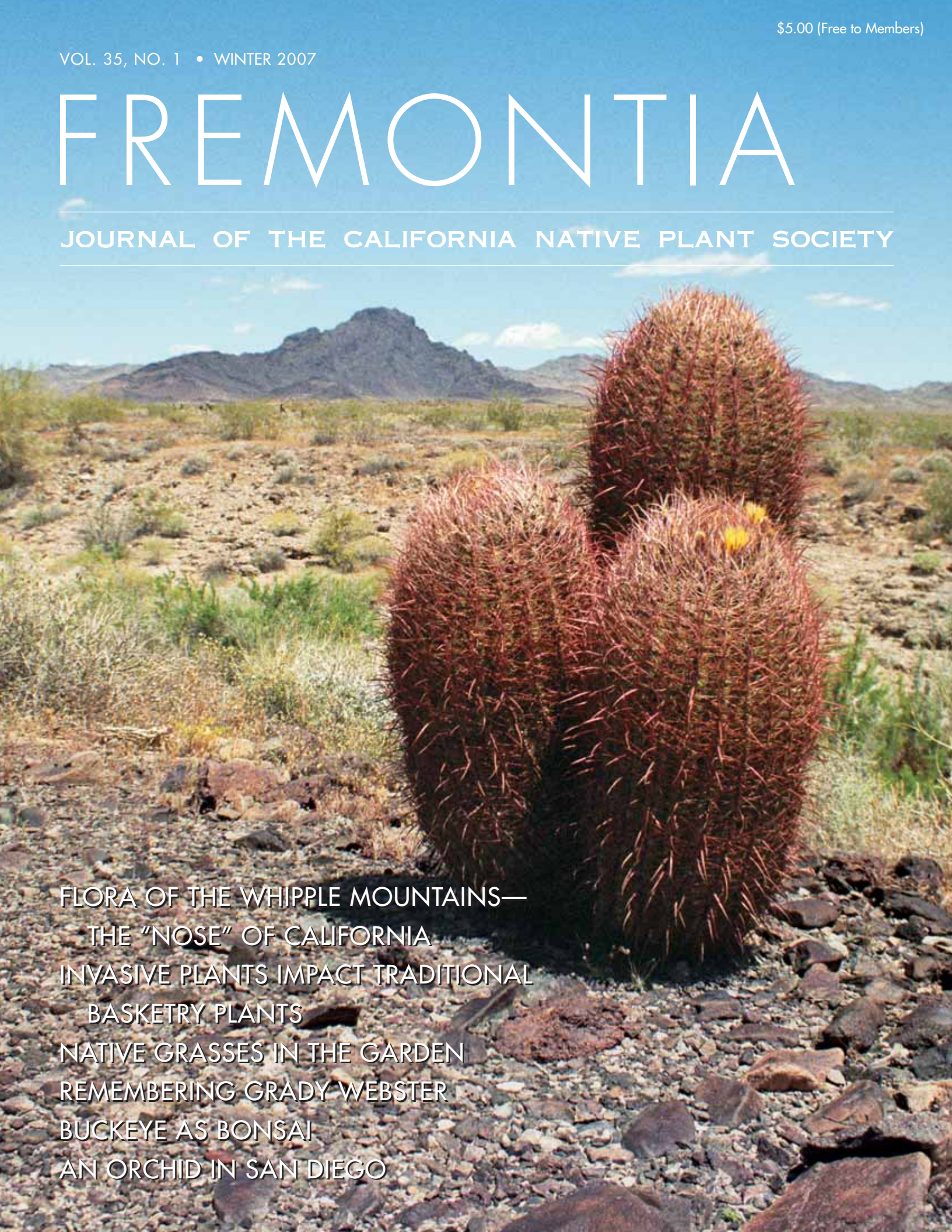


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FLORA OF THE WHIPPLE MOUNTAINS—
THE "NOSE" OF CALIFORNIA
INVASIVE PLANTS IMPACT TRADITIONAL
BASKETRY PLANTS
NATIVE GRASSES IN THE GARDEN
REMEMBERING GRADY WEBSTER
BUCKEYE AS BONSAI
AN ORCHID IN SAN DIEGO

FREMONTIA

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the California Native Flora*

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CALIFORNIA NATIVE PLANT SOCIETY

CNPS, 2707 K Street, Suite 1; Sacramento, CA 95816-5113

Phone: (916) 447-CNPS (2677) Fax: (916) 447-2727

Web site: www.cnps.org Email: cnps@cnps.org

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Grady Webster was a prominent botanist at the University of California, Davis, for 39 years. He is widely known and published in botanical circles, particularly for his work with the Euphorbiaceae (including a highly regarded monograph of the genus *Phyllanthus*, and a realignment of the family into five subfamilies). Grady also inspired many students with his field-based California Floristics class.

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THE COVER: A California barrel cactus (*Ferocactus cylindraceus* var. *cylindraceus*) blooms brightly in front of the dark volcanic Savahia Peak, on the outwash plain southwest of the Whipple Mountains. Photograph by S. De Groot.

THE “NOSE” OF CALIFORNIA: AN IMPORTANT PART OF THE STATE’S PLANT DIVERSITY

by Sarah J. De Groot

Located in southeast San Bernardino County, on the easternmost portion (“the nose”) of California, the Whipple Mountains are home to California’s largest population of saguaro cactus (*Carnegiea gigantea*; Brum 1973) and many other interesting plants (see Figure 1). The mountains range from 102 to 1,259 meters (335 to 4,131 feet) in elevation, and habitats include windy ridges, washes, volcanic bluffs, creosote bajadas or plains (see Figure 2), and rocky canyons. Metamorphic, volcanic, and sedimentary rocks of varying ages all may be found in and around the mountains.

Lieutenant Amiel Weeks Whipple, the mountains’ namesake, described the range as “a pile of black mountains” (Whipple 1856, 109). Lt. Joseph Christmas Ives, while exploring the Colorado River

by steamboat, wrote, “Among the group of fantastic peaks that surmount the chain is a slender and perfectly symmetrical spire that furnishes a striking landmark, as it can be seen from a great way down the river in beautiful relief against the sky” (Ives 1861, 55). This spire is presently called Monument Peak (see Figure 3).

The study area for this floristic project encompassed about 129,500 hectares (500 square miles), and included the main part of the range as well as plains around the mountains. The range is situated in the northeastern corner of the California side of the Sonoran Desert floristic region, with Mojave Desert just north of the mountains and Arizona Sonoran Desert right across the Colorado River to the east (Shreve 1964; McLaughlin 1989, 1995). Given the proximity of the

Mojave and Arizona Sonoran floristic regions, it is no surprise that plants from all three floristic elements are represented. In spite of this interesting biogeographic situation, few botanical collections had been made beyond roadside collecting.

From this study, 383 different kinds of plants were recorded from the mountains. This included five natural hybrids. Non-native plants comprised 11.5% of the total (44 taxa), which reflects a number of plants that have naturalized from the many human developments along the river. The Whipple Mountains share many species with Joshua Tree National Park (Steve McLaughlin, personal communication). This is expected, since Joshua Tree also spans the transition zone between the Sonoran and Mojave deserts in California.

So why is the “nose” important to the state’s plant diversity? Not only are Mojave and Sonoran plants represented, but also some Arizona plants at the western edges of their ranges. Shreve (1964) noted that plant species differ between the east and west portions of the Sonoran Desert, primarily due to patterns of summer rainfall. Basically, some common Arizona plants don’t occur west of the Colorado River, except where California juts into Arizona (at “the nose”). The saguaro cactus is a good example—its California localities are in the Whipple Mountains and above Laguna Dam in Imperial County, on another bulge into Arizona (perhaps California’s chin?). It is listed on the California Native Plant Society’s List 2, as are many other Arizona plants that just reach the eastern edge of California (Tibor 2001).

Whipple Wash showing typical woody shrubs found in these deeper soils with slightly more moisture. All photographs by the author.





CLOCKWISE FROM TOP LEFT: Fig. 1. The location of the Whipple Mountains in southeastern California. • Fig. 3. Monument Peak. • Fig. 2. Creosote bush scrub on a bajada, with the Whipple Mountain range in the background.

RARE SPECIES

The following is an alphabetical listing by genus of the 17 rare plants documented in the Whipple Mountains, with some additional notes about their distributions and habitats. Common names are those given in the *CNPS Inventory of Rare and Endangered Plants in California* (Tibor 2001). CNPS List 2 plants are rare, threatened, or endangered in California, but more common elsewhere. These likely would have been federally or state listed if they did not also occur outside of Cali-

fornia. List 3 plants are ones about which we need more information. List 4 plants have limited distribution—we want to keep an eye on them (Tibor 2001). Higher RED (rarity-endangerment-distribution) numbers indicate greater endangerment or more restricted distributions. For a full description of RED numbers, refer to Tibor (2001).

***Aloysia wrightii* (Verbenaceae).** **Oreganillo.** List 4. RED 1-1-1. This shrub is fairly widely distributed inside and outside of California, and is not endangered. In the Whipple

Mountains, it is restricted to washes and small drainages at higher elevations, generally above 914 meters (3,000 feet).

***Androstephium breviflorum* (Alliaceae, or Liliaceae *sensu lato*).** **Small-flowered androstephium.** List 2. RED 3-1-1. This plant is perennial from a bulb. It appears to be widespread, but infrequently encountered, and its distribution in California is known only from a few specimens (White et al. 1996). Only one collection was made in the Whipple Mountains area, in the Copper Basin Dunes Off-Highway Vehicle Area in 2003. It was

not rediscovered there in 2004 or 2005.

***Bouteloua trifida* (Poaceae).** **Red grama.** List 2. RED 3-1-1. A perennial herb, occurring infrequently in the eastern desert mountain ranges in California, but more common in Arizona, Nevada, and Sonora, Mexico. Occasionally it may be encountered in large washes in the Whipples, although it is not abundant where it occurs.

***Carnegiea gigantea* (Cactaceae).** **Saguaro.** List 2. RED 3-2-1. A com-



mon columnar cactus in Arizona and Sonora, but restricted to two verified localities in California, the Whipple Mountains and the Laguna Dam area of Imperial County. C.B. Wolf noted about 40 cacti five miles above Laguna Dam in 1931, while Brum (1973) counted over 100 in six square miles in the Whipple Mountains. The cactus is restricted to the eastern slopes of the Whipple range (see Figure 4).

Castela emoryi (Simaroubaceae). Crucifixion thorn. List 2. RED 2-1-

Fig. 4 (ABOVE). Saguaro and foothill palo verde association in the eastern foothills of the Whipple Mountains. • Fig. 5 (RIGHT). Crucifixion thorn colony in Chemehuevi Wash.

1. This shrub has tiny deciduous leaves and stiff, thorn-tipped branches. It has limited occurrences in California, but is fairly widespread outside the state. Two small clumps (one with 11 plants) were noted in the Whipple Mountains area, both in open creosote flats along Chemehuevi Wash, north of the main part of the range (see Figure 5).

Cercidium microphyllum (Fabaceae). Little-leaved, foothill, or yellow palo verde. List 4. RED 1-1-1. A deciduous shrub or small tree that is fairly widely distributed outside of California, within California it is found only along the Colorado River. In the Whipple Mountains, it occurs only on the eastern side of the range, on foothill slopes or small washes (see Figure 4). Recently this species was transferred to *Parkinsonia microphylla* (Haston et al. 2005).

Cryptantha holoptera (Boraginaceae). Winged cryptantha. List 4. RED 1-1-2. Usually an annual herb though sometimes a biennial or short-lived perennial, this cryptantha is distributed throughout the southwest, but appears to be infrequent. It was rarely encountered in the Whipple Mountains, with three collections made entirely on the eastern side of the range. One of these plants was markedly woody at the base.

Ditaxis clariana (Euphorbiaceae). Glandular ditaxis. List 2. RED 3-2-1. A short-lived perennial herb, it is restricted in its distribution in California, but more common elsewhere. Known from the Whipple Mountains by a single collection made in 1980, in a wash near the Colorado River on the southeast side of the range.

Matelea parviflora (Apocynaceae *sensu lato*, or Asclepiadaceae). Spearleaf. List 2. RED 3-1-1. A twining perennial herb, rare in California, but common in other southwestern states. A single collection of it was made in the Whipple Mountains, on a steep north-facing slope around 793 meters (2600 feet) elevation, where it was twining through an *Ephedra* shrub.



Opuntia wigginsii (Cactaceae). **Wiggins's cholla.** List 3. RED 3-1-2. Rarely reported in California, this succulent may be a sporadic hybrid between *Opuntia ramosissima* and *Opuntia echinocarpa*. The collections from the Whipples are all juvenile plants, with features intermediate between these two species. However, in the recent treatment for the Flora of North America, Pinkava (2004) says that *O. wigginsii* is simply a dwarf form of *O. echinocarpa*. Chollas are now treated as *Cylindropuntia* (Pinkava 2004).

Pholistoma auritum var. *arizonicum* (Hydrophyllaceae). **Arizona pholistoma.** List 2. RED 3-1-1. The only documented California location of this annual herb is the Whipple Mountains (Tibor 2001), although it also occurs in Arizona, Baja California, and Sonora, Mexico. It is scattered throughout the mountains, generally in washes, but occurs infrequently.

Proboscidea althaefolia (Martyniaceae). **Desert unicorn-plant.** List 4. RED 1-1-1. This perennial herb is not particularly restricted or rare, but simply infrequently encountered. It occurs in most southwestern states and northwest Mexico. In the Whipples, a few plants were found in Chemehuevi Wash.

Psorothamnus fremontii var. *attenuatus* (Fabaceae). **Narrow-leaved psorothamnus.** List 2. RED 2-1-1. Although this shrub is also found in Arizona and Nevada, it is known in California only from the Whipple Mountains (Tibor 2001). Farther west, it is replaced by var. *fremontii*. It is scattered around the mountains, and generally occurs in small patches on slopes or benches above washes. The fruit is foul-smelling and without large prominent glands, like *P. fremontii* var. *fremontii* (Jim Adams, personal communication).

Quercus turbinella (Fagaceae).

Shrub live oak. List 4. RED 1-1-1. Although the CNPS *Inventory* states that this evergreen shrub is "known in California only from the New York Mountains" (Tibor 2001:261), it was also collected in the Whipple Mountains during this study. It is fairly common in the southwest U.S., but is restricted to higher elevations of desert mountains. In the Whipples, it is found only on north-facing slopes above 914 meters (3,000 feet), and generally in rocky chutes.

Senna covesii (Fabaceae). **Coues' senna.** List 2. RED 2-2-1. This perennial herb (or subshrub) has limited occurrences in California, but is more common in Arizona, Nevada, and Baja California. In the Whipple Mountains, it occurs in patches on ridges and along washes at higher elevations, generally above 914 meters (3,000 feet). Seeds do wash downstream, however, and waif plants have been found at lower elevations. This plant was named for Dr. Elliot Coues (Gray 1897, 399); common names including the word "Coves" are in error.

Tetracoccus hallii (Euphorbiaceae). **Hall's tetracoccus.** List 4. RED 1-1-1. A fairly widespread deciduous shrub, but in the Whipple Mountains it occurs in patches of just a few individuals. Usually they are encountered in rocky washes where the bajada meets the mountains.

Teucrium glandulosum (Lamiaceae). **Sticky germander.** List 2. RED 3-1-1. Although also encountered in Arizona and Baja California, the California distribution of this stoloniferous perennial herb (or subshrub) is restricted to the Whipple Mountains (Tibor 2001). It was recorded only from the eastern portion of the range in steep, rocky drainages generally above 305 meters (1,000 feet) elevation.

Based on ranges given above, certain places in the Whipple Moun-



Fig. 6 (TOP). Kofa Mountain barberry (*Berberis harrisoniana*), with immature fruit. • Fig. 7 (BOTTOM). Barestem larkspur (*Delphinium scaposum*).

tains may warrant particular conservation attention—Chemehuevi Wash, for example, was the only Whipple Mountains location of two CNPS listed taxa (*Castela*, *Proboscidea*). Copper Basin Dunes OHV

area was the only collection locality of *Androstephium breviflorum*, whose distribution in California is known from just a few specimens (White et al. 1996). All collections of these plants were reported to the California Natural Diversity Database.

NEW TO CALIFORNIA

Three species previously unreported in California were documented in the Whipple Mountains during this study. The discovery of these species amply demonstrates the need and value of continued botanical exploration:

***Berberis harrisoniana* (Berberidaceae).** Kofa Mountain barberry. Recently added to List 1B. This shrub was collected from one locality in the northeast part of the range. This plant was thought endemic to Arizona until it was discovered in the Whipple Mountains in 2001 (Anderson and De Groot 2004). It is found only in narrow canyons and rocky north-facing chutes, where it receives very little direct sunlight (see Figure 6).

***Delphinium scaposum* (Ranunculaceae).** Barestem larkspur. Recently added to List 2. This herbaceous perennial had not been reported from California, although it is widespread in Arizona, Colorado, Nevada, New Mexico, Utah, and Sonora, Mexico. It is sparsely distributed throughout the mountains, and not found in large numbers (De Groot 2005). Typically, it grows on slopes and banks at the edges of rocky washes (see Figure 7).

***Erigeron oxyphyllus* (Asteraceae).** Wand fleabane. Recently added to List 2. Scattered on rocky hillsides and in washes, generally above 914 meters (3,000 feet), this unusual fleabane was also newly found in California. Previously it had been collected sporadically in southwest Arizona and Sonora, Mexico (De

Groot 2005). In the Whipples, it is often associated with silver wormwood (*Artemisia ludoviciana*).

The Whipple Mountains have a unique flora, with elements from both the Sonoran and Mojave Deserts, and a number of Arizona plants at the edges of their ranges. The 383 taxa documented in this study show that A.W. Whipple's "pile of black mountains" (Whipple 1856, 109) is not just a bare pile of rock. This "nose" is the only California location of some interesting Sonoran desert plants, and makes an important contribution to the state's plant diversity.

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REFERENCES

- Anderson, J., and S.J. De Groot. 2004. Noteworthy collection—California. *Madroño* 51:395.
- Brum, G.D. 1973. Ecology of the saguaro (*Carnegiea gigantea*): Phenol-

- ogy and establishment in marginal populations. *Madroño* 22:195–204.
- De Groot, S.J. 2005. Noteworthy collection—California. *Madroño* 52:125–126.
- Gray, A. 1867. Characters of new plants of California and elsewhere, principally those collected by H.N. Bolander in the state geological survey. *Proceedings of the American Academy of Arts and Sciences* 7: 327–401.
- Haston, E.M., G.P. Lewis, and J.A. Hawkins. 2005. A phylogenetic reappraisal of the *Peltophorum* group (Caesalpinieae: Leguminosae) based on the chloroplast trnL-F, rbcL and rps16 sequence data. *American Journal of Botany* 92:1359–1371.
- Ives, J.C. 1861. Report upon the Colorado River of the West. Government Printing Office, Washington, DC.
- McLaughlin, S.P. 1989. Natural floristic areas of the western United States. *Journal of Biogeography* 16:239–248.
- _____. 1995. Floristic relationships of the eastern Mojave Desert: A quantitative analysis of local floras. *Crossosoma* 21:57–74.
- Pinkava, D.J. 2004. *Cylindropuntia*, pp. 103–118 in FNA Editorial Committee (eds.), *Flora of North America North of Mexico*, Vol. 4. Oxford University Press, New York.
- Shreve, F. 1964. Vegetation of the Sonoran Desert, pp. 1–186 in F. Shreve and I.L. Wiggins (eds.), *Vegetation and flora of the Sonoran Desert*, Vol. 1. Stanford University Press, Stanford, CA.
- Tibor, D.P., ed. 2001. Inventory of Rare and Endangered Plants of California, 6th ed. California Native Plant Society, Sacramento, CA.
- Whipple, A.W. 1856. Part 1: Itinerary, pp. 1–136 in Report of explorations for a railway route, near the thirty-fifth parallel of north latitude, from the Mississippi River to the Pacific Ocean. *Pacific Railroad Reports*, Vol. 3. A.O.P. Nicholson, Washington, DC.
- White, S., A. Sanders, and M. Wilcox. 1996. Noteworthy collection. *Madroño* 43(2):334–335.

Sarah J. De Groot, Rancho Santa Ana Botanic Garden, 1500 N. College Avenue, Claremont, California 91711. sarah.degroot@cgu.edu



Fig. 1. Traditional woven fish traps along riverbank invaded by Himalayan blackberry (*Rubus armeniacus*). Photograph by K. Noorgard.

INVASIVE PLANTS IMPACT CALIFORNIA NATIVE PLANTS USED IN TRADITIONAL BASKETRY

by Jeanine M. Pfeiffer & Elizabeth Huerta Ortiz

California's enormous biological and cultural diversity is represented by a wide range of ecoregions containing over 5,000 native plant species, and by hundreds of Native American groups with living cultural traditions involving native biota. During the past century, California's biocultural diversity has been severely threatened as native ecosystems—homes to native species and Native peoples—have been subjected to agricultural and urban development, habitat destruction, and biological invasions.

Invasive plant species permeate both ecological and cultural landscapes, affecting California's biologi-

cal diversity and its indigenous cultural diversity of nature-based traditional knowledge and practices. Most studies of invasive plant species focus on the biological, genetic, physiological, or ecological impacts on native species. This study links biological impacts with cultural impacts by looking at how invasive plants affect culturally important native plants, and the Native traditions associated with those plants.

THREATS TO CULTURALLY IMPORTANT NATIVES

Invasive plants reduce the abundance and health of culturally important native plants by invading

sacred landscapes, displacing native plants in traditional gathering sites, and stunting or reducing native plant growth or development. For example, the spread of introduced tamarisks, or salt cedars (*Tamarix* spp.)—plants with a strong ability to uptake large quantities of ground water in arid habitats of the Southwestern United States—has caused significant losses of culturally important native plants, including cottonwoods (*Populus fremontii*) and willows (*Salix* spp.) through water deprivation. On Hopi lands, tamarisk invasions are such a serious threat to species of cultural and ceremonial importance that elders are supervising the uprooting and

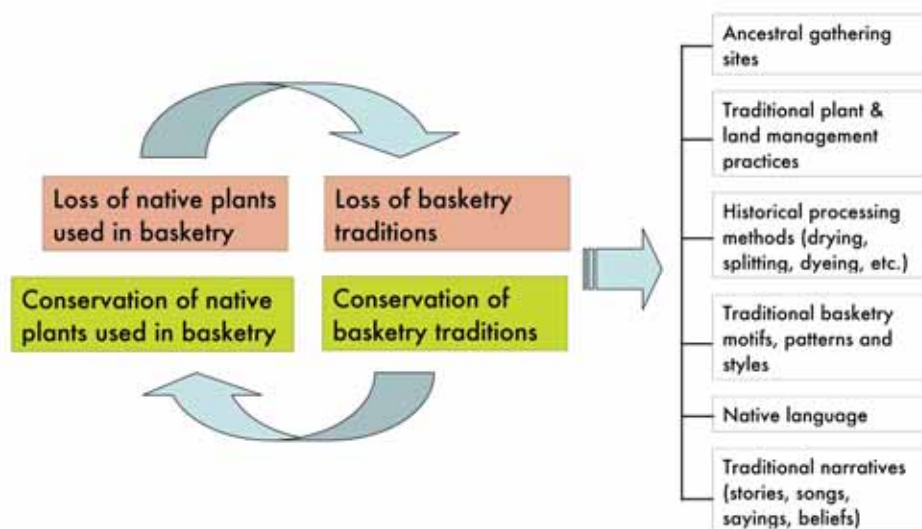


Diagram showing the connections between biological diversity (native plants) and cultural diversity (plant-based basketry traditions).

replanting of plants such as sand reed (*Calamovilfa gigantea*), willow, and yucca closer to reservation lands where they can be better conserved (Salmon 2003).

Invasive plants restrict human access to native plants by creating a physical barrier of thorns or stinging spines, or a chemical barrier from herbicides used in invasive species control programs. The widespread use of herbicides against invasive species on public and private lands in California, and the spread of herbicide residue to native species used as food, animal feed, fiber, medicine, and in rituals, also restricts human access to native plants and disrupts cultural practices (O'Malley 2002, CIBA 2004). For example, on Yurok and Karuk lands in the Klamath Forest, herbicide use by the US Forest Service has led to numerous serious health concerns, threatening traditional gathering of native plants (Peña 2002, MacKenzie 2003).

When native people have a hard time accessing and collecting culturally important plants, the challenges they face in maintaining their traditions are multiplied. Loss of cultural diversity occurs when important family traditions, such as basket weaving, traditional knowledge of local plants, and land care prac-

tices are not passed on to younger generations. In California, traditional basketry using native plants is one of the most prominent conserved Native cultural practices. Basketweavers explicitly use native plant materials and ancestral techniques in traditional basketry in an integrated approach to conserving their history and culture. Yet the preservation, revitalization, and expansion of basketweaving amongst California's indigenous groups has been subject to many stressors, including the basic need to obtain the requisite raw materials for weaving. As Bibby (1996) notes, "Several community weaving traditions may have been lost due to difficulty in obtaining weaving materials." In this study, we discuss how invasive plants are directly and indirectly connected to stressors impacting biological diversity (native plants) and cultural diversity (plant-based traditions) in California.

NATIVE PLANTS' CONNECTION TO CULTURAL DIVERSITY

California's Native communities are renowned for their extensive knowledge of native plants (Heizer and Elsasser 1980, Anderson 2005).

In current times, expressions of Native cultural diversity linked to native plants include specialized linguistic terminology, historical methods of food collection and preparation, festivals for wild-harvested plants, and storytelling, dances, ceremonial regalia, healing rituals, and traditional handicrafts based on native flora. Perhaps the most well-known use of plants by the First Peoples of California are traditional twined and coiled baskets (see Figure 2), made from the shoots, stems, bark, fibers, and roots of native plants such as cottonwoods, willows, sedges (*Carex* spp.), redbuds (*Cercis occidentalis*), deergrasses (*Muhlenbergia rigens*), tules (*Scirpus* spp.), hazelnuts (*Corylus cornuta* var. *californica*), and cattails (*Typha* spp.), along with many other grasses, herbs, ferns, rushes, shrubs, and trees. In addition, dozens of plant species are used to weave and dye Native baskets (Moser 1989, Strike 1994, Bibby 1996, Moerman 1998, Dalrymple 2000).

In honor of their ancestors, and cognizant of their responsibility to carry on family and tribal traditions, today's California Native basketweavers closely replicate the native plant materials, ancestral patterns, and natural dyes used historically in baskets woven for gathering, storage, sifting, cooking, carrying water, cradling infants, and ceremonial purposes. Following the invasions of Spanish, Russian, and Euro-American explorers, missionaries, and settlers in California, Native tribes incorporated introduced non-native, invasive plants such as oats (*Avena fatua*), ripgut brome (*Bromus diandrus*), and Himalayan blackberry (*Rubus armeniacus*)¹ into their food and medicinal practices (see Figure 3), but generally not into basketry traditions (Strike 1994, Moerman

¹ The Himalayan blackberry (*Rubus armeniacus*) is non-native and invasive. The edible California native blackberry (*Rubus ursinus*) is used both medicinally and as food.

1998). Non-native materials are restricted to “fancy” baskets for personal decoration and gifts, commercial sale, or medicinal ceremonies where beads and bird feathers are used.

Native basketry begins with protecting and tending one’s gathering sites, and extends through to the weaving, coloring, and patterning of each basket. Following the establishment of the California Indian Basketweavers Association (CIBA) in 1992, there has been an increase in basketry apprenticeships, classes, conferences, and museum exhibits throughout the State. Native basketry is a sophisticated combination of ancestral traditions and expert knowledge of plant biology, landscape ecology, tribal history, and the arts, and plays a key role in maintaining California tribal culture. According to Jane Dumas, a Kumeyaay basketweaver, “. . . bas-

ketry is part of our life, it’s our history. After we’re gone, it’s going to be here for our future generations” (CIBA 2002b).

FOCUS OF PILOT STUDY

Our study investigated the following questions: Which native plants used in basketry are impacted by invasive species? What types of impacts do invasive plants have on native plants and gathering sites? What are the major problems faced by basketweavers in gathering tradi-

tional plant materials? Our results—based on a pilot study among a small group of basketweavers—represent a first step in understanding how invasive plants affect native traditions, rather than an extensive inventory of invasive plant distribution and cultural impacts throughout the State of California.

Our study involved a three-part survey, containing multiple-choice, fill-in-the-blank, and open-ended questions, administered in 30–60 minute interviews during March and June 2004. Survey respondents were randomly chosen from basketweavers attending ethnobiology and basketry conferences in northern California. The 23 respondents (21 women and 2 men) were from 14 of the 58 Californian counties and 16 tribes. They represented a range of ages, basketry apprenticeship training, levels of basketry expertise, years of basket weaving



Fig. 2. Tule basket (ABOVE). Photograph by J.M. Pfeiffer. • Fig. 3. Himalayan blackberry (*Rubus armeniacus*) invading ceremonial site (BELOW). Photograph by K. Noorgard.





Fig. 4. Starthistle (*Centaurea solstitialis*) invading oak woodland and grassland habitats. Photograph by J. DiTomaso.

experience, mobility, occupations, and geographic residences.

The basketweavers we interviewed also differed by the types of habitats they visited to collect plants, the types of plant materials they used, and the types of baskets they wove. Included in the survey were some of the most respected and expert basketweavers in California, who travel far and wide to collect their material.

Our data analysis was accompanied by an extensive literature review of scientific articles, books, video recordings, and unpublished literature, including government documents, society reports, tribal newsletters, Native American news-magazines, government documents, local county newspapers, conservation organization reports, and con-

ference proceedings.² Our review covered Native basketry, culturally important native plants, invasive plants, and invasive species control efforts in order to provide a broad context for our findings.³ We discovered widespread tribal concern about invasive species, and substantive interagency efforts to combat invasive plants on tribal lands and gathering sites throughout northern and southern California and the American Southwest.

LAND MANAGEMENT ON GATHERING SITES

Traditional basketry is a physical, cultural, and spiritual practice. Plant material is gathered carefully, thankfully, and reverently at specific times of the year, often from

sites maintained by the basketweavers' ancestors for centuries (Ortiz 1993a, Fulkerson 1995). Gathering sites are managed through burning, weeding, tilling, and debris removal. This enables basketweavers to return to the same sites year after year to gather sufficient amounts of high-quality weaving material (Anderson 2005). Basketweavers search for material that is healthy (free from pests, disease, and herbicide residues), strong, straight, supple, and of the right shade or color.

Many plant types gathered by basketweavers require continued onsite care (pruning, burning, thinning,

selection) to produce the desired quality of plant material. This is true for willow, hazelnut, and redbud, where pruning and coppicing (cutting stems close to the ground) encourages long, straight shoots; for deergrass and deerbrush (*Ceanothus* spp.) that are burned to produce tall, supple new shoots; for white root (*Carex barbarae*) that is thinned to yield longer, straighter roots; and for other sedges that are selected for longer lengths between root nodes (Ortiz 1993a, Strike 1994, Stevens 1999, Anderson 2005).

Most plant material used in basketry is processed by stripping, debarking, soaking, drying, dyeing, or division before it can be woven (Moser 1989). Because the act of preparing basketry materials is also a culturally important tradition, Native basketweavers use their mouths and hands to process the plant material, instead of relying on automated or chemical methods. While building the basket, weavers keep in mind not only the intended use, but also their own spiritual and

² Due to editorial restrictions, only a small portion of our literary references are contained in this article. For a more comprehensive listing of relevant texts, contact the first author directly.

³ We reviewed texts located through University of California electronic databases (MELVYL, BIOSIS, Web of Science, JSTOR, and Pro-Cite, among others), Internet searches (Google), and collegial recommendations during February 2002–November 2004.

emotional input while weaving, and are careful to avoid weaving during periods of physical or emotional intensity, illness, or pain. Traditional or historical baskets are cherished, and are considered to have a physical and spiritual connection with the people who make them and the people who receive them (Ortiz 1993a).

DAMAGE CAUSED BY INVASIVE PLANTS

Invasive plants affect native basketry plants and traditions in six major ways: 1) invasive species such as starthistle (*Centaurea solstitialis*) and Scotch broom (*Cytisus scoparius*) displace native basketry plants such as redbud and deergrass at gathering sites; 2) invasive plants with spines and thorns (such as starthistle, cocklebur (*Xanthium strumarium*), and stinging nettle (*Urtica dioica* ssp. *gracilis*)) present a physical barrier to collecting native basketry plants—a serious concern as most expert basketweavers are 60–90 years old; 3) large populations of invasive plants change plant community composition, affecting entire habitats or landscapes by altering the character of sacred sites (see Figure 4); 4) herbicide spread to native plants negatively affects the quality of basketry materials by stunting native plant growth and causing physical deformities; 5) herbicide spread (from chemicals used to control invasive plants) onto native plants leads to chronic exposure to toxic substances by basketweavers collecting in sprayed areas; and 6) uncertainty about the health of native plants growing in areas invaded by non-native plants (which may have been sprayed with herbicides) is a deterrent to collection by basketweavers concerned for their personal health or for the health of the persons using their woven creations. This is especially true of crafts intended for potentially vulnerable recipients, such as woven baby

rattles, infant cradleboards, and medicine baskets.

Starthistle and Scotch broom were the most frequently mentioned invasive plants by the basketweavers interviewed in our survey, primarily affecting redbud and deergrass. Starthistle invasions were reported in gathering sites throughout northern California, especially at lower elevations. The sharp spines on its main flowerhead and side stems of starthistle (see Figures 5 and 6) make it an effective barrier to gathering basketry plants. Knapweed (*Centaurea repens*) and Himalayan blackberry, plants that thrive in wetter environments, were reported as having the highest impact on riverside species such as willow and giant chain fern (*Woodwardia fimbriata*), according to basketweavers from tribes living in heavily forested and well-watered areas such as the Klamath, Sierra, and Yosemite regions. Overgrown blackberry patches block access to creeks, and the US Forest Service practice of using aerial herbicide sprays to control knapweed has made basketweavers collecting in northern California forests wary of sites exposed to herbicides. Perennial peppergrass (*Lepidium latifolium*) is also invading riparian habitat where sedge beds are established, and stinging nettle and Bermuda grass (*Cynodon dactylon*) were also reported as having invaded sedge collecting areas.

Basketweavers working to practice, disseminate, and maintain cultural traditions face a wide range of obstacles beyond the presence of invasive species. Larger issues faced by Native basketweavers that were repeatedly mentioned by our survey



Fig. 5. Starthistle (*Centaurea solstitialis*) head showing spines (top). • Fig. 6. An entire plant of starthistle (*Centaurea solstitialis*). Photographs by J. DiTomaso.

respondents included: 1) health issues related to herbicide exposure and difficulties in obtaining accurate information in order to avoid collecting in sprayed sites; 2) increased scarcity of basketry plant material; 3) communication and bureaucratic barriers to gaining permission to collect basketry materials on public and private lands; and 4) frustration in their inability to practice traditional plant and land management traditions to improve the density, abundance, growth patterns, and quality of basketry plants in gathering areas.

HARMFUL EFFECTS OF HERBICIDE USE

Of the invasive species impacting native basketry plants, starthistle is perhaps the most pernicious. A highly invasive and destructive weed—recorded as causing over \$30 million in damages to California agriculture (Dudley 2000)—it is one of the most targeted species by state and federal noxious weed control such as the US Forest Service and National Parks Service (Cal-IPC 2004). Government agencies' reliance on herbicides to control invasive plant species such as starthistle and knapweed present on public lands results in spraying sites frequently overlapping with gathering sites. As many basketweavers rely on gathering materials wherever they can find them (in primary and secondary forests, riparian corridors, chaparrals, grasslands, and often along roadsides), the possibility that those sites have been recently sprayed with toxic herbicides is of great concern, and an impediment to gathering native plant material.

The use of toxic herbicides on invasive plants is vigorously opposed by traditional basketweavers for several reasons. First, basketweavers can be exposed to herbicide residue over years or decades while repeatedly gathering or processing plant materials with their mouths and hands. Many basketweavers have experienced symptoms of both acute and chronic exposure to herbicides, including headaches, weakness, nausea, numbness, oral lesions, and mouth cancer. Second, spraying herbicides on gathering sites that Native people view as sacred, ceremonial, or of sentimental importance is considered comparable to dumping hazardous wastes on church grounds.

Third, basketweavers are concerned about the long-term effects of herbicide contamination on humans, soils, plants, and wildlife, and

especially on aquatic species in areas exposed to herbicide residue and run-off (Ortiz 1993b, O'Malley 2002). “[Basketweavers] viewed the unregulated herbicide contamination of culturally important plants and wildlife as a distinct threat to Native American gatherers and the continued productive use of the materials and wildlife...” (Indian Country Communications 1995). Herbicide residues have been found on basketry plants for up to 80 weeks following spraying (California EPA-DPR 1999). Nearby in Nevada, Washoe, Shoshone, and Paiute basketweavers report that basketry plants exposed to herbicides are killed off, or if partially killed, remain deformed and brittle, and with twisted shoots and rotten pith. These weavers report that herbicides contribute to increased scarcity of plants such as willow (Fulkerson 1995, Dalrymple 2000), a concern echoed by our survey respondents.

ALTERNATIVE LAND MANAGEMENT REGIMES

Most basketweavers advocate a more proactive, preventative, and integrated stance towards invasive plant control. They recommend maintaining intact, healthy ecosystems to protect gathering sites from invasion, reintroducing natural historical disturbance regimes, restoring native plant populations, protecting native plant competitors of invasive species, and using mechanical (instead of chemical) means to control invasive species (CIBA 2002a).⁴ Basketweavers in our study cited positive examples of collaborative efforts with the US Forest Service to increase access to collection

sites, decrease pesticide use (or at the very least, consistently inform basketweavers of pesticide use in the area), and promote traditional land management practices in Humboldt, Plumas, Sacramento, Tehama, and Tulare counties.

After decades of eliminating or suppressing Native American traditional land management practices that promoted culturally important species such as fire—which was used to enhance the growth of many native plant species (Anderson 2005)—state agencies are now experimenting with restoring traditional burning regimes. Fire suppression has contributed to the invasion of non-native species in California grasslands (such as the rapid takeover by starthistle). However, burning can simultaneously control invasive plants and promote the growth of native plants while helping to conserve associated cultural traditions (DiTomaso et al. 1999).

Californian government agencies from Six Rivers National Forest, Sierra National Forest, Tahoe National Forest, and Shasta-Trinity National Forest (among others) are involved in collaborative restoration and invasive plant control programs with local tribes. These cooperative efforts involve a combination of strategies including burning, propagation, and replanting to promote native plants used in basketry, including beargrass (*Xerophyllum tenax*), deergrass, and hazelnut. Resource managers in Redwood National Park are reintroducing historical burning regimes to “improve native plant establishment and diversification” and avoid “the loss of significant cultural resources” (Underwood et al. 2003). In the Klamath region, the

⁴ CIBA's policy statement on the control of non-native invasive plants as part of their resource protection program includes a call to “halt the use of pesticides on public lands and in other areas where they affect native basketweavers and gatherers; advocate for alternatives to pesticides; protect and enhance plant and animal resources used by basketweavers and gatherers; [and] preserve and expand free unrestricted access to, and stewardship of, gathering sites by basketweavers (CIBA 2002a).

Salmon River Restoration Council (SRRC) has worked collaboratively with local tribal residents and other resource users for over a decade to remove invasive plants in the Salmon River watershed using non-toxic methods, and has succeeded in significantly reducing knapweed populations and maintaining them at low levels (SRRC 2006).

Biological invasions can drastically and irrevocably alter natural and cultural landscapes. Conservation programs that replicate Native land management practices in collaboration with tribal communities can protect both biological and cultural diversity by decreasing invasive species and increasing total plant diversity, while simultaneously supporting traditional cultural practices. Understanding the cultural context of invasive plant impacts, and specifically how the introduction, spread, and attempts at control of invasive plants affect culturally important native plants, habitats, landscapes, and the traditional gatherers and caretakers of this native biodiversity, can help us develop better integrated ways of dealing with invasive species. The achievements of community-based, inter-agency programs such as the ones described in this article serve as a reminder of our collective responsibility and power to conserve biocultural diversity.

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REFERENCES

- Anderson, M.K. 2005. *Tending the Wild*. University of California Press, Berkeley.
- Bibby, B. 1996. *The Fine Art of Californian Basketry*. Sacramento, CA: Crocker Art Museum.
- California EPA-DPR. 1999. *Residues of forestry herbicides in plants of interest to California tribes*. California Environmental Protection Agency, Department of Herbicide Regulation, Environmental Monitoring and Pest Management Branch, Sacramento, CA.
- Cal-IPC. 2004. *The Cal-IPC list: Exotic pest plants of greatest ecological concern in California*. Berkeley, CA: California Invasive Plant Council. Accessed at: <http://www.cal-ipc.org>.
- CIBA. 2002a. *CIBA Policy on control of non-native invasive plants*. Policy Paper, April 2002. Grass Valley, CA: California Indian Basketweavers Association.
- CIBA. 2002b. 2002 CIBA Gathering opening circle comments. *Roots and Shoots Newsletter* 39:7.
- CIBA. 2004. Statewide herbicide use report. *Roots and Shoots Newsletter* 42:10.
- Dalrymple, L. 2000. *Indian Basketmakers of California and the Great Basin*. Santa Fe: Museum of New Mexico Press.
- DiTomaso, J.M., G.B. Kyser, and M.S. Hastings. 1999. Prescribed burning for control of yellow starthistle (*Centaurea solstitialis*) and enhanced native plant diversity. *Weed Science* 47: 233–242.
- Dudley, D.R. 2000. Wicked weed of the west. *California Wildlife* 53(4):32–35.
- Fulkerson, M.L. 1995. *Weavers of Tradition and Beauty: Basketmakers of the Great Basin*. Reno: University of Nevada Press.
- Heizer, R.F. and A.B. Elsasser. 1980. *The Natural World of the California Indians*. Berkeley, CA: University of California Press.
- Indian Country Communications. 1995. Native group ask EPA protection of traditional crops. *News from Indian Country* IX(2):4 (January 30).
- MacKenzie, A. 2003. Forest herbicide plan threatens basketweavers. *Terrain Summer* 2003:16.
- Moerman, D.E. 1998. *Native American Ethnobotany*. Portland, OR: Timber Press.
- Moser, C.L. 1989. *American Indian Basketry of Northern California*. Riverside, CA: Riverside Museum Press.
- O'Malley, M. 2002. *Recognizing illnesses related to forestry herbicides*. Sacramento, CA: California Department of Herbicide Regulation.
- Ortiz, B. 1993a. Contemporary California Indian basketweavers and the environment. In *Before the Wilderness: Environmental Management by Native Californians*, eds. T.C. Blackburn and K. Anderson, 195–211. Menlo Park, CA: Ballena Press.
- Ortiz, B. 1993b. Herbicides and Basketry. *News from Native California* 7(3):7–10.
- Peña, L. 2002. Chemical forestry threatens tradition and health on the Yurok reservation. *News from Native California* 16(1):16–18.
- Salmon, E. 2003. Bringing the clouds home: The Hopi plant redistribution project. Presentation at the 26th Society of Ethnobiology Conference, March 26–29, 2003, University of Washington, Seattle.
- Salmon River Restoration Council (SRRC). 2006. Noxious weed management program. Accessed at <http://www.srrc.org/>
- Stevens, M. 1999. The ethnecology and autecology of white root (*Carex barbarae* Dewey): Implications for restoration. Unpublished Ph.D. dissertation, University of California, Davis.
- Strike, S.S. 1994. *Ethnobotany of the California Indians. Volume 2: Aboriginal Uses of California's Indigenous Plants*. Champaign, IL: Koeltz Scientific Books.
- Underwood, S., L. Arguello, and N. Siefkin. 2003. Restoring ethnographic landscapes and natural elements in Redwood National Park. *Ecological Restoration* 21(4):278–283.

Jeanine M. Pfeiffer, Ph.D., Science and Society Program and Elizabeth Huerta Ortiz, Department of Plant Biology, University of California, One Shields Avenue, Davis, CA 95616. jmpfeiffer@mindspring.com; elyhuerta@gmail.com

NATIVE GRASSES IN SOUTHERN CALIFORNIA GARDENS

by Barbara Eisenstein

For six months or longer each year, we have virtually no rain. Before the rains begin Santa Ana winds blow through Southern California, reducing the relative humidity to ten percent and below. Yet tawny native bunch grasses,

swaying gracefully, look right at home. In spite of their adaptation to our unusual weather pattern, native grasses are rarely used in our gardens. Inspired by chaparral open-space, many have discovered the delights of shrubs like California lilac and manzanita. Unfortunately most of California's native grasslands have been lost to development or overwhelmed by invasive, exotic annual grasses. Hence, the unique beauty of our native grasses is not well known and they remain under-utilized.

Gardeners, though, are familiar with bunch grasses, most non-native, some highly invasive. The following images are of Southern California gardens that feature perennial native grasses in grassland design settings.

Barbara Eisenstein, Horticulture Outreach Coordinator, Rancho Santa Ana Botanic Garden, 1500 N. College Avenue, Claremont, CA 91711. barbara.eisenstein@cgu.edu





Subdued tawny look of grasses in author's parkway garden in October is followed by a vibrant display of wild flowers each spring (OPPOSITE PAGE, TOP). • Flower spikes of deer grass (*Muhlenbergia rigens*) catch the light at dusk (TOP). • California fescue (*Festuca californica*) in a garden in Sunland (FAR LEFT). • Boulders are a natural companion to grasses in this South Pasadena garden (OPPOSITE PAGE, BOTTOM) featuring needle grasses (*Nassella* spp.). • Purple three-awn (*Aristida purpurea*) in author's garden (LEFT). • California melic (*Melica imperfecta*) growing in partial shade in a woodland garden (BOTTOM LEFT). • The grassland bed at the Maloof Garden (RIGHT) includes deergrass (*Muhlenbergia rigens*), intermingled with rush (*Juncus* sp.) and mugwort (*Artemisia douglasiana*). All photographs by the author.



GRADY LINDER WEBSTER: 1927-2005

by Marcel Rejmánek

For almost 40 years, botany at the University of California at Davis was unimaginable without Grady Webster. His teaching, research, and publications helped boost UCD's botany/plant biology program to the one of the top three in the nation for the past 30 years. He was a truly legendary "walking botanical encyclopedia," superb plant taxonomist, tropical botanist, teacher, and irreplaceable friend to those of us for whom plants are a life-long passion. He represented a constant: whenever he was not on one of his field expeditions, he was always in the herbarium, working hard, but always ready to help his less knowledgeable colleagues and students. Regrettably, Grady passed away without warning on October 27, 2005, as a result of a massive stroke. He is survived by his wife, Barbara Donahue Webster, Professor Emerita at UCD, by their daughter Susan Verdi Webster, Professor in Art History at St. Thomas University in St. Paul, and by generations of botany students who became his spiritual children and colleagues.

Grady was born in Ada, Oklahoma, on April 14, 1927. His first

Grady in the Botany Herbarium in Robbins Hall in 1995. Photograph by E. Dean.



Grady Webster at a stop in Ecuador on an expedition in 1992. Photograph by G.F. Hrusa.

publication was a poem "The Wrens Build a Nest." It appeared in *Mickey Mouse Magazine* when he was six years old, and he won a prize of six dollars. After receiving both his bachelor's and master's degrees from the University of Texas, he published his first professional publication on the plant communities and flora of the Stockton Plateau in Texas (1950, *Texas J. Sci.* 2:234–242). He subsequently published over 120 papers and monographs on plant taxonomy, biogeography, and, in particular, the systematics of his favorite family, the spurge family (Euphorbiaceae). His major contributions were voluminous studies of the Euphorbiaceae genera *Croton*, *Dalechampia*, *Fluggea*, *Jatropha*, and, most importantly, *Phyllanthus*, a genus of approximately 600 species. His vast knowledge of the Euphorbiaceae resulted in a break-through realignment of this family into five subfamilies (1994, *Annals of the Missouri Botanical Garden* 8:1–144). This treatment has substantially stood the test of time, including the revolution brought by molecular data.

In addition to his monographic works, Grady made more than 25 major botanical expeditions to over 20 countries, collected over 30,000 herbarium specimens, and participated in several major floras (Dominica, Galapagos, Nicaragua, and Panama). He was a keen collector of botanical literature and wrote more than 70 reviews on books in many fields of botany. Through his many donations of specimens and books, he was largely responsible for building the collections housed at the herbarium at UCD to their current size and scope.

Grady arrived at UCD as Professor of Botany and Director of the Arboretum in 1966. Until his retirement in 1993, Grady taught courses in plant systematics, biogeography, and pollination ecology. However, his major impact at UCD was his class "California Floristics" (Botany 102). Field trips to Bear Valley, Walker Ridge, Table Mountain, Butterfly Valley, and other parts of California are recalled with nostalgia by hundreds of botany-inspired students. He was tireless in those days.

You could see him, even in the late evening hours, walking fast between his book-packed office and the herbarium. I still remember long evenings when Grady stayed up with us until midnight, revising our identifications of more than 150 jarred native wildflower samples for the next day's UCD Picnic Day exhibitions. Over the years, he worked alongside dozens of teaching and herbarium assistants, many of whom have gone on to make their own contributions to the understanding of the California flora through field work, plant collecting, publications, and teaching.

Despite his major contributions to the field of botany, Grady was not just a botanist—he was a renaissance man. His knowledge of history, geography, music, and poetry was very unusual, to say the least. He was also a very modest man, always humble about his accomplishments. What amazed me most

was the attention he gave to everyone who came to the herbarium. Even before his retirement, it always seemed as though he had endless time just for us. We tried not to misuse his kindness. When my student, Steve Brewer, and I started to analyze our permanent plots in the forests of southern Belize, we always struggled to identify our specimens ourselves first, and only when we were completely lost (often not even able to tell the family), we said that we would have to do “Grading.” This meant

that we went to the herbarium and asked Grady for advice. In fact, we had to do that quite often, especially with sterile material. Even unannounced, we were always wel-

come—always that friendly smile, full of understanding. He looked at our specimens, and then he moved swiftly from case to case, and soon he would find the right species or, at



Grady in the field in Ecuador—Grady is pictured with unknown participants of a plant collecting expedition in Reserva Maquipucuna, Ecuador in 1992. Photograph by G.F. Hrusa.

GRADY L. WEBSTER, AN ACCOMPLISHED BOTANICAL CAREER

Grady obtained his Ph.D. from the University of Michigan, where he was one of the first graduate students of Rogers McVaugh. He was then awarded one of the first NSF postdoctoral fellowships to work at Harvard University with Professor I.W. Bailey. In 1958, he became an Assistant Professor at Purdue University, and in 1966, he arrived at UC Davis.

NUMBER OF PUBLICATIONS: Approximately 200, including books, book chapters, essays, journal articles, book reviews, and contributions to floras.

NUMBER OF PLANT COLLECTIONS: 34,515—Grady's last plant collection was a cudweed from Pine Grove, Texas made on October 13, 2005.

PLANT COLLECTING EXPEDITIONS: Over 25 expeditions, including multiple trips to Cuba, Jamaica and many other parts of the Caribbean; multiple trips to Mexico and Baja California; Central America, especially Panama and Costa Rica; multiple trips to South America, especially Surinam, Venezuela, Brazil, Ecuador, and Peru; multiple trips throughout California, Texas and other western states; multiple trips to the Pacific Islands, including Hawaii, New Caledonia, New Guinea, Fiji, Tasmania, and Norfolk Island; Australia; Kenya; and Pakistan.

BOOKS: *Flora of Maquipucuna* (with Robert Rhode), *Changing Plant Life of La Frontera* (with Conrad Bahre).

PRESIDENCIES: Botanical Society of America; Association of Plant Taxonomists; California Botanical Society.

AWARDS: Rackham Fellowship (University of Michigan—1952); NSF Post-Doctoral Fellowship (Harvard University—1953–1955); Guggenheim Fellowship (University of Utrecht—1964–1965); Smithsonian Senior Fellowship (1988); Merit Award (Botanical Society of America—1997); Engler Medal (International Society for Plant Taxonomy—1996); Asa Gray Award (American Society of Plant Taxonomists—2006).



Grady Webster botanizing with a horse in Reserva Maquipucuna, Ecuador in August 2001. Photo by L. Huiet.

least, the right genus or family. Gone are those happy, easy days.

Some 20 years ago, when I came to Davis and joined the faculty of the UCD Botany Department, there was one other botanist like Grady there—Professor Jack Major. Although Jack was already retired at that time (*Fremontia* 30(1):20–23.), field botany was still his passion, and he also had a huge library. He was also a very kind and modest man. Grady and Jack are both gone now, and I am sure that if there is a botanical heaven, both of them are there. They work in an enormous herbarium with specimens of all described and many, many still undescribed plant species. They have immediate access to a library with all the botanical books ever published and, maybe, even with many books that have not been published yet. They are botanizing in the most beautiful mountains, forests, and islands. And they

are carrying on infinite discussions on island biogeography, peculiar pollinators, endemism, soils, plant communities, speciation, and all aspects of life here and there. I hope that this is true. But if it is not, then, at least, I am sure that both of them with their fulfilled lives on this earth seriously challenged Hippocrates' la-

menting about the brevity of our lives and proved that "life is long, if you know how to use it." (Seneca: *De brevitate vitae* 2,1).

Just a few months before his death, Grady received the Asa Gray Award from the American Society of Plant Taxonomists. Bruce Baldwin, one of the many graduate students to pass through the UCD herbarium, wrote in support of the nomination "Grady has truly dedicated his life to systematic botany and made the best of it, by any measure. Our field is much richer as a result of these continuing efforts, which have been an inspiration and foundation for many active young researchers who are carrying Grady's work in exciting new directions. From my perspective, no other living botanist is more deserving of the Asa Gray Award." Remembering him, I would say, together with the Greek playwright Menander: "Man is something beautiful, if he is a man."

Marcel Rejmánek, Professor of Ecology, Section of Evolution and Ecology, University of California, Davis, CA 95616. mrejmanek@ucdavis.edu

Students from UC Davis's course Botany 102: California Floristics are shown on a class field trip near Ione, Amador County, April 15, 1973. Photograph by Grady Webster, courtesy of the UC Davis Center for Plant Diversity Archives.



GROWING NATIVES: CALIFORNIA BUCKEYE AS BONSAI

by Elmer Grossman

Glenn Keator's (2005) article on growing California buckeye (*Aesculus californica*) prompted me to write about an unusual use of this tree—as a bonsai. Because bonsai is a Japanese horticultural practice, the trees and shrubs used both in Japan and here in the United States are generally of Japanese origin. Books on bonsai rarely mention plants not native there, so guidance in growing this California species as a dwarf is unavailable. About 40 years ago when my children were young, we would collect buckeye seeds to make into rotating toys on a doubled string. An excess of seeds led me to begin experimenting with bonsai; I can report that a less likely candidate for dwarf culture can hardly be imagined.

The seeds of buckeyes are easily found in early to mid-autumn, on or under the trees. In nature the large seeds (2–5 cm in diameter) manage to root from on top of or barely under the surface of the ground. My practice has been to place newly gathered seeds in small depressions in pots with loose soil and let them alone. They germinate without any special attention.

The characteristics of plants best suited for dwarf culture include small leaves, short petioles, and a short distance between leaf nodes. Unfortunately for our purposes, California buckeyes have large leaves (6–17 cm), variable but usually long petioles, and generous internodal

spaces. Large, floppy leaves, sparsely placed on a small bonsai look ridiculous, so one must tip pinch new growth before a long internodal space can develop. Without frequent

pruning at the time of transplanting; this is especially necessary when relocating a tree to a shallower container. Some authors also insist on routine root pruning to keep the plant healthy. However, bonsai authorities disagree about the proportion of old roots to be removed and about the frequency with which this should be done, suggesting that this is a matter of art rather than horticultural science.

Once established, the culture of dwarf buckeyes is no different from that of other deciduous bonsai. They will wilt temporarily in very hot weather but recover rapidly. For those unfamiliar with the species, their habit of leafing out in December or January and losing their leaves in summer may be somewhat surprising. In my experience, the only significant pests are deer which come onto our deck and eat new growth down to the trunk. The buckeye in the illustration (see Figure 1) was over 40 years old when it was “pruned” by one of our local black-tailed deer four

years ago. The tooth marks on the trunk are still evident.

REFERENCE

Keator, Glenn. 2005. Growing Natives: California Buckeye. *Fremontia* 33(1): 29.

Elmer R. Grossman, 899 Euclid Avenue, Berkeley, CA 94708-1305. elmer@grossmanfamily.com



40 year old bonsai of California buckeye. Photo by the author.

tip pinching, a leggy plant form develops within the first year. Should this occur, prune back the plant to the first leaves or start again next season.

In order to slow growth and inhibit the development of normal-sized leaves, give bonsai as meager a diet of nutrients as possible. A properly underfed buckeye will have leaves less than 7 cm in diameter. Bonsai books typically advise root

RE-VISITING THE “SPARKLERS” OF CORTE MADERA

by Lucy A. Dueck

On the Fourth of July, 1980, a botanist from the Missouri Botanical Garden discovered a real treasure up in the hills outside of San Diego—the orchid *Spiranthes porrifolia*. In full bloom, it could even be likened to the sparkling spike of children’s fireworks. His find was important because this population of creamy ladies’-tresses, at the southernmost fringe of its range, was the only one documented for this species and this genus in San Diego County. It was also the only recently documented find of this taxon in Southern California since collection in 1891-92 from the San Bernadino Mountains, according to the Consortium of California Herbaria. So he collected a sample to validate its existence for the San Diego Natural History Museum herbarium (see Figure 1).

A piece of that dried sample ended up in my test tube as a ‘consolation prize’ in a quest for fresh samples of this species. I’d undertaken a huge project—putting together the “family tree” of the genus *Spiranthes*, using four segments of DNA from the three plant genomes. But the first challenge was obtaining samples of all 26 taxa found in the U.S. Unfortunately, *S. porrifolia* had evaded my volunteer collectors over its narrow range along the West Coast. So I had to resort to herbarium specimens, which do not dependably provide good DNA. Karen Rich of the herbarium at the San Diego Natural History Museum graciously sent me that piece of dried leaf to test against another sample of *S. porrifolia* from southwestern Oregon, obtained from the University of Idaho herbarium.

The identity of both specimens had been verified by *Spiranthes* expert Dr. Charles Sheviak of the New York State Museum.

Surprisingly, genetic analysis of the only two segments that worked, chloroplast DNA segments *trns-fM* and the *trnL* intron, yielded strikingly different results between the two “*S. porrifolia*” herbarium samples. The Oregon specimen matched a rare endemic species found in Nevada—*S. infernalis*, while the San Diego specimen matched a much more widespread northern species—*S. romanzoffiana*; i.e., they didn’t have a singular species identity, at least so far. I had to find out what was going on—misidentification, hybridization, or something else!

Coincidentally, the 2006 meet-

ing of the Native Orchid Conference (NOC) was held in southwestern Oregon, so I attended and hunted for *S. porrifolia* myself in the area. I was especially interested in re-sampling the population sources for the two herbarium specimens. Through the help of friends, I did obtain fresh leaves from the Oregon site, but the San Diego site was out of range.

I was determined to complete my double-check on the two herbarium samples, however. A graduate student in our lab, Nick Crawford, was returning to school in San Diego, so I sent along some bags of desiccant in the unlikely event he could do some collecting. Meanwhile, I also enlisted advice from an NOC member in the Bay area, Brad Kelley. He suggested I contact the San Diego chapter of the California Native Plant Society for help. Kay Stewart there quickly emailed another CNPS member, Dale Clark, whose family was part-owner of the Corte Madera Ranch, site of the original herbarium collection. Dale not only gave permission to collect on her property, but also contacted two other pivotal people—her brother-in-law Henk van der Werff (the botanist who made the original collection in 1980) for exact directions, and the ranch foreman’s wife Sharon Paulin, who knew the land and flora. The botanists at the San Diego Natural History Museum were alerted about my inquiry and willing to help, too.

Time was running out, though. It was just after July 4th and the orchids could have bloomed already and thus would be difficult to find. But on July 12th, Nick and Margie Mulligan, a botanist from the museum, joined up with



Fig. 1. *Spiranthes porrifolia* herbarium specimen collected July 4, 1980, by Henk van der Werff. Digital scan from the San Diego Synoptic Collection (SD), courtesy of the San Diego Natural History Museum.



Sharon at the ranch. I waited in anticipation all day to hear if they were successful. That night Nick sent me an email with a link to his website displaying photos of almost-finished blooms of the 'sparklers' (see Figure 2) and the simple comment, "nuff said." They had found the same population of *S. porrifolia* as the original herbarium specimen, now consisting of 12 healthy plants. Nick collected leaf samples for me, and Margie obtained a new voucher specimen for the museum. As Sharon said, they were quite a team!

Fig. 2. *Spiranthes porrifolia*, collected July 12, 2006, at Corte Madera Ranch near San Diego. Photograph by N.G. Crawford.

These fresh samples of *S. porrifolia* from San Diego, together with several others from central California and southwest Oregon, are now being processed, sequenced, and compared with other *Spiranthes* to determine their identity and relatedness. This collection story is one of many from my project, made possible only by the willingness and cooperation of dedicated volunteers. The final results on the molecular phylogeny of *Spiranthes* will be submitted to a scientific journal for publication.

Lucy A. Dueck, Savannah River Ecology Laboratory, Drawer E, Aiken, SC 29802.
dueck@srel.edu

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California Invasive Plant Inventory.
California Invasive Plant Council.
2006. 39 Pages.
California Invasive Plant Council, Berkeley, CA.
Currently available only as a free online pdf at www.cal-ipc.org.
Summarizes impacts, potential for

spread, and distribution of more than 200 non-native plants that invade wildlands in California. Complemented by an online database with detailed information. Revision to be published 2007.

Weeds of California and Other Western States. (2 volumes)
Joseph M. DiTomaso and Evelyn A. Healy.
2007. 1760 Pages.
University of California, Division of Agriculture and Natural Resources.
\$100.00 soft cover.

Comprehensive weed identification book for over 800 species with 3000 color photographs of infestations,

whole plants, flowers, seedlings, and seeds. Includes a CD with all the photographs in the book—copyright-free for educational use.

Aquatic and Riparian Weeds of the West.

Joseph M. DiTomaso and Evelyn A. Healy.
2003. 442 Pages.
\$40.00 soft cover.
University of California, Division of Agriculture and Natural Resources.
Outstanding reference for 170 species of submerged, floating leaf, and emergent aquatic weeds with over 550 color photos.

The Use of Fire as a Tool for Controlling Invasive Plants.

Joseph M. DiTomaso and Douglas W. Johnson (eds.).
2006. 56 Pages.
California Invasive Plant Council, Berkeley, CA.
\$5.00 soft cover. Also available as a free online pdf at www.cal-ipc.org.
Captures the current state of knowledge on the use of fire as a tool to manage wildlands.

Yellow Starthistle Management Guide.

Joseph M. DiTomaso, Guy B. Kyser, and Michael J. Pitcairn.
2006. 78 Pages.
California Invasive Plant Council, Berkeley, CA.
\$5.00 soft cover. Also available as a free online pdf at www.cal-ipc.org.
Describes advantages and disadvantages of techniques to control yellow starthistle, including mechanical tools, cultural tools, biological agents, and chemical treatments.

The Weed Workers' Handbook: A Guide to Techniques for Removing Bay Area Invasive Plants.

The Watershed Project and California Invasive Plant Council.
2004. 120 Pages.
The Watershed Project and California Invasive Plant Council, Berkeley, CA.
\$13.00 soft cover. Also available as a free online pdf at www.cal-ipc.org.
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cation and control methods for 27 invasive plants. Also contains a chapter on tools used in weed work and how to organize volunteers.

Broadleaf Weeds of California.

Joseph M. DiTomaso.

2006. CD-ROM—PC format only.

University of California, Davis and the Weed Research and Information Center.

\$40.00.

Grass and Grass-Like Weeds of California.

Joseph M. DiTomaso.

2005. CD-ROM—PC format only.

University of California, Davis and the Weed Research and Information Center.

\$32.00.

These two CD-ROMs for Windows provide interactive keys for identifying weeds using parts visible to the naked eye. Includes a “forgiveness fac-

tor” that allows the user to reach the correct identification even when making a couple of mistakes while keying out the species. The grass CD covers 230 species and the broadleaved CD covers 722 species; both include photos, descriptions, and life histories. Both CDs may be ordered from the California Invasive Plant Council for \$60.00 (a savings of \$12.00).

—Elizabeth Brusati, Ph.D.
and Bart O'Brien

BOOK REVIEW

Introduction to California Chaparral

Ronald D. Quinn and Sterling C. Keeley.

University of California Press, 2006. 344 Pages, 79 color illustrations, 56 line illustrations, 3 maps. \$50.00 hard cover. \$19.95 soft cover.

Californians are no strangers to chaparral but I suspect that many know nothing more than what they see from their automobile windows. These Californians would learn so much from just reading the first chapter alone.

I am struck by how well this book pulls together a variety of insights into an easy-to-read single source. This may be because both authors joined forces only after discovering they were independently working on similar books.

For me, chaparral fires have been so much in the news lately that I turned first to that chapter. It struck me that it is a perfect syllabus for a series of field trips that could be organized around the chaparral fire cycle. Within easy field trip distance, especially in Southern California, are newly-burned sites as well as those of varying ages which provide a spectrum to demonstrate the recovery process.

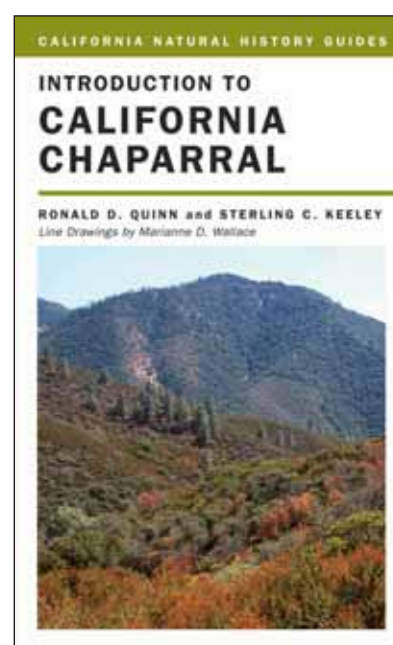
The first field trip should be at “*time-zero*” in the fire cycle to see the “. . . exposed hillsides with blackened skeletons of shrubs protruding here and there, and with ash and charcoal on the surface of the soil.” The branching structure of the various woody species can be seen and contemplated along with the ecologically important burls that are so much a part of the story. Maybe some root structures can be observed in places where fire-lines

have been bulldozed. These morphological features will begin to make sense when you return a few weeks later and observe the newly sprouted shoots, growing from these energy-storing structures, which are accelerating the recovery process of these presently exposed sites.

By all means come back again after the rains and botanize, with book in hand, among the fire-following wildflowers which have germinated and are most likely not familiar to you. They will soon be replaced with subshrubs and the resprouting replacement stand of chaparral shrubs. They won't be seen again until germinating years later, after the next burn.

And so the cycle goes and can be observed on subsequent field trips to visit old, and older, burn sites culminating in a visit to a mature site on the verge of its next burn. The words “fire regime” will take on new meaning. Your group will now have greater interest in watching the years go by at the original site you visited on the first field trip, and the views from your automobile windows will take on new meaning. The young people may even have the opportunity someday, at the original field trip site, to observe the full cycle back to *time-zero* at a future point in their lives. But please, don't be the source of ignition.

I can't help but think how useful these observations and this series of field trips might be for information-challenged public policy makers and newly arrived residents. These subgroups might be especially interested in reading the final chapter, Living with



Chaparral. The information here is not new but it is presented in a coherent manner. I think news reporters would also benefit.

All in all, as interesting as this book is to a botanist, its value extends to other fields of biology too. As your field trips follow the sequence of recovery, this book will guide you to even finer insights. Although you may not have seen the charcoal beetles, this book refers to them as fire beetles (*Melanophila* spp.), mating on a smoldering branch; keep your eyes peeled for the diametrically opposite mating of the rain beetles (*Pleocoma* spp.).¹ The authors describe them as insects superbly keyed to chaparral peculiarities. And watch for the lizards that

shoot blood from their eyes when threatened (coast horned lizard, *Phrynosoma coronatum*).

Surely you will notice the passing sequence of animals changing along with the vegetation . . . lizards (*Phrynosoma* spp., *Cnemidophorus tigris*, *Sceloporus occidentalis*, et al.) through a sequence of rodents² . . . brush mice (*Peromyscus* spp. et al.) to bush rabbits (*Sylvilagus* spp.). All of these creatures are good reasons to include a zoologist on your field trips.

When the wood rats (*Neotoma* spp.) return to dominance, start watching for news for the next fire in that location. Amaze your friends by predicting where they will occur. Again, please don't be the source of ignition.

California, of course, is not alone in displaying chaparral phenomena. Our state is a full-fledged participant in the world's Mediterranean climate.³ This climate occurs elsewhere in the temperate latitudes, both north and south. (Cool! Start planning your next field trip to western or south-east Australia or the Cape Province of South Africa. How about central Chile, South America? [See *Fremontia* 2(3):8-13. 1974. A California botanist in Chile, by G. Ledyard Stebbins.]) This climate type involves less than 3% of the world's land surface and California claims only 10% of that. You may not realize it but many Californians are living in a rare climatic zone.

Mediterranean climate occurs in places where a cold, ocean air mass interacts with a warm, large continental high-pressure air mass extending from the land-ocean interface across the land mass of the adjacent continent. Interacting weather modifiers combine to create alternating cool, wet winters and hot, dry summers. It is as if the chaparral zone is caught between the two air masses as they rub together as you would rub your palms together on a cold day.

California's Mediterranean climate involves the continental "Pacific High" air mass centered in the Nevada/New Mexico/Arizona region and its interaction with California's ocean-based low pressure area. This interaction is modified by cyclical variations of winds and ocean currents. These in turn are tied in with the annual movement of the sun. All of this adds up to winds

that "carry water or take it away." This brings us of course to the Santa Ana winds and their northern California counterpart, the Diablo winds.⁴ Include a climatologist with your field trip group and the trip takes on new insight. How about including a TV weathercaster? Their new insights will enrich the weather reports with occasional natural history tidbits.

What we call chaparral is, of course, nature's manifestation of life's survival tactics to this climatic regime. Whereas you and your chaparral neighbors might install air conditioning and swimming pools, chaparral plants depend on such things as vertical-oriented, evergreen, sclerophyllous leaves, which are adaptations to summer dryness and high temperatures. Other tactics include the previously mentioned burls and deep rooting systems.

For CNPSers, the book has an abundance of information on plants. Shrubs are the most characteristic features of chaparral but Chapter 4 clearly explains the role of non-shrubby plants and their place in the fire cycle as well. My attention was drawn to the concept of "habitat fidelity" among chaparral plants. They are " . . . uniquely adapted to this habitat, whether their periods of abundance is during the long fire-free periods when shrubs dominate, or confined to the period immediately after fire when the shrubs are no longer present." For the most part, you won't find these plants in other vegetation types, only in chaparral.

Incidentally, if you are a fast driver, don't confuse interior, and coastal, sage scrub⁵ with chaparral. Although nearby, sage scrub has a different set of life-preserving strategies, and is also well adapted to the Mediterranean climate. This would make an interesting set of companion field trips.

I missed a discussion on the differing types of chaparral. But that is substance for a yet-to-be-written book derived from the CNPS Vegetation Program, a project highly dependent on input from CNPS chapters like yours. This project recognizes nine different "series" types of chamise chaparral alone, so you can see what a complicated vegetation type chaparral is. Maybe this current book is as deep as you and I might want to go.

The next time you see the famous "Hollywood" sign, think again of chaparral because that name was inspired by the chaparral species toyon, or California holly (*Heteromeles arbutifolia*). Toyon and four other chaparral species specifically discussed in this book are members of the rose family. This revelation brought a new thought to my mind. Could chaparral be considered a rose garden? In any case, the discussion of chamise (*Adenostoma fasciculatum*) gave me new perspective. You will see me this spring hanging out, with camera in hand, at the chamise stand within walking distance of my home in an effort to document its annual changes from vegetative growth, to flowering, to bud-set, to over-wintering condition, to the next growth season.⁶ This stand happens to be an over-mature condition and I may soon be able to photograph it at *time-zero*. And, no, I will *not* be the source of ignition.

As I read this book I frequently found myself saying, "How cool! I never thought of it that way before." The view out the car window during that long drive to Las Vegas may be boring but your field trip experiences with California's chaparral and reading this book will be invigorating.

—Norden H. (Dan) Cheatham
East Bay Chapter

¹ See California Natural History Guide No. 88. *Field Guide to Beetles of California*.

² See California Natural History Guide No. 66. *Mammals of California*.

³ See Dallman, Peter. 1998. *Plant Life in the World's Mediterranean Climates*. Published by CNPS/UC Press.

⁴ See California Natural History Guide #87. *Introduction to Air in California*.

⁵ See California Natural History Guide #85. *Introduction to Plant Life of Southern California: Coast to Foothills*.

⁶ See California Natural History Guide # 69. *Introduction to California Plant Life*.



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CONTRIBUTING PHOTOGRAPHERS

Nicholas G. Crawford is a Masters student at San Diego State University, where he is studying lizard evolution. He assisted Lucy Dueck in finding a lost population of *Spiranthes porrifolia* with the help of Margaret Mulligan (San Diego Natural History Museum) and Sharon Paulin (Corta Madera Ranch).

Ellen Dean is Curator at the UC Davis Center for Plant Diversity. The Center houses thousands of Grady Webster's herbarium collections from all over the world.

Joe DiTomaso is a weed ecologist in the UC Davis Weed Science Program, who has worked at the forefront of invasive plant species in California for over a decade.

Barbara Eisenstein, both author and photographer, is the Native Plant Outreach and Education Coordinator at Rancho Santa Ana Botanic Garden. She fields native plant gardening questions from novice to expert gardeners on the Garden Hotline. Relying on the expertise of co-workers and her own experience with native plants, she develops materials, gives talks and does whatever she can to encourage the use of native plants in gardens and landscapes.

G. Frederic Hrusa, Ph.D., is a Senior Botanist at the California Department of Food and Agriculture. He received his Ph.D. from UC, Davis, and travelled with Grady Webster on many field trips, including to Ecuador.

Layne Huiet, Ph.D., is a volunteer botanist specializing in pteridophytes, associated with UC, Berkeley, and UC, Davis, who travelled to Ecuador on a field trip organized by Dr. Alan Smith and Grady Webster.

Kari Noorgard is a sociologist at Whitman College who has studied environmental justice issues associated with Native American groups in the Pacific Northwest, including the impact of herbicide use and the decline of wild salmon populations on tribal health.

MATERIALS FOR PUBLICATION

Members and others are invited to submit material for publication in *Fremontia*. Instructions for contributors can be found on the CNPS website, www.cnps.org, or can be requested from *Fremontia* Editor, Bart O'Brien at bart.obrien@cgu.edu or c/o Rancho Santa Ana Botanic Garden, 1500 N. College Ave., Claremont, CA 91711.

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FROM THE EDITOR

With this issue, you may note a few minor tweaks to *Fremontia*. Since we are a quarterly journal focused on the plants of California, it makes sense that rather than arbitrary months of publication we should recognize the seasons. Readers can still expect *Fremontia* on the same schedule: January, April, July, and October—but the issues will be titled Winter, Spring, Summer, and Fall.

In the previous *Fremontia* editorial, I paid homage to former *Fremontia* editors. Further acknowledgments are warranted for two ongoing contributors to our reader's *Fremontia* experience: Beth Hansen-Winter, designer, and Bob Hass, copy editor.

Beth Hansen-Winter is *Fremontia*'s third officially designated designer and also serves as our de facto art director. She has continuously produced the visually appealing work that we have all enjoyed since her first issue, *Fremontia* 14(1), April 1986. She was preceded in this capacity by Marie Carluccio who designed five issues of *Fremontia* from January 1985 to January 1986. Michael Zipkin was *Fremontia*'s first named designer. He designed the first three issues of Volume 12 in 1984.

Bob Hass is *Fremontia*'s first designated copy editor. He began this work with *Fremontia* 29(1), January 2001. Many readers will also recognize his

name as the editor of the *CNPS Bulletin*. The *Bulletin* again appears as an insert in *Fremontia* to help CNPS save mailing costs in order to accomplish more programmatic work in science, conservation, and education.

I wish to convey my personal thanks and appreciation to Beth and Bob for continuing to provide their professional services to *Fremontia*, and to express my gratitude to their predecessors for providing their expert services for the foundation of today's *Fremontia*.

My next editorial will cover Bob Ornduff's and Laurence Hyman's contributions to *Fremontia*.

Bart O'Brien

CONTRIBUTORS

Sarah J. De Groot is a Ph.D. candidate at Rancho Santa Ana Botanic Garden, where she is currently working on the systematics of the genus *Eriastrum*. She is a native Southern Californian from the Escondido area, and has always had a strong interest in plants.

Lucy Dueck, M.Sc., works as a research professional in molecular ecology at Savannah River Ecology Laboratory, a field station for the University of Georgia. Her *Spiranthes* project was partially funded by a grant from the American Orchid Society.

Elmer R. Grossman, author and photographer, formerly practiced and taught pediatrics in the Bay Area. He is now peacefully retired, watching over his bonsai and garden in Berkeley.

Elizabeth Huerta Ortiz is a science educator working at the outdoor school at Rancho Alegre in Santa Barbara. She has a plant biology degree from UC Davis and is currently working toward a Ph.D. in science education. Her botanical research includes the investigation of the morphology and leaf development in *Marsileaceae*, and the effects of a plant pathogen on different grass species near Bodega Bay.

Jeanine M. Pfeiffer is an ethnoecologist at UC Davis whose work focuses on the global connections between biological and cultural diversity and the role of indigenous knowledge and management practices in conserving biocultural diversity. As executive director of the non-profit conservation organization ECO-SEA (<http://www.ecosea.org>), she works on applied research programs in gender and biodiversity, wild-harvested foods, and community-based ecotourism.

Marcel Rejmánek is a Professor of Ecology at University of California, Davis. His research and teaching focus on biological invasions, regeneration of tropical forests, and plant community ecology.



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