in Sonoran desertscrub, chaparral, or juniper-grassland, 3600' to 5800'



Top: Photo by Steve Jones,
Bottom: Photo by Carolyn Flower



KOFA BARBERRY

Berberis harrisoniana

Barberry Family (*Berberidaceae*)

A rounded, evergreen shrub up to 6.5 ft. tall. The flowers are bright yellow and the fruits are blue-black berries. The leaves are trifoliate (with three leaves or three leaflets) and about 1 in. wide. The filaments are toothed, and the three leaflets taper to a short, stout spine.

There are only three known localities of Kofa barberry: the west end of the Kofa Mountains (including Palm Canyon), the north end of the Ajo Mountains, and the south end of the Sand Tank Mountains. The species has also been reported in the Eagletail Mountains. This species is of conservation concern due to its rarity and restricted range.

BLOOMS mid-February to March, fruiting March to April

HABITAT/ELEVATION Occupies the bottom of deep, shady, rocky canyons with soils derived from andesite or rhyolite, 2200' to 3500'



Photos by Ries Lindley

FISH CREEK FLEABANE

Erigeron piscaticus

Sunflower Family (Asteraceae)

Annual herb that is up to 3 ft. tall. Flower heads are daisy-like, containing dozens of white ray florets. Leaves are oval, 0.4–0.8 inches long and mostly smooth-edged. Aids to identification include lack of lobed leaves and the presence of sparse hairs on the upper stem.

There are only four collections for this species in Arizona, two from Graham County and two in Maricopa County. The last time this species was collected was in 1979 by Peter Warren. The small range of the species makes it vulnerable to flooding and recreational impacts from hiking and camping.

BLOOMS May to August, continuing into October

HABITAT/ELEVATION Typically occupies sandy alluvium substrates in canyon bottoms under mature walnut, alder, and hackberry, associated with riparian habitats near perennial streams, 2250' to 3500'



Photo by Mark Haberstich / TNC

RIPLEY'S WILD BUCKWHEAT

Eriogonum ripleyi

Buckwheat Family (*Polygonaceae*)

Woody perennial subshrub that forms a mat on the ground, growing 2–8 in. tall with numerous branches. It can be distinguished from other species in its genus by its low form, heavy branching, and short linear leaves. The leaves are densely covered with wooly hair on the underside. Flowers are on the end of the branches, petals are white with a red-broad center stripe.

This species has a small range and very specific substrate. *E. ripleyi* is threatened by degradation of habitat from livestock grazing, construction of reservoirs, mining, and off-road vehicle traffic. The range is northeast of Peach Spring, Verde River drainage, adjacent to Horseshoe Lake, Arizona.

BLOOMS Flowering April to June

HABITAT/ELEVATION In Tertiary lakebeds on well-drained powdery soils derived from limestone, sandstone, or volcanic tuffs and ashes, 2000' to 6000'



Photos by Steve Jones

ARIZONA CLIFFROSE

Purshia subintegra

Rose Family (*Rosaceae*)

Low straggling perennial shrub growing from 3–6 ft. tall and generally wider than tall. Bark pale-gray and shreddy, with flowers that are white or yellow. Leaves have one prominent vein and will be either slightly lobed or lacking significant division.

The species is found near Bylas, Horseshoe Lake, Burro Creek, and Cottonwood (Verde Valley). Threats identified include mining, livestock grazing, off-road vehicle use, urbanization, and pesticides.

BLOOMS April to May, fruiting May to June

HABITAT/ELEVATION Restricted to nutrient-deficient, calcareous limy-tuff soils derived from Tertiary lacustrine deposits. Crucifixion-thorn, *Castela emoryi*, is the most common plant associate, 2500' to 4000'



Top: Photo by Steve Jones,
Bottom: Photo by Dr. Kristin Haskins



ARAVAIPA SAGE

Salvia amissa

Mint Family (*Lamiaceae*)

Herbaceous perennial. Its leaf shape, leaf hairs, and elevation distinguish it from the other fourteen *Salvia* species in Arizona. The flowers are arranged in a circular or spiral pattern (whorl) along the flowering stem, each whorl with three or more pale lavender to purple flowers. The leaves are simple with toothed edges and arranged opposite one another. They appear gray or white due to being covered in short hairs.

The primary range is in southern Arizona including Aravaipa Creek, Santa Catalinas, Galiuros and Winchester Mountains. Threats include grazing, camping, and off-road vehicles. Needs some light, but a fair amount of shade.

BLOOMS July to October

HABITAT/ELEVATION Upper floodplain terraces in shady canyon bottoms in understory of mature sycamore, ash, walnut, and mesquite; gravel, sand and silt substrates, 1500' to 5000'



Photos by Charles Kane

TUMAMOCA GLOBEBERRY

Tumamoca macdouglii

Melon/Gourd Family (*Cucurbitaceae*)

A perennial vine that climbs into bushes and is up to 5 ft. tall. The flowers are white, and the male and female reproductive organs are in separate plants (dioecious). The stems are annual, and the juvenile leaves are almost never toothed, notched or divided, but the older leaves are 3-lobed, rounded in outline, with clasping tendrils. The fruits are round, berry-like and bright red at maturity.

Its range consists of the Tucson Mountains, Avra Valley, Puerto Blanco Mountains, Santa Catalina Mountains, Santa Cruz Valley, Vekol Valley, Santa Rosa Valley, Santa Rita Mountains, Silverbell Mountains, and also Sonora and Sinaloa Mexico.

BLOOMS July to August; fruits August to September

HABITAT/ELEVATION *T. macdouglii* is usually along sandy arroyos and sandy washes in desert grassland, Sinaloan thornscrub, Sonoran Desert and upland Sonoran Desert, below 3000'



Photos by Frank Reichenbacher, M.S.

INVASIVE SPECIES

The National Invasive Species Information Center defines an invasive species as a species:

1. Non-native (or alien) to the ecosystem under consideration
2. Whose introduction causes or is likely to cause “harm” to people, the environment, and/or economy.

Invasive species can be plants, animals, and other organisms (e.g. microbes). Human actions are the primary means of invasive species introduction.

Concerns over invasive species are ever mounting. Invasive species are demonstrated to negatively impact existing ecosystems through their capacities to outcompete native species for resources, alter predator-prey relations, create shifts in ecological processes such as fire frequency and intensity, disrupt food webs and plant-pollinator relationships, and so on. Just behind habitat loss, *invasive species are the foremost threat to native biodiversity. In fact, 42% of ALL threatened or endangered species are at risk due to non-native, invasive species.*



Photo by Patrick Alexander

In addition to losses in biodiversity, economies are significantly impacted by invasive species. The United States incurs \$1.1–120 billion per year in economic losses due to exotic, invasive species.

The plant species for this field guide occur in the Sonoran Desert and are prevalent in Maricopa County. With the exception of *Oncosiphon piluliferum* (Globe Chamomile), the species selected for this guide are known to produce severe or substantial ecological impacts in Sonoran Desert ecosystems.

GIANT REED

Arundo donax

Grass Family (*Poaceae*)

Tall clumping perennial grass 9–30 ft. tall. Hollow stems divided by partitions like bamboo. Seedheads are creamy brown, 1–2 ft. long, and plume-shaped tending to lean to one side. Leaves are pale green to blue-green, 1–2 in. wide and 1 ft. long—looking somewhat like corn leaves from a distance. The plant reproduces vegetatively from rhizomes and plant fragments and spreads easily by water.

Native to Europe, the plant is sold as a soil-stabilizing ornamental. It typically forms dense stands on disturbed sites, in riparian areas and wetlands, and along ditches, culverts, and roadsides where water accumulates. It is threatening Maricopa County riparian ecosystems by outcompeting native species for resources.

BLOOMS Summer

HABITAT Riparian areas, wetlands, ditches, culverts, roadsides, washes, disturbed areas



Top: Photo by Steve Jones, Bottom: Photo from Wikipedia credited as Forest and Kim Starr

WILD OAT

Avena fatua

Grass Family (*Poaceae*)

Tall winter annual grass with typical oat in appearance. Hollow, erect stems 1–4 ft. long with nodding groups of flower/seed clusters. Seeds have awns 1–1.5 in. long. Leaf blades are dark green, flat, 4–18 in. long and less than .5 in. wide. Leaves and seedlings are slightly hairy.

Native to Europe and central Asia, *A. fatua* was introduced as a forage species. Wild oats are renowned for their competitive ability. A challenge in both agriculture and natural areas, wild oats can produce up to 10,000 seeds per square meter reducing crop yields and outcompeting native grasses through allelopathy and superior root systems. Fairly common in spring in the Sonoran Desert, it dries out by late spring, providing a source of standing fuel to carry fires from roadsides into adjacent natural areas.

BLOOMS Winter and spring

HABITAT/ELEVATION Along washes, ditch banks, at roadsides and in agricultural fields up to 3900'



Photos by Max Licher

SAHARA MUSTARD

Brassica tournefortii

Mustard Family (*Brassicaceae*)

Yellow-flowered winter annual to 3 ft. tall. Flowers are small and inconspicuous with four petals. Leaves range from 3–12 in. long, are deeply lobed, and found near the base of the plant—rarely on stems. If in seed, look for pods up to 2.75 in. long, narrowed between seeds, with a smooth pointed section at top.

Native to the Mediterranean region and Eurasia, Sahara mustard spreads readily along roads, trails, in agriculture, and in newly disturbed areas. It is known to increase fire frequency and fuel load. Increased fire frequency can cause scrub habitats to convert to grasslands because the native shrubs are not adapted to recurrent fires.

BLOOMS Late winter to early spring

HABITAT RRoadsides, fields, rocky bajadas, along washes, and on desert flats, below 3000'



Top: Photo by Max Licher, Bottom: Photo by Steve Jones

RED BROME OR FOXTAIL CHESS

Tamarix madritensis ssp. rubens

(=*B. rubens*)

Grass Family (*Poaceae*)

Winter annual grass 4–15 in. tall with erect stems topped with brush-like, long-awned spiklets. Awns and foliage turn purplish-red as the plants mature, then fade to light tan as the plants age. Leaves are narrow, flat, and pointed with small soft hairs. Young plants are bright green and hairy.

Native to S Europe, N Africa, and SW Asia, red brome invades disturbed areas, rangeland, roadsides, and agricultural fields. It also occurs in undisturbed native communities, in open woodlands, and on south-facing slopes. Red brome is highly flammable and promotes wildfires in desert plant communities not adapted to fire. Seeds are spread by animals, wind, and human activities (e.g. construction equipment, contaminated feed.)

BLOOMS Spring

HABITAT/ELEVATION Found to 7000' in rangeland and disturbed areas but also common on south facing slopes, in open woodlands, and in undisturbed native communities



Photos by Max Licher

REDSTEM STORK'S BILL, FILAREE

Erodium cicutarium

Geraniaceae (geranium family)

Winter annual or biannual herb up to 15 in. tall. Leaves are fern-like and flat to the ground in a rosette over winter, but during the growing season, will grow along stems. Flowers grow in clusters of 2–8 and are small, rose-lavender, pink, or lilac, often spotted. Fruit pods are distinctive with a beak-like appearance, and five segments per flower.

Native to Eurasia and N Africa, redstem filaree has become widely naturalized across North America and elsewhere in the world, particularly in non-tropical regions. It is an aggressive, widespread plant commonly found along roadsides, grasslands, fields, and desert areas. It often carpets large areas, outcompeting native grasses and forbs for resources and preventing native seed germination.

BLOOMS February to May

HABITAT/ELEVATION Flourishes in a wide range of habitats up to 6,900 ft. Commonly found in disturbed areas, agriculture, roadside, and undisturbed washes and sandy areas



Photos by Steve Jones

GLOBE CHAMOMILE

Oncosiphon pilulifer

Sunflower Family (*Asteraceae*)

Annual herb with numerous small flower heads appearing like bright yellow or gold half-spheres. Erect stems up to 20 in. tall, sparsely covered with stiff, slender bristles. Leaves resemble carrot leaves. Stems and leaves are strongly scented.

Native to Eurasia, *O. pilulifer* was introduced as an ornamental plant. The plant is rapidly spreading across central Arizona and SE California. At this time, the species is not listed as an invasive or noxious species by Arizona or the federal government, but is under review.

BLOOMS February to June

ELEVATION/HABITAT Found on roadsides and in disturbed areas, river bottoms, agricultural areas, riparian areas, and washes in clay, sandy and gravelly soils typically 1500' to 3000'



Top: Photo by Liz Makings, Bottom: Photo by Steve Jones

BUFFELGRASS

Pennisetum ciliare

Grass Family (*Poaceae*)

Perennial shrubby bunchgrass up to 3–5 ft. tall and 3 ft. wide. Flower heads are brush-like, 1.5–5 in. long and plump with brown to purplish coloring when fresh, or occasionally straw-colored. Leaves are flat, 3–12 in. long, green in color, sometimes with long, soft hairs. Fruits are densely packed and bristled. Profuse branching in older plants gives them a messy, tangled appearance.

Widespread in Africa, the Middle East, Indonesia, and tropical Asia. Buffelgrass was introduced in the 1930's as livestock forage. New branches produce leaves and flower spikes very quickly after light rains, making buffelgrass an extremely prolific seed producer. The plant spreads aggressively and patches double in size every 2–3 years forming dense monotypic stands of thickly matted plants. Buffelgrass significantly increases fuel load and fire risk. Unlike most native species, Buffelgrass is fire-adapted and re-emerges readily after a burn. The USFWS named *P. ciliare* a foremost threat to the Desert Tortoise populations due to changes in forage, temperature, and fire frequency.

BLOOMS July to October

HABITAT Found to 3000', widespread in disturbed habitats, along roads and trails, and in washes. Also found on south slopes and in undisturbed backcountry, likely due to "seed rain" phenomenon



Top: Photo by Patrick Alexander, Bottom: Photo by Steve Jones

CRIMSON FOUNTAIN GRASS

Pennisetum setaceum

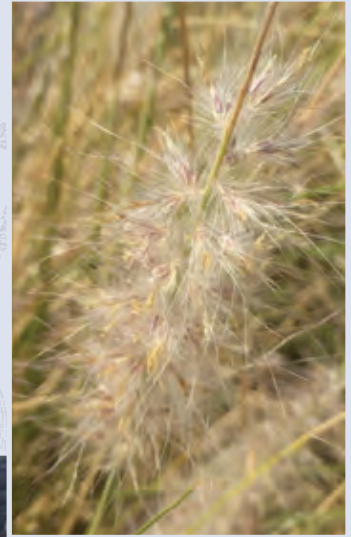
Grass Family (*Poaceae*)

Tufted perennial bunch grass grows up to 5 ft. tall. Flowerheads are showy pink to purplish, 3–15 in. long and 1–2 in. wide with a brush-like appearance. Long, narrow, green leaf-blades are .125–1.5 in. wide, have hairy edges, and arise from the base of the plant.

Originally native to N Africa, the Middle East and SW Asia, fountain grass was introduced as a landscape plant. It is a prolific seed producer and spreads rapidly from cultivation into nearby disturbed areas as well as undisturbed habitats. Although some varieties are sold as “sterile”, research has shown that they do occasionally set seed, so no varieties are recommended for landscaping. Fountain grass can form dense stands, out competing native plants for resources. It is highly flammable and increases wildfire risk.

BLOOMS May to October

HABITAT In natural areas, occurs mainly in washes, riparian areas, in grasslands, on disturbed roadsides, on rocky outcrops and cliffs, and in canyons, from 2000' to 3500'



Photos by Steve Jones

AFRICAN SUMAC

Rhus lancea

Suman or Cashew Family (Anacardiaceae)

Evergreen tree or large shrub, single or multi-stemmed averaging 15–30 ft. tall at maturity. Trees are either male or female (dioecious). Leaves are compound with three leaflets (2–4 in. long), shiny, usually with a serrated edge. Flowers are small and inconspicuous with whitish-green flowers and a musty fragrance.

Native to southwestern Africa, *R. lancea* was introduced as a low water landscape plant and is sold throughout the nursery trade. The tree produces copious amounts of seed, which germinate readily near water. It also spreads via suckers. *R. lancea* has high invasive potential, primarily in riparian areas where it diverts channel flow, enhancing the potential for streambank erosion. Its superior capacity to compete for light shades out native flora.

BLOOMS Winter

HABITAT/ELEVATION In natural areas, occurs mainly in riparian areas, washes, and areas with constant or seasonal water from 800' to 3500'



Photos by Bri Weldon

MEDITERRANEAN GRASS

Schismus arabicus and *S. barbatus*

Grass Family (*Poaceae*)

Schismus arabicus and *S. barbatus* are very similar both in appearance and in genetic makeup. They are small, tufted, winter/spring annual grasses 4–8 in. tall. Leaves are soft, bright green, narrow, and 1.5–2.5 in. long, emanating primarily from the base of the plant.

Schismus arabicus is generally more common in arid regions, whereas *S. barbatus* is more common in semi-arid shrublands.

Native to Europe, N Africa, and western Asia, Mediterranean grasses are widespread and have become dominate annual grasses in Maricopa County. *Schismus arabicus* is generally more common in arid regions, whereas *S. barbatus* is more common in semi-arid shrublands. These species increase rapidly and outcompete native forage species preferred by Desert Tortoise. The grasses fill open ground between shrubs creating carpets of green that fade to a straw color as the plants age. When dry, Mediterranean grasses become very fine, continuous fuel to carry fire, another threat to Desert Tortoise.

BLOOMS January to May

HABITAT/ELEVATION To 4250' on dry, open ground, often in disturbed areas, on roadsides, in fields



Photos by Patrick Alexander

SALT CEDAR, FIVE-STAMEN TAMARIX

Tamarix chinensis (= *T. ramosissima*)

Tamarix Family (*Tamaricaceae*)

Shrub, or small tree often 8–16 ft. tall with slender branches. Younger branches are flexible and reddish in color while older bark is brown. Flowers are tiny, white with pink petals, crowded in narrow long clusters .5–1.5 in. long. Leaves are small and scale-like. Fruit and seeds are tiny, brown, and inconspicuous. Reproduces by seed, root sprouts, and stem fragments. Resprouts vigorously when damaged.

Native to Eastern Europe and temperate Asia, *Tamarix* is common along streams and lake shores and in wetlands and washes. *Tamarix* escaped cultivation in the mid-1800's and was common by 1900 along Arizona rivers. This species is extremely invasive in riparian areas, nearly completely replacing native vegetation with dense thickets. It is associated with dramatic changes in geomorphology, groundwater availability, soil chemistry, fire frequency, plant community composition, and native wildlife diversity.

BLOOMS January to October

HABITAT/ELEVATION Below 500', mostly on low ground where water collects. They are most abundant in riparian habitats, along streams, irrigation ditches, and other moist areas. *Tamarisks* thrive in alkaline and saline soils



Photos by Steve Jones

GLOSSARY

ALTERNATE Borne singly at each node, as leaves on a stem

ANNUAL Plants that completes its lifecycle in one year

APEX (pl. Apices) The tip, the point farthest from the point of attachment

AWN A narrow, bristle-like appendage, usually at the tip or dorsal surface

BASAL Positioned at or arising from the base, as leaves arising from the base of the stem

BLADE The broad part of a leaf or petal

BUR A structure armed with often hooked or barbed spines or appendages

CLASPING Wholly or partly surrounding the stem (as in a clasping leaf)

DECUMBENT Reclining on the ground but with the tip ascending

FILAMENT A thread-like structure; the stalk of the stamen that supports the anther

GLAND An appendage, protuberance, or other structure which secretes sticky or oil substances

GLANDULAR Of or pertaining to a gland; gland-like; bearing glands

INFLORESCENCE The flowering part of the plant; a flower cluster; the arrangement of the flowers on the flowering axis

LEAFLETS A division of a compound leaf

LEAF An expanded, usually photosynthetic organ of a plant

LIGULE A strap-shaped organ; the membranous appendage arising from the inner surface of the leaf at the junction with the leaf sheath in many grasses and some sedges

LOBE A rounded division or segment of an organ, as of a leaf

LOBED Bearing lobes which are less than half way to the base or midvein

MARGIN The edge; such as the edge of the leaf blade

NODE The position on the stem where the leaves or branches originate

OBLONG Two to four times longer than broad with nearly parallel sides

OPPOSITE Born across from one another at the same node, as in a stem with two leaves per node

PERENNIAL A plant that lives for more than two years

PINNATE Resembling a feather, as in a compound leaf with leaflets arranged on opposite sides of an elongated axis

PUBESCENT Covered with short, fine hairs

RACEME An unbranched, elongated inflorescence with pedicellate (with a pedicle) flowers maturing from the bottom upwards

RAY The strap-like portion of a ligulate (with a ligule) flower (or the ligulate flower itself in the Asteraceae)

RHIZOME A horizontal underground stem; rootstock

ROSETTE A dense radiating cluster of leaves (or other organs), usually at or near ground level

SCABROUS Rough to the touch, due to the structure of the epidermal cells or the presence of short, stiff hairs

SPIKE An unbranched, elongated inflorescence with sessile or subsessile flowers or spikelets maturing from the bottom upwards

SPIKELETS A small spike or secondary spike; the ultimate flower cluster of grasses and sedges

SPINE A stiff, slender, sharp-pointed structure arising from below the epidermis, representing a modified leaf or stipule; any structure with the appearance of a true spine

STALK The supporting structure of an organ, usually narrower in diameter than the organ

STEM The portion of the plant axis bearing nodes, leaves, and buds and usually found above ground

TERMINAL At the tip or apex

TRIFOLIATE With three leaves or three leaflets

TOOTHED Dentate; a tooth is any small lobe or point along a margin (such as when describing the edge of the leaf blade)

TUBULAR With the form of a tube or cylinder

UMBEL A flat-topped or convex inflorescence with the pedicels arising more or less from a common point, like the struts of an umbrella

WARTY With warts (a firm protuberance)

WHORL A ring-like arrangement of similar parts arising from a common point or node; a verticil

Photo by Steve Jones



INDEX

Map.....	7	Arizona Agave - <i>Agave x arizonica</i>	50
Introduction	8	Kofa Barberry - <i>Berberis harrisoniana</i>	52
Pollinator Plant Species	10	Fish Creek Fleabane - <i>Erigeron piscaticus</i>	54
Whitestem Milkweed - <i>Asclepias albicans</i>	12	Ripley's Wild Buckwheat - <i>Eriogonum ripleyi</i>	56
Desert Milkweed - <i>Asclepias subulata</i>	14	Arizona Cliffrose - <i>Purshia subintegra</i>	58
Desert Broom - <i>Baccharis sarothroides</i>	16	Aravaipa Sage - <i>Salvia amissa</i>	60
Pink Fairyduster - <i>Calliandra eriophylla</i>	18	Tumamoca Globeberry - <i>Tumamoca macdougliei</i>	62
Brittlebush - <i>Encelia farinosa</i>	20	Invasive Species	64
Spreading Fleabane - <i>Erigeron divergens</i>	22	Giant Reed - <i>Arundo donax</i>	66
California Buckwheat - <i>Eriogonum fasciculatum</i>	24	Wild Oat - <i>Avena fatua</i>	68
Desert Lavender - <i>Hyptis emoryi</i>	26	Sahara Mustard - <i>Brassica tournefortii</i>	70
Chuparosa - <i>Justicia californica</i>	28	Red Brome or Foxtail Chess - <i>Bromus madritensis</i>	72
Littleleaf Ratany - <i>Krameria erecta</i>	30	<i>ssp. rubens</i> (= <i>B. rubens</i>)	
Creosote Bush - <i>Larrea tridentata</i>	32	Redstem Stork's Bill, filaree - <i>Erodium cicutarium</i>	74
Shrubby Deervetch, Desert Rockpea - <i>Lotus rigidus</i>	34	Globe Chamomile - <i>Oncosiphon piluliferum</i>	76
Fremont's Thornbush, Wolfberry - <i>Lycium fremontii</i>	36	Buffelgrass - <i>Pennisetum ciliare</i>	78
Chia - <i>Salvia columbariae</i>	38	Crimson Fountain Grass - <i>Pennisetum setaceum</i>	80
Desert Globemallow - <i>Sphaeralcea ambigua</i>	40	African Sumac - <i>Rhus lancea</i>	82
Ten Rare Species of Maricopa County	42	Mediterranean Grass - <i>Schismus arabicus</i>	84
Pima Indian Mallow - <i>Abutilon parishii</i>	44	<i>and S. barbatus</i>	
Tonto Basin Agave - <i>Agave delamateri</i>	46	Salt Cedar, Five-stamen Tamarix - <i>Tamarix chinensis</i>	86
Hohokam Agave - <i>Agave murpheyi</i>	48	(= <i>T. ramosissima</i>)	

REFERENCES

SEINet

Cal Weed Mapper

TNC I Rank Protocol

Phoenix District Weed Management

*Field Identification Cards for Invasive Non-Native Plant Species
Known To Threaten Arizona Wildlands*

Plant Identification Terminology: An Illustrated Glossary
James C. Harris and Melina Woolf Harris Second Edition

*A Falcon Guide: Plants of Arizona A Field Guide Anne Orth Epple,
Photography by Lewis E. Epple; Updated by John F. Weins*

*A Falcon Guide: Sonoran Desert Wildflowers A Field Guide to
Common Species of the Sonoran Desert, including Anza-Borrego
Desert State Park, Saguaro National Park, Organ Pipe Cactus
National Monument, Ironwood Forest National Monument,
and the Sonoran Portion of Joshua Tree National Park by
Richard Spellenberg*

Back Cover and Inside Cover: Photos by Osha Gray Davidson





CAZCA

GENERAL ARIZONA CONSERVATION ALLIANCE

Central Arizona Conservation Alliance
Desert Botanical Garden
1201 N. Galvin Parkway
Phoenix, AZ 85008

mymountainparks.org