Figure 1. View southeast from San Bernardino National Wildlife Refuge overlook. A remnant of the ciénega is yellow area at far right just north of the border wall. A larger portion of the ciénega system lies to the south in Cuenca Los Ojos, Rancho San Bernardino, in Mexico. Black Draw is visible as the cottonwood-willow forest running from north to south (left to right in the photo). Mountains in the distance are the Sierra Pan Duro-San Luis Sky Island complex in Sonora. *Photo credit Chris Roll.*

# Trans-border Flora and History of San Bernardino, Arizona–Sonora

*by Thomas R. Van Devender[1], Chris Roll[2], Ana Lilia Reina-Guerrero[1], Joseph Barron, II[3], Jorge A. Valenzuela-Chacon[4], and Anays C. Blanco-Gutierrez[4]*

**Abstract**

The trans-border flora of the San Bernardino National Wildlife Refuge in Arizona and Rancho San Bernardino in Sonora has 541 taxa in 316 genera and 86 families. The most diverse families are Poaceae (88 taxa), Asteraceae (84 taxa), Fabaceae (28 species), Euphorbiaceae (24 species), Amaranthaceae (18 species), Boraginaceae and Solanaceae (17 species each), and Brassicaceae (15 species). The most speciose genera are *Euphorbia* (17 species), *Bouteloua* and *Eragrostis* (7 species each), and *Aristida, Boerhavia, Ipomoea, Oenothera, Opuntia,* and *Phacelia,* (6 species each). A total of 70 taxa (12.9%) are non-native, dominated by grasses (31 taxa).

After the conquest of the Aztec Empire in 1521, New Spain was explored along the Pacific coast by ships and with soldiers, miners, and missionaries inland. In the 1620–1640s, Jesuit priests introduced cattle in Sonora at more than 20 missions they established. An estimated 10,000 cattle were in northern Sonora when Padre Eusebio Kino visited in 1694. Cattle ranching thrived in this part of New Spain (Mexico after Independence in 1821) but was repeatedly interrupted by Apache depredations. The wetlands at San Bernardino were visited by Spanish explorers in the early 1500s. Later it was on the route from the Santa Rita Mines, New Mexico, to the Spanish Presidio at Fronteras, Sonora. In the mid-1800's, the Mormon Battalion in the Mexican-American War and California-bound miners in the 1849 Gold Rush passed through. The U.S. Mexico Boundary Expedition camped there in 1851–1853. Besides the wetlands, travelers recorded lush grassland and herds of feral cattle. The U.S.-Mexico Boundary went through San Bernardino. In 1884, John Slaughter bought the 1822 Mexican San Bernardino Land Grant to establish Rancho San Bernardino in Arizona and Sonora. In 1982, the San Bernardino National Wildlife Refuge was established in Arizona to protect the ciénega and endangered Río Yaqui fishes. Valer Clark created Cuenca Los Ojos Preserve to protect nine ranches in Sonora, including San Bernardino. In 2018, it was registered as a Mexican non-profit organization.

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**Resumen**

La flora transfronteriza del San Bernardino National Wildlife Refuge en Arizona y el Rancho San Bernardino en Sonora cuenta

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# Trans-border Flora and History of San Bernardino *continued*

con 541 taxones en 316 géneros y 86 familias. Las familias más diversas son Poaceae (88 taxones), Asteraceae (84 taxones), Fabaceae (28 especies), Euphorbiaceae (24 especies), Amaranthaceae (18 especies), Boraginaceae y Solanaceae (17 especies cada una) y Brassicaceae (15 especies). Los géneros con mayor diversidad son *Euphorbia* (17 especies), *Bouteloua* y *Eragrostis* (7 especies cada una), y *Aristida*, *Boerhavia*, *Ipomoea*, *Oenothera*, *Opuntia* y *Phacelia* (6 especies cada una). Un total de 70 taxones (12.9%) son introducidos, dominados por gramíneas (31 taxones).

Tras la conquista del Imperio Azteca en 1521, Nueva España fue explorada a lo largo de la costa del Pacífico por barcos y con soldados, mineros y misioneros en el interior. Entre 1620 y 1640, los sacerdotes jesuitas introdujeron ganado en más de 20 misiones que establecieron en Sonora. Se estima que había 10,000 cabezas de ganado en el norte de Sonora cuando el Padre Eusebio Kino la visitó en 1694. La ganadería prosperó en esta parte de Nueva España (México después de la Independencia en 1821), pero se vio interrumpida repetidamente por los ataques de los apaches. Los humedales de San Bernardino fueron visitados por exploradores españoles a principios del siglo XVI. Más tarde, San Bernardino estuvo ubicado en la ruta de las minas de Santa Rita, Nuevo México, al presidio español en Fronteras, Sonora. A mediados del siglo XIX, también pasaron por allí el Batallón Mormón en la Guerra México-Estados Unidos y los mineros con destino a California en la Fiebre del Oro de 1849. La expedición estadounidense para trazar la frontera entre México y Estados Unidos acampó allí entre 1851 y 1853. Además de los humedales, los viajeros registraron exuberantes pastizales y manadas de ganado salvaje. Así la frontera entre Estados Unidos y México dividió a San Bernardino. En 1884, John Slaughter adquirió la concesión de tierras mexicana de San Bernardino de 1822 para establecer el Rancho San Bernardino en Arizona y Sonora. En 1982, se estableció el San Bernardino National Wildlife Refuge en Arizona para proteger la ciénega y los peces en peligro de extinción del río Yaqui. Valer Clark creó la Reserva de la Cuenca de los Ojos para proteger nueve ranchos en Sonora, incluyendo San Bernardino. En 2018, se registró como una organización mexicana sin fines de lucro.

## Introduction

The northern limit of the New World tropics is in Sonora, not as often stated at the Tropic of Cancer (23.37°N) just north of Mazatlán, Sinaloa. The northernmost tropical deciduous forest is in the Sierra San Xavier, Sonora (28.6°N), 680 km north-northwest of Mazatlán and 300 km south of the Arizona border. Thornscrub is the tropical vegetation transitional between tropical deciduous forest and other vegetation types in Sonora (Van Devender & Reina-G. 2021). Coastal thornscrub is on the coastal plain of the Gulf of California from the Sinaloan border north to Guaymas, Sonora. Foothills thornscrub is inland on rocky slopes north to ca. 30.4°N near Arizpe on the Río Sonora and Angostura on the Río Bavispe, 96 to104 km south of the Arizona border (Van Devender & Reina-G. 2021) There it merges into more temperate desert grassland as winters become colder.

The Sierra Madre Occidental reaches its northern limit in the Sierra de Huachinera in northeastern Sonora (30.25°N). Between the Sierra Madre and the Mogollon Rim in central Arizona, there are 55 isolated Sky Island mountain ranges, or complexes of several ranges connected by oak woodland corridors in the Madrean Archipelago (= Sky Island Region), 32 of them in northeastern Sonora (Deyo et al. 2013; Van Devender et al. 2013a). These Sky Islands, crowned with oak woodland or pine-oak forest, emerge from lowland "seas" of desert grassland, foothills thornscrub, or tropical deciduous forest.

Here we present the first trans-border local flora for the wetlands between the San Bernardino National Wildlife Refuge (SBNWR) in Arizona and Rancho San Bernardino (RSB) in Sonora (Figures 1, 2) and discuss the history of the region.

## Study Area

The San Bernardino Valley runs north-south at the Mexico-United States border in northeastern Sonora and southeastern Arizona (Minckley & Radke 2021). The elevations range from 1,161 m at the northern edge of the SBNWR and ca. 1,180 m

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Figure 2. Map of the study area. *Drafted by Marina Maskaykina.*

Figure 3. Chihuahuan desertscrub in southeastern corner of Rancho San Bernardino. Dominants are *Larrea divaricata, Vachellia vernicosa*, and *Opuntia engelmannii*. *Photo by Ana Lilia Reina-G.*

## Trans-border Flora and History of San Bernardino *continued*

along Silver Creek on the west side of RSB to 1,114 m where the Río San Bernardino crosses Mexican Federal Highway 2.

### Vegetation

The regional upland vegetation in the San Bernardino area is desert grassland with Chihuahuan desertscrub on limestone outcrops and alluvial surfaces (Van Devender & Reina-G. 2021). Desert grassland is dominated by diverse perennial grasses, variable abundances of the shrubs *Neltuma* (= *Prosopis*) *velutina* (velvet mesquite), *Rhus microphylla* (littleleaf sumac), *Ephedra trifurca* (Mexican tea), and *Gutierrezia microcephala* (threadleaf snakeweed); and the succulents *Agave palmeri* (Palmer's agave), *Cylindropuntia imbricata* subsp. *spinosior* (cane cholla), *Opuntia chlorotica* (silver dollar prickly pear), *O. macrocentra* (purple prickly pear), *O. santa-rita* (Santa Rita prickly pear), *Yucca baccata* (banana yucca), and *Y. elata* (soaptree yucca).

Chihuahuan desertscrub is well-developed in the western and eastern parts of RSB (Figure 3). Dominants include *Larrea divaricata* (creosotebush), *Flourensia cernua* (black brush, tarbush), *Parthenium incanum* (mariola), and *Vachellia vernicosa* (Chihuahuan whitethorn) as well as the succulents *Echinocereus fendleri* subsp. *rectispinus* (Fendler's hedgehog cactus), *Opuntia engelmannii* (Engelmann prickly pear), and *O. phaeacantha* (brown-spine prickly pear). *Fouquieria splendens* (ocotillo) is locally abundant just west of RSB. The historically lush grassland has deteriorated with grazing and agriculture. Today, it is a heavily disturbed shrub-invaded desert grassland. Most of the desert grassland and Chihuahuan desertscrub dominants are present, plus *Atriplex canescens* (fourwing saltbush), *Baccharis sarothroides* (desert broom), and *Condaliopsis* (= *Ziziphus*) *obtusifolia* (lotebush). The only area of cold temperate Plains grassland in Sonora is in the southern extension of the Cloverdale-Animas Valley playa on Rancho El Valle, eastern Cuenca Los Ojos.

East of Rancho San Bernardino on Cuenca Los Ojos, oak woodland dominated by *Quercus arizonica* (Arizona oak) and *Q. emoryi* (Emory oak) is on rocky hills. A post-fire interior chaparral dominated by *Q. toumeyi* (Toumey oak) in Cajón del Diablo on the west side of the Sierra San Luis is a very unusual vegetation type in Sonora. Additional species in pine-oak forest at higher elevations in the Sierra San Luis near the Chihuahua border include *Pinus arizonica* (Arizona pine), *P. engelmannii* (Apache pine), *P. discolor* (border pinyon), *Q. hypoleucoides* (silverleaf oak), *Q. rugosa* (netleaf oak), and *Q. viminea* (willowleaf oak). *Quercus grisea* (gray oak) is a Chihuahuan oak woodland species that reaches its southwestern limit in the Sierra San Luis. *Quercus turbinella* (shrub live oak) is a winter-rainfall chaparral species that reaches its southeastern limit along the border in Cuenca Los Ojos. *Quercus pungens* is a shrub found on limestone outcrops in the Agua Prieta area (Van Devender et al. 2013).

Riparian habitats are linear mesic vegetation that transects upland habitats or local wetlands in areas where geologic or edaphic situations force water to the surface. In riparian drainages, water, seeds, and nutrients are harvested from the

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Figure 4. Cottonwood-willow riparian forest at Rancho Ojos Caliente on Cajón Bonito. *Photo by Tom Van Devender.*
Figure 5. *Sambucus nigra* subsp. *cerulea* in the ciénega on Rancho San Bernadino. A. Plant. B. flowers. *Photos by Ana Lilia Reina-G.*

## Trans-border Flora and History of San Bernardino *continued*

entire local watershed. These are high energy, unstable habitats with regular floods. Upland species are often found at low elevations in riparian habitats. The San Bernardino Ciénega and Río San Bernardino were historically considered the largest, most extensive wetland in northwestern Mexico and southern Arizona (https://en.wikipedia.org/wiki/San Bernardino Ranch). *Populus fremontii* (Fremont cottonwood), *Salix gooddingii* (Goodding willow), and *Celtis reticulata* (netleaf hackberry) are dominants in cottonwood-willow riparian deciduous forest (Figure 4) along Black Draw and Hay Hollow in SBNWR and along the Río San Bernardino in Sonora. In 2007, Robert L. Minckley collected *Platanus wrightii* (Arizona Sycamore) on RSB, but it has not been seen since. *Sapindus drummondii* (wingleaf soapberry) is occasionally present. A few individual *Sambucus nigra* subsp. *cerulea* (blue elderberry) (Figure 5) are present but were possibly introduced or escaped as it is widely used medicinally and planted in gardens. An extensive cottonwood-willow forest lines Cajón Bonito in the adjacent Arroyo Guadalupe drainage which heads in the Sierra San Luis-Pan Duro, crosses Ranchos Pan Duro and La Victoria and most of Cuenca Los Ojos. Additional riparian species at Rancho Los Ojos Calientes include *Chilopsis linearis* (desert willow), *Juglans major* (Arizona walnut), and *Salix bonplandiana* (Bonpland willow). High-elevation riparian trees at low-elevation in Cajón Bonito are *Acer grandidenttum* (bigtooth maple), *Hesperocyparis arizonica* (Arizona cypress), *Juniperus deppeana* (alligator bark juniper), and *Prunus serotina* (wild cherry).

The Río Yaqui has one of the largest drainage basins in Sonora. Arroyo Guadalupe begins in southwestern New Mexico and flows across the southeastern corner of Arizona into Sonora. The Río Agua Prieta begins in Arizona west of Douglas and flows southeast to meet the Río San Bernardino at La Junta de dos Ríos. In between, Black Draw in SBNWR in southeastern Arizona becomes Río San Bernardino in Sonora, flows south to become the Río Batepito, and join the Río Bavispe at Colonia Morelos. The Ríos Áros and Bavispe, which begin in the Sierra Madre Occidental in Chihuahua, join 54 kilometers (by air) north of Sahuaripa to become the main Río Yaqui, and eventually flow into the Gulf of California west of Ciudad Obregón.

### Methods

The botanical exploration of the borderlands began during the U.S.-Mexico Boundary survey of 1848-1853, when John M. Bigelow, Charles C. Parry, Arthur C. V. Schott, Edmund K. Smith, and George Thurber collected plants between Guadalupe Canyon and modern Nogales. The botany of the boundary survey was published in Torrey (1859) but localities were vague with only a few refences to San Bernardino (Marrs-Smith 1983, Van Devender & Reina-G. 2005). Thurber collected in San Bernardino in 1851–1852. His *Echites brachysiphon* collected at San Bernardino in 1852 was designated as the isolectotype of *Mandevilla brachysiphon*. Schott collected the rare Sonoran paintbrush *Castilleja minor* in Cajón Bonito; Reina-G. and Van Devender re-discovered it in the same area 114 years later in 2009! More plants were collected in the Sonoran borderlands in 1892–1894 on the second U.S.-Mexico International Boundary Survey led by Edgar A. Mearns.

In 1978, Lyle A. McGill collected 29 species of plants in the same area. In 1980, Elinor Lehto and Donald J. Pinkava sampled aquatic plants at San Bernardino. All three were from Arizona State University (ASU). In 1980–1981, Laurence J. Toolin, Van Devender, Paul S. Martin, Barbara G. Phillips, and Vera Markgraf collected 69 species of plants on an inventory for The Nature Conservancy and the University of Arizona. The most important

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Figure 6. *Coryphantha robbinsorum*. A. Plants. B. Flower. *Photos by Erik F. Enderson.*

## Trans-border Flora and History of San Bernardino *continued*

botanical study at SBNWR was Gayle E. Marrs-Smith's 1980–1982 master's degree thesis at ASU on the flora and vegetation of the refuge (Marrs-Smith 1983). She was assisted by botanists Thomas Clark, Thomas F. Daniel, Phil Johnston, and Sandra Limerick. Daniel and Mary Butterwick returned to collect in 1983. Robert Hastings collected in the area in 2015. Chris Roll surveyed plants on SBNWR on over 80 trips in 2023–2025.

In 1993, Richard S. Felger collected a few specimens on Rancho San Bernardino in Sonora with Rubén Layne-Ruiz in route to his Rancho Pan Duro. In 2000, Alberto Búrquez-Montijo collected 85 species on SBNWR and 137 species on RSB. In 2002–2005 and 2007–2008, Minckley collected 20 plant species on SBNWR and 127 species on RSB; T'ai H. Roulston collected four species on SBNWR and 49 species on RSB; and Noelia la Torre 18 species on SBNWR and 60 species on RSB. They were members of Minckley's team studying composition and species richness of bees in the San Bernardino Valley (Minckley & Radke 2021).

In 2007, Van Devender, Reina-G., John F. Wiens, and Jeffrey Moore from the Arizona-Sonora Desert Museum (ASDM) surveyed limestone areas from west of Agua Prieta across Cuenca Los Ojos into adjacent Chihuahua under a U.S. Fish and Wildlife Service (FWS) Section 6 Contract in search of the Cochise foxtail cactus (*Coryphantha robbinsorum*) which was described from Cochise County near the Slaughter Ranch (Figure 6). It was listed in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1975 and given Threatened status by the U.S. Fish and Wildlife Service in 1986. They failed to find it and concluded in the final report that Lopresti's (1984) report of *C. robbinsorum* in Sonora was a fabrication and the species does not occur in Mexico (Van Devender & Reina-G. 2007). The flora of Chihuahuan desertscrub on limestone in northeastern Sonora was published in Van Devender et al. (2013). Many of the records in the Municipality of Agua Prieta helped document the forgotten flora of the borderland (Van Devender & Reina-G. 2005) for Curator J. Jesús Sánchez-E.'s Herbario Universidad de Sonora (USON) inventory project funded by the Comisión Nacional de Ciencia y Tecnología (CONACYT).

In 2007, Van Devender, Reina-G., and Erik F. Enderson surveyed plants on Rancho El Valle in eastern Cuenca Los Ojos, while searching for the Prairie Rattlesnake (*Crotalus viridis*, Enderson 2010). In 2010, Van Devender, Reina-G., and Roll inventoried plants in the area. In 2011, David A. Delgado from USON collected plants on RSB. Plants were intensely studied in many areas on Cuenca Los Ojos, including RSB, on the Madrean Archipelago Biodiversity Assessment Cuenca Los Ojos Expedition in 2009 and the Madrean Discovery Expedition Cajón Bonito Expedition in 2017 (Van Devender & Reina-G. 2017).

The specimens collected on these trips are deposited in the University of Arizona (ARIZ), ASDM, ASU, the Robert L. Minckley Private Collection (now in ARIZ), USON, and other herbaria. The records and observations from the more recent plant inventories in Cuenca Los Ojos are publicly available in the Madrean Discovery Expeditions (madreandiscovery.org) and linked databases in the SEINet/SYMBIOTA herbarium network. The San Bernardino plant records from SBNWR and RSB summarized here were compiled from the SEINet database and iNaturalist.

### Sonoran Local Floras

Detailed local floras are crucial to understanding regional plant distributions, ecology, and biogeography. They are always

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# Trans-border Flora and History of San Bernardino *continued*

preliminary with composition increasing with additional fieldwork and losing and gaining species with time. Stephen S. White's doctoral research in 1938–1942 along the Río Bavispe and in the Sierra El Tigre was the first systematic study of flora and vegetation in the Sonoran borderlands (northernmost point 55 km south of RSB, White 1948). In Arizona, the floras of the Chiricahua (Bennett et al. 1996) and Huachuca Mountains (Bowers & McLaughlin 1996) to the north and northwest are well known.

Since 2000, preliminary local floras have been published in many areas in Sonora (Figure 7). Local floras in tropical areas began with tropical deciduous forest along the Río Cuchujaqui near Álamos (Van Devender et al. 2000); foothills thornscrub at Ojo de Tonibabi in the Sierra de la Madera near Moctezuma (Valenzuela et al. 2013) and the lower Río Bavispe Valley (Van Devender et al. 2018); foothills thornscrub-oak woodland in the Sierra Murrieta near Bacanora (Van Devender et al. 2024); and foothills thornscrub-desert grassland transition in the El Picacho de Bacoachi south of Cananea (Van Devender et al. 2023).

Local floras have been published about the temperate oak woodland or oak woodland-desert grassland transition in the Sierra Juriquipa southeast of Nacozari de García (Makings et al. 2018), Sierra Buenos Aires east of Bacoachi (Ferguson et al. 2018), Rancho El Aribabi in the Sierra Azul west of Cananea (Sánchez-E. et al. 2013), and Sierra Chivato east of Nogales (Van Devender et al. 2019). Local floras in higher mountain ranges with pine-oak forest above oak woodland were in the Sierras Bacadéhuachi (Van Devender et al. 2013b), La Púrica northwest of Nacozari de García (Sánchez-E. et al. 2018), and Elenita west of Cananea (Carnahan et al. 2018).

Local floras were reported in Chihuahuan desertscrub in the Agua Prieta area in northeastern Sonora (Reina-G. & Van Devender 2013, Van Devender et al. 2013c) and Sonoran desertscrub in the Sierra Bachoco at Hermosillo in central Sonora (Sánchez-E. & Van Devender 2021). The San Bernardino local flora here includes desert grassland, Chihuahuan desertscrub, a very large ciénega, and riparian gallery forest.

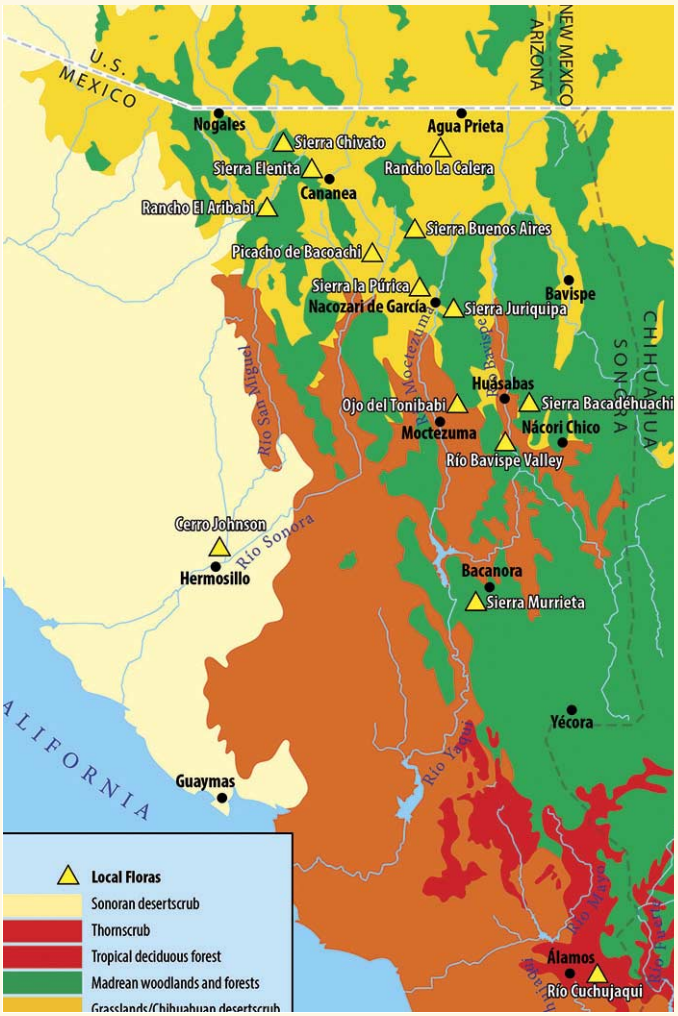


Figure 7. Map of local floras in Sonora. Vegetation modified from Brown & Lowe (1982). *Drafted by Marina Maskaykina.*

### Results

Marrs-Smith (1983) reported 343 plant taxa (species plus additional subspecies, varieties, and hybrids) in 230 genera and 72 families for SBNWR. We report 452 taxa in 265 genera and 70 families for SBNWR (108 additional taxa). We report 343 taxa in 198 genera and 57 families for the RSB in Sonora. The greater diversity on SBNWR likely reflects less systematic collecting on RSB. The trans-border flora for both areas has 541 taxa in 316 genera and 86 families. The most diverse families are Poaceae (88 taxa), Asteraceae (84 taxa), Fabaceae (28 species), Euphorbiaceae (24 species), Amaranthaceae (18 species), Boraginaceae and Solanaceae (17 species each), Brassicaceae (15 species), Malvaceae (14 species), Cactaceae and Cyperaceae (13 species each), Plantaginaceae and Verbenaceae (11 species each), and Convolvulaceae (10 species). The most speciose genera are *Euphorbia* (17 species), *Bouteloua* and *Eragrostis* (7 species each), and *Aristida, Boerhavia, Ipomoea, Oenothera, Opuntia,* and *Phacelia* (6 species each).

**Non-native species.** Plants often thrive and expand their ranges during periods of good climatic conditions and contract them during droughts or after catastrophic freezes. The abundances of common, non-native species such as *Descurainia sophia* (common tansy mustard), *Melilotus indicus* (Indian sweet-clover), and *Sisymbrium irio* (London rocket, *pamitón*) fluctuate dramatically tracking winter rainfall. *Salsola tragus* (tumbleweed) responds to summer rains. It is also important to

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recognize that only a relatively few non-native species are serious invasives that compete with native species or impact vegetation.

In 2007 and 2010, Reina-G. and Van Devender did an intensive survey of non-natives plants on various ranches in Cuenca Los Ojos and along Mexican Federal Highway 2. The results were included in a summary of Sonoran non-native plants (Van Devender et al. 2020). In addition to Roll's 2023–2025 surveys, refuge biologists inventoried non-native plants in 2013, 2020, and 2024 as part of management and eradication activities (U.S. Fish and Wildlife Service 2025a). Here we report a total of 70 non-native species (12.9.0%) in the trans-border San Bernardino flora. The families with the most exotic species are Poaceae (31 taxa), Brassicaceae (7 species), Asteraceae (5 species), and Fabaceae and Lamiaceae (3 species each).

*Asparagus officinalis* (asparagus), *Hordeum jubatum* (foxtail barley), and *Mirabilis jalapa* (marvel-of-peru, *maravilla*) are escaped garden plants. *Hordeum vulgare* var. *trifurcatum* and *Sorghum bicolor* are cultivated barley and sorghum. *Carya illinoiensis* (pecan, *nuez*), *Schinus molle* (Peruvian peppertree, *pimiento, pirul*), and *Ziziphus jujuba* (jujube, *datil chino*) were individuals of cultivated trees established away from houses or along highways. *Schinus molle* is an elegant urban tree that was brought to Mexico from Peru in 1550 by Antonio de Mendoza y Pacheco, the first Virrey ( = Viceroy) of New Spain. It has become a serious invasive weed in Australia, South Africa, and southern Mexico but is rarely encountered in Sonora. The *Ziziphus jujuba* likely descended from fruit trees grown by Chinese immigrants in the late 1800s who were forced to flee northern Sonora in the early 1900s during the Mexican Revolution.

*Berula erecta* (cutleaf waterparsnip), *Echinochloa colona* (junglerice), *Nasturtium officinale* (water cress, *berro*), *Polygonum argyrocoleon* (silver-sheath knotweed), *Polypogon monspliensis* (rabbitsfoot grass), and *Rumex crispus* (curly dock) can be locally invasive in aquatic habitats or adjacent wet soil. *Cynodon dactylon* (Bermuda grass) is an Old World grass found worldwide which thrives in wet areas but is also found in drier arroyos and along highways. *Sorghum halepense* is a stout perennial grass native to Asia and northern Africa. In about 1840, Colonel William Johnson admired it in Africa and planted it on his plantation in Alabama. It has been introduced worldwide and is a serious invasive species. It is of special concern in SBNWR. *Nicotiana glauca* (tree tobacco, *juan loco*) is a South American species widely scattered in Sonora. Although it locally forms thick stands in wide sandy riverbeds, it does not seem to compete with native species and is an important food source for migrating hummingbirds (Van Devender et al. 2004).

Some of the trans-border San Bernardino non-native plants are serious invasives in other areas, including *Bassia scoparia* (summer cypress, burningbush), *Bothriochloa ischaemum* (yellow bluestem), *Bromus rubens* (red brome), *B. tectorum* (cheatgrass), *Brassica tournefortii* (Sahara mustard), *Cenchrus ciliaris* (buffelgrass), *Centaurea melitensis* (Maltese star-thistle), *Eragrostis lehmanniana* (Lehmann lovegrass), and *Rhaponticum repens* (Russian knapweed). *Bassia scoparia, B. rubens, B. tectorum, C. melitensis,* and *R. repens* are invasive in winter rainfall areas to the north that are only recently reaching Sonora. *Bromus rubens* and *B. tectorum* are fire-prone winter annual grasses native to Eurasia and Africa that cause extensive damage to natural communities in the western United States. In Sonora, *B. rubens* has been collected on Pinacate Peak in 1985–1987, Sonoyta in 1992, and the Sierra El Humo in 2005. Van Devender and Reina-G. collected it in 2007–2008 in Arroyo Guadalupe on Rancho Puerta Blanca. The only known Sonoran locality for *B. tectorum* is in the Pinacate region. Since the seeds of these bromes do not survive long in the soil, populations are dramatically reduced in dry winters. Marrs-Smith collected both *B. rubens* and *B. tectorum* on SBNWR in 1981 but they have not been seen since. *Brassica tournefortii* is an African winter annual that has invaded vast areas in the sandy desert lowlands of California, Arizona, and Sonora. It is expanding eastward but is not invasive at higher elevations on Cuenca Los Ojos (Van Devender et al. 2020).

During the Dust Bowl in the 1930s, severe drought and overgrazing resulted in massive erosion and livestock loss. Government agencies and land grant universities tried to reverse catastrophic land use failures by planting miracle or silver bullet grasses to control erosion and provide livestock forage. The U.S. Department of Agriculture Tucson Plant Materials Center cultivated and introduced a variety of grasses from other parts of the world. Some of them, including *Cenchrus ciliaris* and *Eragrostis lehmanniana*, are the most serious invasive species today. They were not concerned about introduced species becoming invasive.

By the summer of 2006, Ibarra-F. et al. (2009) estimated that ca. 1 million hectares of *Cenchrus ciliaris* had been planted in Sonora. It is now ubiquitous but not noticeably expanding its range. *Cenchrus ciliaris* is scattered in the border lands from Douglas to SBNWR in Cochise County and the Agua Prieta area in Sonora. In 2007 and 2010, Reina-G. and Van Devender only found it in two localities on Cuenca Los Ojos (45 and 46 km east of Agua Prieta). These localities at 1,420 and 1,616 m elevation were unusually high for the species. We recently recorded it in Silver Creek and the southeastern corner of RSB. It has

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Figure 8. *Lilaeopsis schaffneri* var. *recurva* population along Leslie Creek, Leslie Canyon and flower (inset). *Photos by William R. Radke.*

## Trans-border Flora and History of San Bernardino *continued*

expanded its range since 2010 but is only locally a serious invasive in the study area.

*Eragrostis lehmanniana* is an especially pervasive invader in desert grassland in the southwestern United States, especially in southeastern Arizona, but has not expanded far south of the Arizona-Sonora borderlands. In Sonora, it is a serious invasive only in the foothills of the Sierras San José near Naco and Sierra San Luis in the eastern part of Cuenca Los Ojos (Van Devender et al. 2020). *Eragrostis echinochloidea* (African lovegrass) is a South African perennial grass that since its introduction in the 1940s has spread widely in the Tucson-Nogales area, but only recently into northern Sonora. *Eragrostis superba* (Wilman lovegrass) is another African grass that has a similar distribution in southern Arizona but is rare in Sonora. It was collected on SBNWR by Marrs-Smith in 1981 and Robert Hastings in 2015. It is expected to occur on RSB. *Bothriochloa ischaemum* from Eurasia and north Africa is widely invasive across the United States, including Arizona. In northern Sonora, it has been collected locally from Magdalena-Nogales east to Cajón Bonito on Cuenca Los Ojos.

Expanding use of roads provides vectors for non-native species to spread into the area. This includes both visitation to the refuge and Slaughter Ranch as well as traffic along the Roosevelt easement parallel to the international border. Refuge staff monitor these areas annually to observe and treat new arrivals of potentially invasive species, one example being the removal of occasional *Tamarix chinensis-T. ramosissima*-complex before it can harm the native riparian habitats.

Climate change predictions include milder winters with reduced precipitation, warmer summers with more intense fore-summer drought, and likely greater warm season precipitation in the summer monsoon and more frequent late summer-fall tropical storms and hurricanes. The southern distribution limits of winter rainfall species such as *Bassia scoparia, B. rubens. B. tectorum, Centaurea melitensis,* and *Rhaponticum repens* are likely to move north away from San Bernardino. The distributions of summer-active non-native perennial grasses, including *Bothriochloa ischaemum, Cenchrus ciliaris, Eragrostis echinocloidea, E. lehmanniana,* and *E. superba,* are likely to continue expanding southward in Sonora.

### Noteworthy Species

*Lilaeopsis schaffneri* var. *recurva* (Huachuca waterumbel) is a federally listed Endangered Species in the United States. It is a delicate aquatic plant found in ciénegas and marshy areas along streams (Figure 8) in a small area from Tucson to Nogales and Douglas, Arizona, a few scattered areas in northern Sonora, and a single locality in Chihuahua. It is highly vulnerable because its habitat is so limited and severely impacted by cattle (Malcom & Radke 2008). It was reported to occur around Slaughter Ranch and several impoundments on SBNWR in the 1980s and 1990s, but these naturally occurring populations were not found in

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Figure 9. San Bernardino National Wildlife Refuge plants. A, B. *Oenothera havardii*. C. *Glandularia pumila. Photos by Chris Roll.*

## Trans-border Flora and History of San Bernardino *continued*

surveys in the 2000s (U.S. Fish and Wildlife 2017a). Since the 2000s, refuge staff have propagated and planted water umbel in suitable sites along Black Draw and Hay Hollow with mixed success (Malcom et al. 2017, Barron, pers. data). Several patches persisted and spread along the riparian corridor naturally for awhile through spring 2024 (U.S. Fish and Wildlife 2025b), but late season surveys in SBNWR and Leslie canyon did not find any patches. In 2008, James R. Rorabaugh found it in Río San Bernardino just below its confluence with Cajón Bonito (67 km by air SSE of MEX 2). It potentially occurs on RSB.

A thistle collected by Charles Wright in the San Bernardino Ciénega' in 1851 was described in his honor as *Cirsium wrightii* (Wright's marsh thistle) by Asa Gray, the famous Harvard University botanist, in 1853. This single specimen is currently the only evidence of the plant occurring in Arizona, with a dozen present localities in New Mexico in the SEINet database. It is known in Mexico from three localities. In 1890, Carl V. Hartman collected it in Fronteras, Sonora, on the Carl Lumholtz Expedition to Mexico. This is the site of the Spanish Presidio, 58 km south-southwest of the refuge locality, on the Río Cabullona, a north-flowing tributary of the Río Bavispe. In 1982, Frank W. Reichenbacher and Van Devender collected it at Ojo de los Reyes in the Río Santa María Valley near Galeana, Chihuahua. At the time, they were working for The Nature Conservancy's Arizona Natural Heritage Program when Rancho San Bernardino was transferred to the U.S. Fish & Wildlife Service to found the refuge. The specimen was determined by Billie Lee Turner, guru of Mexican Asteraceae, at the University of Texas Herbarium. Since then, Ojo de los Reyes has been pumped dry by Mennonite farmers (Jesüs Sánchez-E., pers. comm, 2022). In 2022, Valenzuela-Chacón collected it at Ojo Vareleño near Casa Grandes, Chihuahua, 53 km north-northwest of Ojo los Reyes.

*C. wrightii* is a wetland-obligate species with pale lavender or white flowers strongly associated with ciénegas that is an Endangered species in New Mexico. It is thought to be extirpated from the San Bernardino wetlands due to intense grazing and agricultural practices despite several surveys on both sides of the border (U.S. Fish and Wildlife Service 2017).

*Oenothera havardii* (Havard's evening primrose) is a tufted perennial with a large flower (Figure 9A, B) that is only known from a few SEINet records in a curiously scattered distribution in Texas, Chihuahua, and the Agua Prieta-Douglas and San Bernardino areas in Arizona and Sonora. It is likely more common in disturbed habitats because, unless in flower, it is easily overlooked.

*Glandularia pumila* (dwarf vervain) is a common annual (Figure 9C) in central Texas and tropical southern and central Sonora. The SBNWR specimens are the first records from Arizona. It is locally abundant in wet years but absent in dry years.

*Ibervillea tenuisecta* (slimlobe globeberry) occurs in the Chihuahuan Desert from San Luis Potosí north to western Texas and west to southeastern Arizona. In Sonora, it is known from near Agua Prieta and San Bernardino. In the warm season, dissected leaves emerge from a large subterranean tuber and then bear yellow flowers and orange fruit (Figure 10A). It is related to *I. sonorae* (*güerequi*) in tropical southern Sonora which has an aboveground tuber that is used medicinally.

*Peniocereus greggii* (night-blooming cereus) was first collected at San Bernardino by Thurber in 1851. It is found in northeastern Mexico through the Chihuahuan Desert in Texas west to western Arizona and northwestern Sonora. Usually, multiple stems grow from a very large tuber underneath taller mesquites or other

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Figure 10. *Ibervillea tenuisecta* on San Bernardino National Wildlife Refuge. Photo by Roll. B, C. *Peniocereus greggii* flowers and tuber on Mesa la Víboras. *Photos by Erik F. Enderson.*

## Trans-border Flora and History of San Bernardino *continued*

desert shrubs. Its large white flowers open at night. The Chihuahuan variety *P. g.* var. *greggii* is in the San Bernardino area (Figure 10B, C). A large population at Mesa Las Víboras (14 km SSE of RSB) is unusual because the cactus stems, flowers, and fruit are higher than dwarf velvet mesquites growing in clay soil!

### History

***History of Mexico.*** After the 1521 conquest of the Aztec Empire, Hernán Cortés founded Mexico City as the capital of New Spain and immediately began the exploration of the vast new territory along the coasts, and establishing mines and missions inland. Acapulco (now in the state of Guerrero) was established in 1523 as the New World Pacific coast terminus for the Spanish *galleon* trade with the Philippines. In 1531, Nuño Beltrán de Guzmán established an outpost at San Miguel de Culiacán (now Sinaloa) to control the indigenous populations. In 1533-1535, Cortés sent ships from Culiacán to the Cape Region of the Baja California Peninsula and established the short-lived colony at Santa Cruz (= La Paz; Moriarty 1965).

The inland exploration of New Spain was fueled by the quest for minerals. Rich silver mines were opened in Zacatecas (central Mexico) in 1546. The Chamuscado and Rodríguez Expedition trekked through El Paso in Nuevo México in 1581–1582. El Paso del Norte (now Ciudad Juárez, Chihuahua) was founded in 1659. Santa Fe, Nuevo México, founded in 1610, is the oldest state capital in the United States and the earliest European settlement west of the Mississippi River.

Napoleon's invasion of Spain in 1808 led to a political crisis among American-born Spaniards in New Spain, resulting in the Mexican War of Independence in 1810–1821. The territory of the new country of Mexico was enormous — from the Yucatán Peninsula north to Texas and Colorado, and west to California. The state of Sonora, along the Pacific coast from Jalisco north to the Gila River included today's Sinaloa and southern Arizona. The state of California extended from the Baja California Peninsula north to Canada and east to Nuevo México. The area from Guatamala south to Panamá was added to Mexico in 1822–1823.

***European History of Sonora.*** Ships commanded by Francisco de Ulloa discovered the port of Guaymas in 1539 (Figure 11). Resistance to European intrusion on their lands by the Yaqui Indians kept the Spanish out of southern Sonora until the 1600s. Álamos in southern Sonora was founded in 1630 when Jesuit missionaries built a church (French 1962). Resistance to European intrusion on their lands by the Yaqui Indians kept the Spanish out of southern Sonora until the 1600s. Álamos in southern Sonora was founded in 1630 when Jesuit missionaries built a church. With the discovery of rich silver deposits at La Aduana in 1683, Álamos grew into a wealthy colonial town. Small missions were established near Guaymas in the 1610s and 1620s when the Jesuits worked with the Yaqui Indians, but were soon abandoned. In the early 1700s, Jesuits Juan Maria Salvaterra and Eusebio Francisco Kino established several missions near Guaymas but they were abandoned by 1759 because of Seri Indian attacks. Although a military force defeated the Seris and Pimas and built a fort in 1769, colonists did not settle in the area until the early 1800s. New Spain authorized Guaymas for commercial maritime traffic for the port in 1811 and established a Mexican customs house in 1823.

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# Trans-border Flora and History of San Bernardino *continued*

Figure 11. View of Guaymas Bay. Columnar cactus is *Pachycereus pringlei* (cardón). *Photo by Tom Van Devender.*

Jesuit missions were founded in Ures in 1644, Fronteras in 1845, and Arizpe in 1646. The New Spain province of Sonora, Ostimuri y Sinaloa formed in 1691 but was divided into the states of Sinaloa and Sonora in 1823. Ures, with about 1,300 settlers, was the capital of Sonora. The states were reunited in 1824 and re-separated in 1831 with the Sonoran capital in Hermosillo, Arizpe, and by 1838, Ures again.

In 1701, a Spanish presidio (military post) named Santa Rosa de Corodéguachi was established in Fronteras in northern Sonora to protect the scattered settlers and missions from Apache depredations. The second commander of the Fronteras Presidio in 1726 was Juan Bautista de Anza, whose son of the same name took 240 colonists from Tubac (now Arizona) to settle Monterrey in Upper California in 1775–1776 and then discovered San Francisco Bay. To provide a base for a general offensive campaign against the Apaches, the presidio was temporarily relocated from Fronteras to the San Bernardino springs in 1775–1780 and extensive fortress-like buildings were constructed.

***History of San Bernardino.*** Because of the well-known perennial springs, San Bernardino was an important stop for travelers. The first European to have passed through San Bernardino was likely Álvar Núñez Cabeza de Vaca, a survivor of the ill-fated Panfilo de Narvaez Expedition in 1530. In 1539 and 1540, the Fray Marcos de Niza and Francisco Vázquez de Coronado expeditions passed through San Bernardino in search of the fabled seven cities of Cíbola.

Prior to the Mexican-American War (1846–1848), there were no towns and few Europeans between El Paso (now Texas) and Tucson (now Arizona) in the modern borderlands. The most-traveled route was from El Paso to the Santa Rita del Cobre mine (near Silver City, now New Mexico) south through Guadalupe Pass, along Arroyo Guadalupe to San Bernardino and Fronteras. In ca.1800, rich copper deposits were discovered in Santa Rita (in Chihuahua). From 1828 to 1838, Mina Santa Rita del Cobre produced vast amounts of copper. In 1838 Apaches massacred the people and burned the town, temporarily halting production. In 1862, New Mexico was the second most important mining district in the U.S. after Michigan, mostly because of the Santa Rita Mine.

In the 1620–1640s, Jesuit missionaries introduced cattle at the missions they established in Sonora. In 1694, when Padre Eusebio Kino visited San Bernardino, it was estimated that there were 10,000 cattle in northern Sonora (Wagoner 1975). But like the mines, ranches were periodically abandoned because of Apache raids. In the early 1700s, there were lots of cattle on San Bernardino but it was abandoned in the late 1700s. With the Mexican San Bernardino Land Grant to Lieutenant Ignacio Pérez in 1822, ranching revived but was abandoned by 1830 as the trading rapport between the Apaches and Spanish deteriorated after Mexican Independence in 1821.

The history of San Bernardino was directly impacted by faraway events. Texas won its independence from Mexico in 1836. It's application for U.S. statehood in 1845 sparked a heated debate because Texas was a slave state. When statehood was approved by Congress, Antonio López de Santa Anna, president of Mexico eleven times when he was not in exile, moved into Texas. He intended to reclaim the land between the Rios Bravo (Grande) and Nueces, reneging on the Texas-Mexico treaty. U.S. troops met the Mexican force in Texas, beginning the Mexican-American War. The only military confrontation in Sonora in the war was siege and capture of the port of Guaymas (Figure 11) by U.S. warships in 1847, which crippled the economy of the state.

In 1846, the Mormon Battalion went through the ruins of Rancho San Bernardino south of today's border. They were U.S. Army volunteers led by Lt. Colonel Philip St. George Cooke to develop a wagon road from New Mexico to San Diego (Cooke 1848). Robert Whitworth wrote in his diary "2 ft tall grass was as far as you could see in a beautiful valley. Mesquite was the only 'tree.'" Feral cattle were common. 'An immense red bull rushed by', startling Cooke. Antelope were 'plenty'.

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# Trans-border Flora and History of San Bernardino *continued*

Figure 12. A. Former Texas ranger John Slaughter ready for action. B. Valer Austin in Silver Creek on Rancho San Bernardino regaling visitors with her conservation actions. *Photo by Ana Lilia Reina-G.*

One of the routes to California during the 1849 Gold Rush was through San Bernardino. Benjamin Harris saw extensive grassland with 5,000–15,000 feral cattle near modern Agua Prieta. H.D.J. Powell saw locally common mesquite. After the Mexican-American War, the U.S. Mexico Boundary Survey Expedition camped at San Bernardino in 1851 where Boundary Commissioner John Russell Bartlett saw "luxuriant meadows of grass and lots of water". Feral bulls bellowed and wolves howled at night (Davis 1982). In 1853, surveyor William H. Emory also noted "numerous springs, rushy ponds, and thick grasses" in the area (Emory 1857).

When the war ended, Sonora lost 339,370 hectares of its territory to the U.S. through the Treaty of Guadalupe Hidalgo. An additional 76,800 km$^2$ in present-day southern Arizona and southwestern New Mexico were added to the U.S. in the Gadsden Purchase in 1854. The United States-Mexico boundary passed through the San Bernardino Valley, leaving most of San Bernardino Land Grant in Mexico with only 970 ha (2,400 acres) in the United States (Wagoner 1975). It also divided wetlands with long-term impacts. Rancho Los Nogales was a camp for the U.S. Boundary Survey Expedition that grew into the town of Nogales.

Biologists on the Second U.S.-Mexico (1892–1894) boundary survey, led by U.S. Army Captain Edgar A. Mearns, inventoried the Sierra San Luis and Cajón Bonito. The area between Monument 73 at Arroyo Guadalupe (now Rancho Puerta Blanca) and Naco, Arizona/Sonora was visited in August 1893 (Mearns 1907). Lieutenant David Dubose Gaillard wrote the general vegetation descriptions for sites visited, including "The San Bernardino River is wooded with willow, cottonwood, boxelder, ash and mesquite; a few red junipers grow on adjacent hills; and creosote bush, mesquite, acacia and ocotillo occupy the stony mesas and arroyos which constitute the major portion of that region. The broad meadows below the San Bernardino Springs are now covered by grazing herds; but at the time of Emory's survey they were occupied by a dense growth of cane which has since entirely disappeared." He described the Arizona-Sonora borderlands as "bare, jagged mountains rising out of the plains like islands from the sea" — one of the first times that the powerful "sky island in a desert sea" image was used. Later he was the lead engineer on the construction of the Panama Canal.

### Conservation of the San Bernardino Wetlands

As outlined above, the San Bernardino Ciénega and Río San Bernardino in the headwaters of the Río Yaqui were once extensive but today only exist in remnant sections. Many of the historical springs have either stopped flowing or only flow for part of the year (Hendrickson & Minckley 1985). Many areas of former Ciénega have been invaded by mesquite and other shrubs.

***Slaughter Ranch.*** John Horton Slaughter (1841–1922) was a Texas ranger and Confederate soldier before moving to Arizona in late 1870s (Figure 12A). The Apache campaign of Crooke and Bourke in 1883 removed the Apache influence from southern Arizona and opened the San Bernardino Valley for permanent settlement (Bourke 1886). In 1884, Slaughter bought the San Bernardino Land Grant on both sides of the border from the descendants of Ignacio Pérez plus adjacent lands to establish a successful cattle ranch. In 1886–1890, he was the Sheriff of Cochise County. The ranch house became the San Bernardino Ranch National Historical Monument in 1964. In 1980, The Nature Conservancy bought the ranch as a holding project until Congress approved funds to transfer it to the U.S. Fish & Wildlife Service. The 2,369-acre San Bernardino National Wildlife Refuge was established in 1982 to protect what remained of the ciénega and wildlife, especially endangered Río Yaqui fishes (Hendrickson & Minckley 1985). In addition to monitoring and management of federally listed species, the refuge is presently working to restore former ciénega habitat through restoration of the water table.

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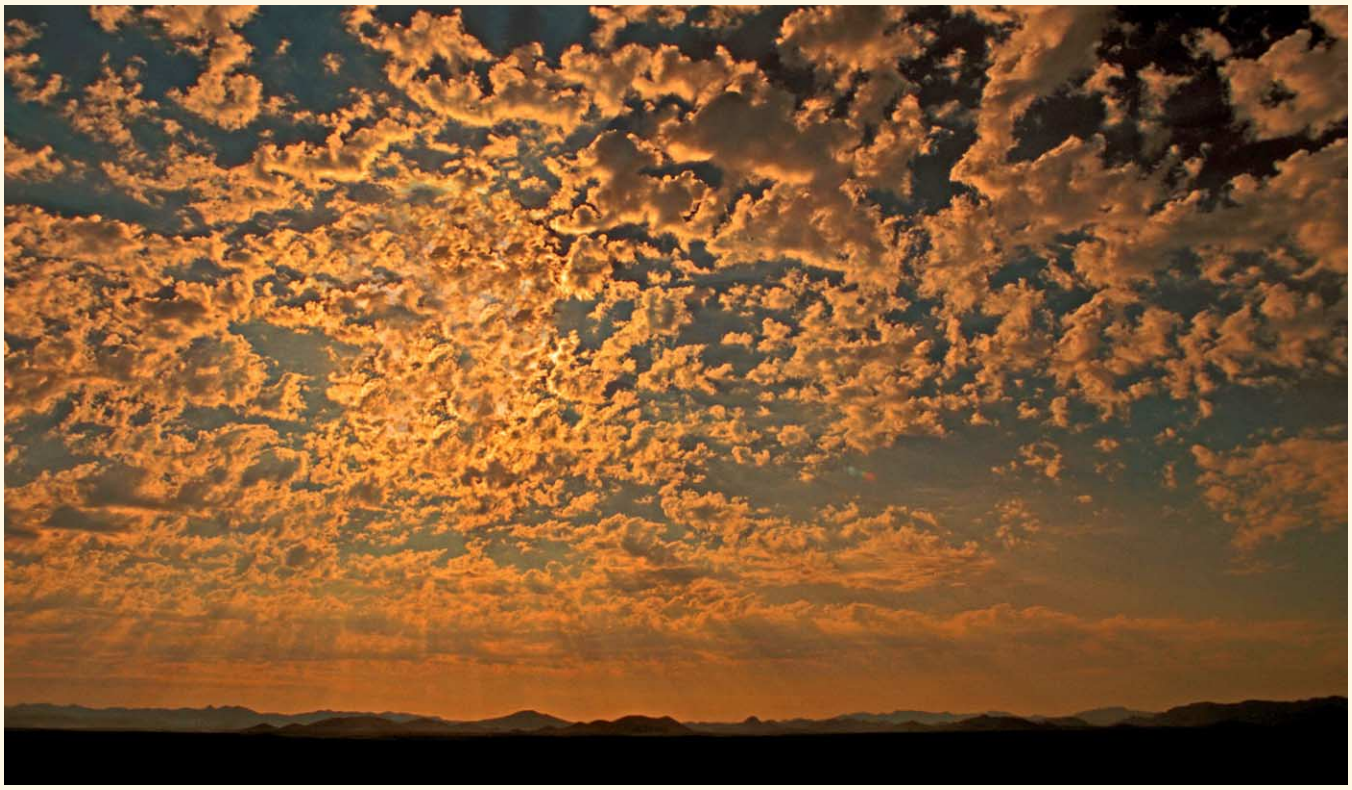

Figure 13. Sunrise in the San Bernardino Valley. *Photo by William R. Radke.*

## Trans-border Flora and History of San Bernardino *continued*

***Rancho San Bernardino.*** Valer Clark moved to a cattle ranch in the Chiricahua Mountains in southeastern Arizona (Figure 12B). She was taken by the rawness of the desert landscape but dismayed by how overgrazing had taken its toll on the grasslands. In the next four decades, she acquired more than 120,000 acres on nine ranches in Sonora south of the Arizona border that became the private Cuenca Los Ojos Foundation. It not only protected the San Bernardino wetlands but adjacent Chihuahuan desertscrub and desert grassland; Plains grassland in the southern extension of the Cloverdale-Animas Valley; and oak woodland and pine-oak forest in the Sierra San Luis. The recovery of cottonwood gallery forests along Cajón Bonito (Figure 4) and grasses in many areas in the absence of cattle grazing has been amazing. *Muhlenbergia porteri* (bush muhly) is a palatable grass that is widespread in desertscrub and desert grassland in the southwestern United States and Sonora that is often uncommon or rare with cattle grazing. Its abundance on RSB reflects a strong recovery without grazing. In 2018, Clark formally created non-profit organizations in the U.S. (501[c])3) and Mexico (A.C. [Civil Association]) named Cuenca los Ojos (Figure 13).

***San Bernardino and the Border Wall.*** In recent years, the construction of a wall along the U.S.-Mexico border has been controversial. Concerns have been expressed about biotic impacts, especially that the wall interrupts animal dispersals. The genetic integrity of animal populations and dispersal of individuals between them are not legally protected in the U.S. or Mexico. Animals are continuously killed along Mexican Federal Highway 2 immediately south of the border, including American black bear (*Ursus americanus*) and mountain lion (*Puma concolor*). In contrast, animals are not dying along the wall. Concerns have also been raised about the effects of the wall on water. Modifications in the wall allow water to pass in riparian areas like San Bernardino. Upland vegetation receives the same amount of rainfall on both sides of the border. Differences in vegetation north and south of the wall reflect different land use history, not interference in water flow.


### Acknowledgments

Valer Clark's vision and the creation of Cuenca Los Ojos are shining examples of conservation in Sonora. Valer, Robert L. Minckley, and T'ai Roulston hosted plant trips and Sky Island Alliance and Madrean Discovery Expeditions biotic inventories. Olyvia A. Childress and Valerie Gordon facilitated recent visits to SBNWR and RSB. Taxonomic advice from Susan D. Carnahan, George M. Ferguson, Mark Fishbein, Elizabeth Makings, Guy L. Nesom, and Michael Bauer helped with the ever-changing plant


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# CHECKLIST: San Bernardino, Arizona and Sonora *page 1 of 7*

NWR = San Bernardino National Wildlife Refuge

RSB = Rancho San Bernardino

An asterisk (*) denotes non-native status.

## Pteridophytes

### MARSILEACEAE

*Marsilea vestita* Hook. & Grev. NWR

## Gymnosperms

### CUPRESSACEAE

*Juniperus arizonica* (R.P. Adams) R.P. Adams NWR

### EPHEDRACEAE

*Ephedra trifurca* Torr. ex S. Watson NWR, RSB

## Eudicots

### ACANTHACEAE

*Anisacanthus thurberi* (Torr.) A. Gray NWR, RSB

*Carlowrightia arizonica* A. Gray NWR

*Dicliptera resupinata* (Vahl) Juss. RSB

*Ruellia ciliatiflora* Hook. NWR, RSB

*Tetramerium nervosum* Nees NWR, RSB

### AIZOACEAE

*Trianthema portulacastrum* L. NWR, RSB

### AMARANTHACEAE

*Alternanthera caracasana* Kunth RSB

*Amaranthus palmeri* S. Watson NWR, RSB

*Amaranthus torreyi* (A. Gray) Benth. ex S. Watson NWR

*Atriplex canescens* (Pursh) Nutt. NWR, RSB

*Atriplex elegans* (Moq.) D. Dietr. NWR, RSB

*Atriplex semibaccata* R. Br. RSB

*Atriplex wrightii* S. Watson NWR **Bassia scoparia* (L.) A.J. Scott RSB

*Blitum nuttallianum* Schult. NWR

**Chenopodium album* L. var. *lanceolatum* (Muhl. ex Willd.) Coss. & Germ. NWR

*Chenopodium arizonicum* Standl. NWR

*Chenopodium fremontii* S. Watson NWR

*Chenopodium incanum* (S. Watson) A. Heller var. *elatum* Crawford NWR

*Chenopodium leptophyllum* (Moq.) Nutt. ex S. Watson NWR

*Chenopodium neomexicanum* Standl. NWR, RSB

**Salsola tragus* L. NWR, RSB

*Suaeda torreyana* S. Watson RSB

*Tidestromia lanuginosa* (Nutt.) Standl. NWR, RSB

### ANACARDIACEAE

*Rhus microphylla* Engelm. NWR, RSB

**Schinus molle* L. RSB

### APIACEAE

**Berula erecta* (Huds.) Coville NWR, RSB

*Bowlesia incana* Ruiz & Pav. NWR

*Daucus pusillus* Michx. NWR, RSB

*Lilaeopsis schaffneriana* (Schltdl.) J.M. Coult. & Rose var. *recurva* (A.W. Hill) Affolter NWR

*Spermolepis lateriflora* G.L. Nesom NWR

*Vesper multinervatus* (J.M. Coult. & Rose) R.L. Hartm. & G.L. Nesom NWR

*Yabea microcarpa* (Hook. & Arn.) K.-Pol. RSB

### APOCYNACEAE

*Asclepias brachystephana* Engelm. ex Torr. NWR

*Asclepias nyctaginifolia* A. Gray NWR

*Asclepias subverticillata* (A. Gray) Vail NWR, RSB

*Chthamalia producta* (Torr.) L.O. Alvarado & E.B. Cortez NWR, RSB

*Funastrum crispum* (Benth.) Schltr. NWR

*Funastrum cynanchoides* (Decne.) Schltr. NWR, RSB

*Funastrum heterophyllum* (Engelm. ex Torr.) Standl. NWR, RSB

*Mandevilla brachysiphon* (Torr.) Pichon RSB

*Matelea parvifolia* (Torr.) Woods. RSB

### ARISTOLOCHIACEAE

*Aristolochia watsonii* Wooton. & Standl.

### ASTERACEAE

*Acourtia nana* (A. Gray) Reveal & R.M. King NWR, RSB

*Acourtia wrightii* (A. Gray) Reveal & R.M. King NWR, RSB

*Almutaster pauciflorus* (Nutt.) A. Löve & D. Löve NWR

*Ambrosia confertiflora* DC. NWR, RSB

*Ambrosia monogyra* (Torr. & A. Gray) Strother & B.G. Baldwin NWR, RSB

*Arida parviflora* (A. Gray) D.R. Morgan & R.L. Hartm. RSB

*Artemisia ludoviciana* Nutt. NWR

*Baccharis pteronioides* DC. RSB

*Baccharis salicifolia* (Ruiz & Pav.) Pers. NWR, RSB

*Baccharis sarothroides* A. Gray NWR, RSB

*Baileya multiradiata* Harv. & A. Gray NWR, RSB

*Baileya pleniradiata* Harv. & A. Gray NWR

*Barkleyanthus salicifolius* (Kunth) H.E. Robins. & Brett. RSB

*Bebbia juncea* (Benth.) Greene NWR, RSB

*Bidens laevis* (L.) Britton, Sterns & Poggenb. NWR

*Bidens leptocephala* Sherff NWR

*Calycoseris wrightii* A. Gray NWR, RSB

**Centaurea melitensis* L. NWR, RSB

*Chaenactis stevioides* Hook. & Arn. NWR, RSB

*Chaetopappa ericoides* (Torr.) G.L. Nesom NWR, RSB

*Chloracantha spinosa* (Benth.) G.L. Nesom NWR

*Cirsium neomexicanum* A. Gray RSB

*Cirsium ochrocentrum* A. Gray NWR, RSB*Cirsium wrightii* A. Gray NWR (extirpated)

*Conoclinium dissectum* A.Gray NWR

*Conyza canadensis* (L.) Cronquist var. *glabrata* (A. Gray) Cronquist NWR, RSB

*Diaperia verna* (Raf.) Morefield NWR

*Encelia farinosa* A. Gray ex Torr. RSB

*Erigeron divergens* Torr. & A. Gray NWR, RSB

*Erigeron flagellaris* A. Gray RSB

# CHECKLIST: San Bernardino, Arizona and Sonora *page 2 of 7*

*Flourensia cernua* DC. NWR, RSB

*Gaillardia pulchella* Foug. RSB

*Gamochaeta stagnalis* (I.M.Johnst.) Anderb. NWR

*Gutierrezia microcephala* (DC.) A. Gray NWR, RSB

*Gutierrezia sarothrae* (Pursh) Britton & Rusby RSB

*Hedosyne ambrosiifolia* (A. Gray) Strother NWR

*Helenium thurberi* A. Gray NWR, RSB

*Helianthus annuus* L. NWR, RSB

*Helianthus ciliaris* DC. NWR

*Heliomeris hispida* (A. Gray) Cockerell NWR

*Heliomeris longifolia* (Robins. & Greenm.) Cockerell RSB

*Heterotheca subaxillaris* (Lam.) Britton & Rusby NWR

*Hymenothrix wislizeni* A. Gray NWR

*Hymenoxys odorata* DC. NWR, RSB

*Isocoma acradenia* (Greene) Greene NWR, RSB

*Isocoma tenuisecta* Greene NWR, RSB

**Lactuca saligna* L. RSB

**Lactuca serriola* L. NWR, RSB

*Laennecia coulteri* (A. Gray) G.L. Nesom NWR, RSB

*Machaeranthera tagetina* Greene NWR, RSB

*Malacothrix fendleri* A. Gray NWR, RSB

*Malacothrix glabrata* (A. Gray ex D.C. Eaton) A. Gray NWR, RSB

*Parthenium incanum* Kunth NWR, RSB

*Pectis cylindrica* (Fern.) Rydb. NWR, RSB

*Pectis filipes* Harvey & A. Gray var. *subnuda* Fern. NWR

*Picradeniopsis absinthifolia* (Benth.) B.G. Baldwin NWR, RSB

*Pluchea sericea* (Nutt.) Coville NWR

*Porophyllum gracile* Benth. NWR

*Prenanthella exigua* (A. Gray) Rydb. RSB

**Pseudognaphalim luteoalbum* (L.) Hilliard & B.L. Burtt NWR

*Pseudognaphalium stramineum* (Kunth) W.A. Weber NWR

*Psilostrophe cooperi* (A. Gray) Greene RSB

**Rhaponticum repens* (L.) Hidalgo RSB

*Sanvitalia abertii* A. Gray NWR

*Senecio flaccidus* Less. var. *flaccidus* NWR, RSB

*Senecio flaccidus* Less. var. *monoensis* (Greene) B.L. Turner & T.M. Barkl. NWR, RSB

*Solidago velutina* DC. NWR

*Solidago wrightii* A. Gray var. *adenophora* Blake NWR

**Sonchus asper* (L.) Hill NWR, RSB

**Sonchus oleraceus* L. NWR, RSB

*Stephanomeria* aff. *tenuifolia* (Raf.) Hall RSB

*Stephanomeria pauciflora* (Torr.) A. Nels. NWR, RSB

*Symphyotrichum subulatum* (Michx.) G.L. Nesom var. *parviflorum* (Nees) S.D. Sundberg NWR

*Thymophylla acerosa* (DC.) Strother NWR, RSB

*Thymophylla pentachaeta* (DC.) Small NWR, RSB

*Uropappus lindleyi* (DC.) Nutt. NWR, RSB

*Verbesina encelioides* (Cav.) Benth. & Hook. f. ex A. Gray subsp. *exauriculata* (B.L. Rob. & Greenm.) J.R. Coleman NWR, RSB

*Verbesina rothrockii* B.L. Rob. & Greenm. NWR

*Viguiera dentata* (Cav.) Spreng. NWR

*Xanthisma gracile* (Nutt.) D.R. Morgan & R.L. Hartm. NWR, RSB

*Xanthisma spinulosum* (Pursh) D.R. Morgan & R.L. Hartman var. *chihuahuanum* (B.L. Turner & R.L. Hartman) D.R. Morgan & R.L. Hartman NWR, RSB

*Xanthium orientale L. NWR*

*Zinnia acerosa* (DC.) A. Gray NWR, RSB

*Zinnia grandiflora* Nutt. RSB

### BIGNONIACEAE

*Chilopsis linearis* (Cav.) Sweet RSB

### BORAGINACEAE

*Cryptantha barbigera* (A. Gray) Greene NWR, RSB

*Cryptantha crassisepala* (Torr. & A. Gray) Greene NWR, RSB

*Cryptantha muricata* (Hook. & Arn.) A. Nelson & J.F. Macbr. RSB

*Cryptantha pterocarya* (Torr.) Greene NWR

*Eucrypta micrantha* (Torr.) Heller NWR, RSB

*Johnstonella angustifolia* (Torr.) Hasenstab & M.G. Simpson NWR, RSB

*Lappula occidentalis* (S. Watson) Greene NWR, RSB

*Pectocarya platycarpa* (Munz & I.M. Johnst.) Munz & I.M. Johnst. NWR

*Pectocarya recurvata* I.M. Johnston RSB

*Phacelia affinis* A. Gray NWR, RSB

*Phacelia arizonica* A. Gray NWR, RSB

*Phacelia bombycina* Wooton & Standl. NWR

*Phacelia caerulea* Greene NWR, RSB

*Phacelia crenulata* Torr. ex S. Watson NWR, RSB

*Phacelia neomexicana* Thurb. ex Torr. RSB

*Plagiobothrys arizonicus* (A. Gray) Greene ex A. Gray NWR

*Tiquilia canescens* (A. DC.) A.T. Richardson NWR, RSB

### BRASSICACEAE

**Brassica nigra* (L.) W.D.J. Koch RSB

**Brassica tournefortii* Gouan RSB

**Chorispora tenella* (Pall.) DC. RSB

*Descurainia obtusa* (Greene) O.E. Schulz subsp. *adenophora* (Wooton & Standl.) Detling RSB

*Descurainia pinnata* (Walter) Britton NWR, RSB

**Descurainia sophia* (L.) Webb ex Prantl NWR, RSB

*Erysimum capitatum* (Douglas ex Hook.) Greene RSB

*Lepidium oblongum* Small NWR

*Lepidium thurberi* Wooton NWR, RSB

**Nasturtium officinale* W.T. Aiton NWR

*Physaria gordonii* (A. Gray) O'Kane & Al-Shehbaz NWR, RSB

*Physaria purpurea* (A. Gray) O'Kane & Al-Shehbaz NWR, RSB

**Rhaphanus raphanistrum* L. RSB

**Sisymbrium irio* L. NWR, RSB

# CHECKLIST: San Bernardino, Arizona and Sonora *page 3 of 7*

*Streptanthus carinatus* C. Wright ex A. Gray subsp. *arizonicus* (S. Watson) Kruckeb., Rodman & Worth. NWR, RSB

### CACTACEAE

*Cylindropuntia fulgida* (Engelm.) Knuth NWR

*Cylindropuntia imbricata* (Haw.) F.M. Knuth subsp. *spinosior* (Engelm.) M.A .Baker, Cloud-H. & Majure NWR, RSB

*Cylindropuntia imbricata* (Haw.) F.M. Knuth x *C. leptocaulis* (DC.) Knuth NWR

*Cylindropuntia leptocaulis* (DC.) Knuth NWR, RSB

*Echinocereus fendleri* (Engelm.) Sencke ex J.N. Haage subsp. *rectispinus* (Peebles) N.P. Taylor NWR, RSB

*Ferocactus wislizeni* (Engelm.) Britton & Rose NWR, RSB

*Opuntia chlorotica* Engelm. & Bigelow NWR

*Opuntia engelmannii* Salm-Dyck NWR, RSB

*Opuntia macrocentra* Engelm. NWR, RSB

*Opuntia macrorhiza* Engelm. subsp. *pottsii* (Salm-Dyck) U. Guzmán & Mandujano RSB

*Opuntia phaeacantha* Engelm. NWR, RSB

*Opuntia santa-rita* (Griffiths & Hare) Rose NWR, RSB

*Peniocereus greggii* (Engelm.) Britt. & Rose

### CAMPANULACEACE

*Nemacladus orientalis* (McVaugh) Morin RSB

### CANNABACEAE

*Celtis pallida* Torr. NWR, RSB

*Celtis reticulata* Torr. NWR, RSB

### CARYOPHYLLACEAE

*Silene antirrhina* L. RSB

### CELASTRACEAE

*Mortonia scabrella* A. Gray RSB

### CERATOPHYLLACEAE

*Ceratophyllum demersum* L. NWR

### COCHLOSPERMACEAE

*Amoreuxia palmatifida* DC. NWR, RSB

### CONVOLVULACEAE

**Convolvulus arvensis* L. NWR, RSB

*Convolvulus equitans* Benth. NWR, RSB

*Cuscuta umbellata* Kunth NWR

*Evolvulus alsinoides* (L.) L. NWR

*Ipomoea barbatisepala* A. Gray NWR

*Ipomoea costellata* Torr. NWR, RSB

*Ipomoea cristulata* Hallier f. NWR, RSB

*Ipomoea hederacea* Jacq. NWR

*Ipomoea leptotoma* Torr. var. *ternifolia* (Torr.) J.A. McDonald NWR

*Ipomoea purpurea* (L.) Roth NWR, RSB

### CUCURBITACEAE

*Apodanthera undulata* A. Gray NWR

*Cucurbita digitata* A. Gray NWR, RSB

*Cucurbita foetidissima* Kunth NWR, RSB

*Echinopepon wrightii* (A. Gray) S. Watson NWR, RSB

*Ibervillea tenuisecta* (A. Gray) Small NWR, RSB

*Sicyos laciniatus* L. NWR

### EUPHORBIACEAE

*Acalypha neomexicana* Muell.-Arg. NWR

*Acalypha ostryifolia* Riddell ex J.M. Coult. NWR, RSB

*Argythamnia serrata* (Torr.) Müll.-Arg. NWR, RSB

*Cnidoscolus angustidens* Torr. RSB

*Croton pottsii* (Klotzsch) Muell.-Arg. NWR, RSB

*Euphorbia abramsiana* L.C. Wheeler NWR, RSB

*Euphorbia albomarginata* Torr. & A. Gray NWR, RSB

*Euphorbia capitellata* Engelm. NWR, RSB

*Euphorbia exstipulata* Engelm. NWR, RSB

*Euphorbia florida* Engelm. NWR, RSB

*Euphorbia glyptosperma* Engelm. NWR

*Euphorbia gracillima* S.Watson RSB

*Euphorbia heterophylla* L. NWR, RSB

*Euphorbia hyssopifolia* L. NWR, RSB

*Euphorbia indivisa* (Engelm.) Tidestrom NWR, RSB

*Euphorbia micromera* Boiss. NWR, RSB

*Euphorbia prostrata* Aiton NWR, RSB

*Euphorbia serpillifolia* Pers. NWR, RSB

*Euphorbia serrula* Engelm. NWR, RSB

*Euphorbia setiloba* Engelm. ex Torr. NWR

*Euphorbia spathulata* Lam. NWR

*Euphorbia stictospora* Engelm. NWR, RSB

*Jatropha macrorhiza* Benth. NWR, RSB

*Manihot angustiloba* (Torr.) Muell.-Arg. NWR

### FABACEAE

*Acmispon brachycarpus* (Benth.) D.D. Sokoloff NWR, RSB

*Astragalus allochrous* A. Gray var. *playanus* (M.E. Jones) Isely NWR, RSB

*Astragalus nuttallianus* DC. var. *austrinus* (Small) Barneby NWR, RSB

*Astragalus thurberi* A. Gray NWR, RSB

**Caesalpinia gilliesii* (Hook.) Wallich ex D. Dietr. NWR

*Chamaecrista nictitans* (L.) Moench NWR

*Dalea formosa* Torr. NWR, RSB

*Dalea mollissima* (Rydb.) Munz RSB

*Dalea pogonathera* A. Gray NWR, RSB

*Dalea pulchra* Gentry RSB

*Hoffmannseggia glauca* (Ortega) Eifert NWR, RSB

*Lupinus brevicaulis* S. Watson NWR, RSB

*Lupinus concinnus* J.G. Agardh RSB

*Lupinus sparsiflorus* Benth. RSB

**Melilotus albus* Medik. NWR, RSB

**Melilotus indicus* (L.) All. NWR, RSB

*Mimosa biuncifera* Benth. NWR, RSB

*Neltuma odorata* (Torr. & Frém.) C.E. Hughes & G.P. Lewis NWR

*Neltuma velutina* (Wooton) Britton & Rose NWR, RSB

*Parkinsonia aculeata* L. RSB

*Phaseolus acutifolius* A. Gray var. *latifolius* Freeman NWR

*Rhynchosia senna* Gillies ex Hook. NWR

*Senna bauhinioides* (A. Gray) Irwin & Barneby NWR, RSB

*Senna hirsuta* (L.) H.S. Irwin & Barneby *var. glaberrima* (M.E. Jones) H.S. Irwin & Barneby NWR, RSB

# CHECKLIST: San Bernardino, Arizona and Sonora *page 4 of 7*

*Senna wislizeni* (A. Gray) Irwin & Barneby RSB

*Vachellia constricta* (Benth. ex A. Gray) Seigler & Ebinger NWR, RSB

*Vachellia vernicosa* (Britton & Rose) Seigler & Ebinger NWR, RSB

*Vicia ludoviciana* Nutt. NWR

### FOUQUIERIACEAE

*Fouquieria splendens* Engelm. NWR, RSB

### GENTIANACEAE

*Zeltnera arizonica* (A. Gray) G. Mans. RSB

### GERANIACEAE

**Erodium cicutarium* (L.) L'Hér. NWR, RSB

*Erodium texanum* A. Gray NWR

### HYDRANGEACEAE

*Fendlera rupicola* A. Gray RSB

### JUGLANDACEAE

**Carya illinoinensis* (Wangenh.) K. Koch NWR

### KRAMERIACEAE

*Krameria erecta* Willd. ex J.A. Schultes RSB

*Krameria lanceolata* Torr. RSB

### LAMIACEAE

*Agastache wrightii* (Greenm.) Wooton & Standl. NWR

*Clerodendrum coulteri* (A. Gray) Govaerts NWR, RSB

*Hedeoma nana* (Torr.) Briq. NWR

**Lamium amplexicaule* L. RSB

**Marrubium vulgare* L. NWR, RSB

**Mentha spicata* L. NWR

### LINACEAE

*Linum pratense* (J.B.S. Norton) Small NWR

*Linum puberulum* (Engelm.) Heller NWR

### LOASACEAE

*Mentzelia albicaulis* (Dougl.) Dougl. ex Torr. & A. Gray NWR, RSB

*Mentzelia aspera* L. NWR

*Mentzelia isolata* Gentry NWR

*Mentzelia longiloba* J. Darl. NWR, RSB

### LYTHRACEAE

*Ammannia coccinea* Rottb. NWR

*Lythrum californicum* Torr. & A. Gray RSB

### MALPIGHIACEAE

*Cottsia gracilis* (A. Gray) W.R. Anderson NWR, RSB

### MALVACEAE

*Abutilon incanum* (Link) Sweet NWR

*Abutilon mollicomum* (Willd.) Sweet NWR

*Abutilon parvulum* A. Gray NWR, RSB

*Anoda cristata* (L.) Schltdl. NWR

*Anoda pentaschista* A. Gray NWR, RSB

*Corchorus hirtus* L. NWR

*Hibiscus denudatus* Benth. NWR, RSB

*Malvella lepidota* (A. Gray) Fryxell NWR

*Rhynchosida physocalyx* (A. Gray) Fryxell NWR, RSB

*Sida abutilifolia* Mill. NWR, RSB

*Sidalcea neomexicana* A. Gray RSB

*Sphaeralcea angustifolia* (Cav.) G. Don NWR, RSB

*Sphaeralcea emoryi* Torr. ex A. Gray RSB

*Sphaeralcea incana* Torr. ex A. Gray RSB

*Sphaeralcea laxa* Wooton & Standl. NWR, RSB

### MARTYNIACEAE

*Proboscidea altheifolia* (Benth.) Decne. NWR

*Proboscidea parviflora* (Wooton) Wooton & Standl. NWR, RSB

### MOLLUGINACEAE

*Mollugo verticillata* L. NWR, RSB

### MONTIACEAE

*Calandrinia ciliata* (Ruiz & Pav.) DC. NWR

### MORACEAE

*Morus microphylla* Buckley NWR

### NAMACEAE

*Nama hispida* A.Gray NWR, RSB

### NYCTAGINACEAE

*Allionia incarnata* L. NWR, RSB

*Boerhavia coccinea* P. Mill. NWR, RSB

*Boerhavia coulteri* (Hook. f.) S. Watson var. *palmeri* (S. Watson) Spellenb. NWR, RSB

*Boerhavia erecta* L. NWR

*Boerhavia spicata* Choisy NWR, RSB

*Boerhavia triquetra* S. Watson NWR, RSB

*Boerhavia wrightii* A. Gray NWR, RSB

*Commicarpus scandens* (L.) Standl. NWR, RSB

**Mirabilis jalapa* L. RSB

### OLEACEAE

*Fraxinus velutina* Torr. NWR

*Menodora scabra* A. Gray NWR, RSB

### ONAGRACEAE

*Chylismia claviformis* (Torr. & Frém.) A. Heller RSB

*Epilobium ciliatum* Raf. NWR

*Eremothera chamaenerioides* (A. Gray) W.L. Wagner & Hoch NWR, RSB

*Oenothera curtiflora* W. L. Wagner & Hoch NWR, RSB

*Oenothera havardii* S. Watson NWR, RSB

*Oenothera kunthiana* (Spach) Munz RSB

*Oenothera primiveris* A. Gray NWR, RSB

*Oenothera rosea* L'Hér. ex Aiton RSB

*Oenothera triloba* Nutt. NWR

### OROBANCHACEAE

*Orobanche cooperi* (A. Gray) A. Heller NWR, RSB

### PAPAVERACEAE

*Argemone pleiacantha* Greene NWR

*Corydalis aurea* Willd. subsp. *occidentalis* (Engelm. ex Gray) G.B. Ownbey NWR, RSB

*Eschscholzia californica* Cham. subsp. *mexicana* (Greene) C. Clark NWR, RSB

**Fumaria officinalis* L. RSB

### PHRYMACEAE

*Erythranthe guttata* (Fisch. ex DC.) G.L. Nesom NWR, RSB

### PHYTOLACCACEAE

*Rivina humilis* L. NWR, RSB

### PETIVERIACEAE

*Rivina humilis* L.

# CHECKLIST: San Bernardino, Arizona and Sonora *page 5 of 7*

## PLANTAGINACEAE

*Mecardonia procumbens* (P. Mill.) Small NWR

*Nuttallanthus texanus* (Scheele) D.A. Sutton NWR, RSB

*Penstemon parryi* (A. Gray) A. Gray RSB

*Penstemon superbus* A. Nels. RSB

*Plantago patagonica* Jacq. NWR, RSB

*Plantago rhodosperma* Decne. NWR

*Plantago virginica* L. RSB

*Schistophragma intermedium* (A .Gray) Pennell NWR, RSB

*Veronica americana* Schwein. ex Benth. RSB

*Veronica anagallis-aquatica* L. NWR, RSB

*Veronica peregrina* L. subsp. *xalapensis* (Kunth) Pennell NWR, RSB

## PLATANACEAE

*Platanus wrightii* S. Watson RSB

## POLEMONIACEAE

*Eriastrum diffusum* (A. Gray) Mason NWR, RSB

*Gilia flavocincta* A. Nels. NWR

*Gilia mexicana* A.& V. Grant NWR

*Gilia sinuata* Douglas ex Benth. NWR, RSB

*Ipomopsis longiflora* (Torr.) V. Grant subsp. *australis* Fletcher & W.L. Wagner NWR, RSB

*Linanthus bigelovii* (A. Gray) Greene NWR, RSB

## POLYGALACEAE

*Hebecarpa obscura* (Benth.) J.R. Abbott NWR

*Rhinotropis lindheimeri* (A. Gray) J.R. Abbott var. *parvifolia* (Wheelock) J.R. Abbott NWR, RSB

## POLYGONACEAE

*Eriogonum abertianum* Torr. NWR, RSB

*Eriogonum polycladon* Benth. NWR

*Eriogonum wrightii* Torr. ex Benth. NWR, RSB

*Persicaria lapathifolia* (L.) Delarbre NWR, RSB

**Polygonum argyrocoleon* Steud. ex Kunze NWR, RSB

**Rumex crispus* L. NWR, RSB

*Rumex hymenosepalus* Torr. NWR, RSB

## PORTULACACEAE

**Portulaca oleracea* L. NWR

*Portulaca retusa* Engelm. RSB

*Portulaca suffrutescens* Engelm. NWR

*Portulaca umbraticola* Kunth NWR

## PRIMULACEAE

*Androsace occidentalis* Pursh NWR

## RANUNCULACEAE

*Clematis drummondii* Torr. & A. Gray NWR, RSB

*Clematis ligusticifolia* Nutt. NWR, RSB

*Delphinium wootonii* Rydb. RSB

*Myosurus minimus* L. NWR

*Ranunculus sceleratus* L. NWR

## RHAMNACEAE

*Condalia correllii* M.C. Johnston NWR

*Condaliopsis obusifolia* (Hook. ex A. Gray) Seuss. NWR, RSB

**Ziziphus jujuba* Mill. RSB

## RUBIACEAE

*Galium proliferum* A. Gray NWR

## SALICACEAE

*Populus fremontii* S. Watson NWR, RSB

*Salix gooddingii* C.R. Ball NWR, RSB

*Salix taxifolia* Kunth RSB

## SANTALACEAE

*Phoradendron californicum* Nutt. NWR, RSB

## SAPINDACEAE

*Sapindus drummondii* Hook. & Arn. NWR, RSB

## SAPOTACEAE

*Sideroxylon lanuginosum* Michx. subsp. *rigidum* (A. Gray) T.D. Pennington NWR, RSB

## SAURURACEAE

*Anemopsis californica* (Nutt.) Hook. & Arn. NWR, RSB

## SCROPHULARIACEAE

**Verbascum virgatum* Stokes NWR, RSB

## SOLANACEAE

*Chamaesaracha arida* Henrickson NWR, RSB

*Chamaesaracha sordida* (Dunal) A. Gray NWR, RSB

*Datura innoxia* Mill. NWR, RSB

*Datura quercifolia* Kunth NWR, RSB

*Lycium andersonii* A. Gray NWR, RSB

*Lycium berlandieri* Dunal RSB

*Lycium pallidum* Miers RSB

*Margaranthus solanaceous* Schltdl. NWR

**Nicotiana glauca* Graham NWR

*Nicotiana obtusifolia* M. Martens & Galeotti NWR

*Physalis acutifolia* (Miers) Sandw. NWR, RSB

*Physalis angulata* L. NWR

*Physalis pubescens* L. NWR

*Solanum elaeagnifolium* Cav. NWR, RSB

*Solanum nigrum* L. NWR

*Solanum setigeroides* (Whalen) S. Stern NWR, RSB

## TALINACEAE

*Talinum aurantiacum* Engelm. RSB

*Talinum sonorae* D.J. Ferguson NWR

## TAMARICACEAE

**Tamarix chinensis* Lour.-*T. ramosissima* Ledeb. NWR, RSB

## URTICACEAE

*Parietaria pensylvanica* Muhl. ex Willd. var. *hespera* (B.D. Hinton) S.L. Welsh NWR

## VERBENACEAE

*Aloysia gratissima* (Gillies & Hook.) Troncoso NWR

*Aloysia wrightii* Heller ex Abrams NWR

*Glandularia gooddingii* (Briq.) Solbrig RSB

*Glandularia latilobata* (L.M. Perry) G.L. Nesom NWR, RSB

*Glandularia pumila* (Rydb.) Umber NWR

*Glandularia wrightii* (A. Gray) Umber NWR

*Verbena bracteata* Cav. ex Lag. & Rodr. RSB

*Verbena carolina* L. RSB

*Verbena menthifolia* Benth. NWR

# CHECKLIST: San Bernardino, Arizona and Sonora *page 6 of 7*

*Verbena neomexicana* (A. Gray) Small RSB

*Verbena plicata* Greene NWR, RSB

*Verbena scabra* Vahl NWR

### VIBURNACEAE

*Sambucus nigra* L. subsp. *cerulea* (Raf.) Bolli NWR, RSB

### VIOLACEAE

*Hybanthus verticillatus* (Ortega) Baill. NWR, RSB

### ZYGOPHYLLACEAE

*Kallstroemia californica* (S. Watson) Vail RSB

*Kallstroemia grandiflora* Torr. ex A. Gray NWR, RSB

*Kallstroemia hirsutissima* Vail ex Small NWR

*Kallstroemia parviflora* J.B.S. Norton NWR

*Larrea divaricata* Cav. subsp. *tridentata* (Sessé & Moc. ex DC.) Felger & C.H. Lowe NWR, RSB

**Tribulus terrestris* L. NWR, RSB

## Monocots

### ALISMATACEAE

*Sagittaria longiloba* Engelm. ex J.G. Sm. RSB

### AMARYLLIDACEAE

*Allium macropetalum* Rydb. NWR, RSB

*Nothoscordum bivalve* (L.) Britton NWR
*Zephyranthes longifolia* Hemsl. NWR, RSB

### ARACEAE

*Lemna gibba* L. NWR

*Lemna minor* L. NWR

*Lemna minuta* Kunth NWR

### ASPARAGACEAE

*Agave palmeri* Engelm. NWR, RSB

**Asparagus officinalis* L. NWR

*Dichelostemma capitatum* (Benth.) Alph. Wood subsp. *pauciflorum* (Torr.) G. Keator NWR, RSB

*Nolina texana* S. Watson RSB

*Yucca baccata* Torr. NWR, RSB

*Yucca elata* (Engelm.) Engelm. NWR, RSB

### COMMELINACEAE

*Commelina erecta* L. NWR, RSB

### CYPERACEAE

*Bolboschoenus maritimus* (L.) Palla NWR

*Carex agrostoides* Mackenzie NWR, RSB

*Carex praegracilis* W. Boott NWR

*Cyperus esculentus* L. NWR

*Cyperus niger* Ruiz & Pav. NWR

*Cyperus odoratus* L. NWR, RSB

*Cyperus squarrosus* L. NWR

*Eleocharis macrostachya* Britton NWR

*Eleocharis palustris* (L.) Roem. & Schult. NWR

*Eleocharis parishii* Britton NWR, RSB

*Eleocharis rostellata* (Torr.) Torr. NWR, RSB

*Schoenoplectus acutus* (Muhl. ex Bigelow) Á. Löve & D. Löve var. *occidentalis* (S. Watson) S.G. Smith NWR

*Schoenoplectus americanus* (Pers.) Volk. ex Schinz & R. Keller *RSB*

### HYDROCHARITACEAE

*Najas guadalupensis* (Spreng.) Magnus NWR

*Najas marina* L. NWR

### IRIDACEAE

*Sisyrinchium angustifolium* Mill. RSB

*Sisyrinchium scabrum* Cham. & Schltdl. RSB

### JUNCACEAE

*Juncus balticus* Willd. subsp. *ater* (Rydb.) Snogerup NWR, RSB

*Juncus balticus* Willd. subsp. *mexicanus* (Willd. ex Schult. & Schult. f.) Snogerup NWR

*Juncus bufonius* L. RSB

*Juncus torreyi* Coville NWR, RSB

### POACEAE

*Aristida adscensionis* L. NWR

*Aristida purpurea* Nutt. var. *longiseta* (Steud.) Vasey NWR

*Aristida purpurea* Nutt. var. *nealleyi* (Vasey) Allred NWR, RSB

*Aristida purpurea* Nutt. var. *purpurea* NWR

*Aristida ternipes* Cav. var. *gentilis* (Henr.) Allred NWR

*Aristida ternipes* Cav. var. *ternipes* NWR, RSB

**Arundo donax* L. NWR

*Bothriochloa barbinodis* (Lag.) Herter NWR

**Bothriochloa ischaemum* (L.) Keng NWR, RSB

*Bothriochloa laguroides* (DC.) Herter subsp. *torreyana* (Steud.) Allred & Gould NWR

*Bouteloua barbata* Lag. var. *barbata* NWR, RSB

*Bouteloua chondrosioides* (Kunth) Benth. ex S. Watson NWR

*Bouteloua curtipendula* (Michx.) Torr. NWR, RSB

*Bouteloua dactyloides* (Nutt.) Columbus RSB

*Bouteloua eriopoda* (Torr.) Torr. NWR

*Bouteloua gracilis* (Kunth) Lag. ex Griffiths RSB

*Bouteloua repens* (Kunth) Scribn. & Merr. NWR

**Bromus catharticus* Vahl NWR, RSB

**Bromus rubens* L. NWR

**Bromus tectorum* L. NWR

**Cenchrus americanus* (L.) Morrone NWR

**Cenchrus ciliaris* L NWR, RSB

*Chloris virgata Sw.* NWR, RSB

*Cottea pappophoroides* Kunth NWR

**Cynodon dactylon* (L.) Pers. NWR, RSB

*Dasyochloa pulchella* (Kunth) Willd. ex Rydb. NWR, RSB

*Digitaria californica* (Benth.) Henr. NWR, RSB

*Dinebra panicea* (Retz.) P.M. Peterson & N. Snow subsp. *brachiata* (Steud.) P.M. Peterson & N. Snow NWR

*Dinebra viscida* (Scribn.) P.M. Peterson & N. Snow NWR

*Disakisperma dubium* (Kunth) P.M. Peterson & N. Snow NWR, RSB

*Distichlis spicata* (L.) Greene NWR, RSB

**Echinochloa colona* (L.) Link NWR

# CHECKLIST: San Bernardino, Arizona and Sonora *page 7 of 7*

**Echinochloa crus-galli* (L.) P. Beauv. NWR

*Elymus elymoides* (Raf.) Swezey NWR

*Enneapogon desvauxii* Desv. ex Beauv. NWR

**Eragrostis barrelieri* Daveau NWR

**Eragrostis cilianensis* (All.) Vignolo ex Janch. NWR, RSB

**Eragrostis echinochloidea* Stapf NWR

**Eragrostis lehmanniana* Nees NWR, RSB

*Eragrostis lugens* Rupr. RSB

*Eragrostis pectinacea* (Michx.) Nees ex Steud. NWR

**Eragrostis superba* Peyr. NWR

*Eriochloa acuminata* (J. Presl) Kunth var. *acuminata* NWR, RSB

*Erioneuron avenaceum* (Kunth) Tateoka var. *longiaristatum* (Kurtz) Beetle NWR

*Heteropogon contortus* (L.) Beauv. ex Roemer & J.A. Schultes NWR

*Hilaria belangeri* (Steud.) Nash NWR

*Hilaria mutica* (Buckley) Benth. NWR, RSB

*Hopia obtusa* (Kunth) Zuloaga & Morrone NWR, RSB

**Hordeum jubatum* L. RSB

**Hordeum murinum* L. subsp. *glaucum* (Steud.) Tzvelev NWR

**Hordeum murinum* L. subsp. *leporinum* (Link) Arcang. NWR

*Hordeum pusillum* Nutt. NWR**Hordeum vulgare* L. var. *trisulcatum* (Schltdl.) Alef. RSB

*Leptochloa crinita* (Lag.) P.M. Peterson & N. Snow NWR

*Lolium multiflorum* Lam. NWR

*Muhlenbergia alopecuroides* (Griseb.) P.M. Peterson & Columbus NWR

*Muhlenbergia asperifolia* (Nees & Meyen ex Trin.) Parodi NWR, RSB

*Muhlenbergia porteri* Scribn. ex Beal NWR, RSB

**Panicum antidotale* Retz. NWR

**Panicum coloratum* L. NWR, RSB

*Panicum hirticaule* J. Presl var. *hirticaule* NWR, RSB

*Panicum hirticaule* J. Presl var. *stramineum* (A.S. Hitchc. & Chase) Beetle NWR

**Paspalum dilatatum* Poir. NWR

*Paspalum distichum* L. NWR, RSB

*Phalaris caroliniana* Walter NWR

**Phalaris minor* Retz. RSB

**Poa annua* L. NWR

*Poa bigelovii* Vasey & Scribn. NWR

**Polypogon monspeliensis* (L.) Desf. NWR, RSB

**Polypogon viridis* (Gouan) Breistr. NWR

*Schedonorus arundinaceus* (Schreb.) Dumort. NWR

*Schedonorus pratense* Huds. NWR

**Schismus arabicus* Nees RSB

**Schismus barbatus* (Loefl. ex L.) Thellung NWR

*Scleropogon brevifolius* Phil. NWR

**Setaria adhaerens* (Forsk.) Chiov. NWR, RSB

*Setaria grisebachii* Fourn. NWR, RSB

*Setaria macrostachya* Kunth NWR, RSB

**Sorghum bicolor* (L.) Moench NWR

**Sorghum halepense* (L.) Pers. NWR, RSB

*Sporobolus airoides* (Torr.) Torr. NWR, RSB

*Sporobolus contractus* A.S. Hitchc. NWR

*Sporobolus cryptandrus* (Torr.) A. Gray NWR

*Sporobolus pyramidatus* (Lam,) Hitchc. NWR

*Sporobolus wrightii* Munro ex Scribn. NWR, RSB

*Tridentopsis mutica* (Torr.) P.M. Peterson NWR

*Urochloa arizonica* (Scribn. & Merr.) O. Morrone & F. Zuloaga NWR

*Urochloa fusca* (Sw.) B.F. Hansen & Wunderlin NWR, RSB

### PONTEDERIACEAE

*Heteranthera limosa* (Sw.) Willd. NWR, RSB

### POTAMOGETONACEAE

*Potamogeton foliosus* Raf. NWR

*Potamogeton gramineus* L. NWR

*Potamogeton nodosus* Poir. NWR

*Stuckenia pectinata* (L.) Börner NWR

*Zannichellia palustris* L. NWR

### TYPHACEAE

*Typha domingensis* Pers. RSB