



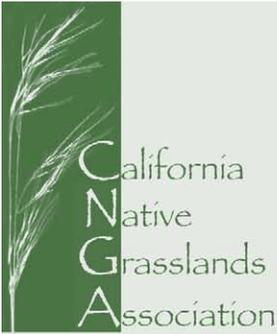
California
Native
Grasslands
Association

GRASSLANDS

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Mission Statement

The mission of the California Native Grasslands Association is to promote, preserve, and restore the diversity of California's native grasses and grassland ecosystems through education, advocacy, research, and stewardship.

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From the President's Keyboard

Dear CNGA Members, Sponsors, and Friends,

So much has happened since the last edition of *Grasslands* that I can only focus on a few items.

First and foremost, on behalf of the Board of Directors, I want to thank all of you who have sponsored CNGA, donated to, or are new or continuous members of our organization.

Secondly, I want to thank all our Board Members who are working continuously and passionately to advocate for native grasslands ecosystems and offering educational workshops. *Landscaping with Natives* is coming up next at UC Davis September 21 (see box on next page).

CNGA chaired a well-attended grassland session at the SERCAL conference in Carmel Valley and attended the mini Cal-IPC symposium in Concord, joining other highly knowledgeable professionals in the grassland weed control session. We will also be present at the upcoming CNPS conference.

Our half-day field trips are going well despite the summer heat.

We are working towards offering hybrid workshops that seem to have beneficial logistics for many of our members who cannot otherwise attend in person.

Lastly, we are still very much involved in various projects to preserve historical grasslands and in projects that support the 30x30 initiative.

On a personal note, I have decided to not run as President again next year and will instead focus on workshop implementation and advocacy. Thank you for your trust over the past few years.

On behalf of the CNGA Board,

JP Marié, Board President



The mission of the California Native Grasslands Association is to promote, preserve, and restore the diversity of California's native grasses and grassland ecosystems through education, advocacy, research, and stewardship.

CNGA Events

Registration is OPEN at [CNGA.org/Events](https://cnga.org/Events)



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Landscaping with Nature: Habitat Gardening with Natives in the Built Environment

September 21, 2022 — 8 am to 3 pm
Putah Creek Lodge at UC Davis Arboretum

This workshop is suitable for landscape professionals and anyone interested in maximizing habitat values in their landscaping. Expert instructors from the industry will present cutting-edge methods of design, installation, management, and maintenance. Topics include plant selection, evolutionary interactions, habitat features, and best practices to create a wildlife-friendly landscape and make the most out of every drop of water!

Presenters: **Ryan Deering**, GATEways Horticulturist, UC Davis Arboretum & Public Garden | **Haven Kiers**, Assistant Professor of Landscape Architecture, UC Davis | **Billy Krimmel**, Miridae Landscape Architecture and Construction, Sacramento | **Julia Michaels**, Restoration Ecologist & Designer, Hedgerow Farms, Inc. | **Pat Reynolds**, Director of Native Seed & Nursery Program Heritage Growers/River Partners, Sacramento | **Neal Williams**, Professor of Entomology and Nematology, Dept. of Entomology, UC Davis

COMING THIS FALL:

Grassland Research Awards for Student Scholarship Speaker Seminar

Join us Tuesday evenings from September 20 through December, GRASS award recipients will present their research and findings during this series of on-line events.



For more information and to register, visit <https://cnga.org/Events>.

Grasslands Submission Guidelines

Send written submissions, as email attachments, to grasslands@cnga.org. All submissions are reviewed by the *Grasslands* Editorial Committee for suitability for publication. Written submissions include peer-reviewed research reports and non-refereed articles, such as progress reports, observations, field notes, interviews, book reviews, and opinions.

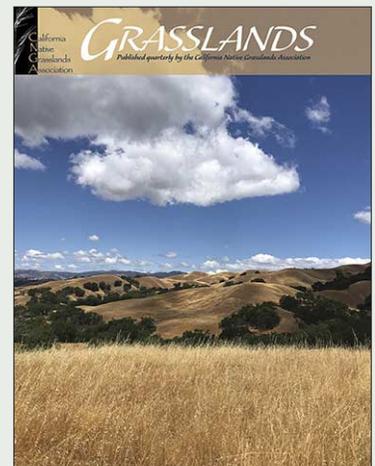
Also considered for publication are high-resolution color photographs. For each issue, the Editorial Committee votes on photos that will be featured on our full-color covers. Send photo submissions (at least 300 dpi resolution), as email attachments, to the Editor at grasslands@cnga.org. Include a caption and credited photographer's name.

Submission deadlines for articles:

- * **Winter 2022** 15 Nov 2022 * **Spring 2023:** 15 Feb 2023
- * **Summer 2023:** 15 May 2023 * **Fall 2023:** 15 Aug 2023

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MEET A GRASSLAND RESEARCHER **Gregory Arena**

PhD Candidate in the Department of Integrative Biology, UC Berkeley gregory.c.arena@berkeley.edu

What is your study system?

I work in the coastal prairies of the Marin Headlands in Golden Gate National Recreation Area (GGNRA). In less than 10 miles between the warm southern exposure of Mount Tamalpais and the fog-veiled Pacific lie serpentine barrens, redwood groves, oak woodland, coastal scrub, chaparral communities, and hardwood forests. Grasslands are the stitching that binds this ecotonal patchwork. I study how the plant life that comprises these grasslands adapts to and for succession and climate stress.

What are your primary research goals?

The coastal grasslands found in the GGNRA provide scaffolding for much of the diverse ecology found in the park. My investigation focuses on how the intrusion of woody plants, primarily coyote-brush (*Baccharis pilularis*), affects the vigor of perennial native bunchgrass — purple needlegrass (*Stipa pulchra*) — one of the dominant native grasses in my study system. For me, this question began five years ago while I was working as a restoration technician at the GGNRA removing invasive species. In the more than 40 years since the GGNRA was created, native grasslands have waned in an absence of historic disturbances such as herbivory and fire, which can be essential to preserving and creating these habitats. In addition, the pressures of invasive species introduced to this landscape have only aggravated native grassland decline. To maintain open grasslands, land managers across the state regularly employ mechanical methods to prevent brush encroachment into grasslands. During my time conducting inventory and monitoring surveys at the GGNRA, I observed that even while grasslands as an ecosystem type are spatially in decline, the native components of these grasslands — the bunchgrass and herbs — appeared in far greater abundance. This is particularly true at the interface between grasslands and woody plant communities, where native grasses often outnumbered invasive competitors (Arena 2019). My research now focuses on

characterizing the physiological effects of coastal scrub on purple needlegrass as well as how coastal scrub can alter microclimates to facilitate drought tolerance in native grassland species.

Who is your audience?

Working both ends of conservation — research and implementation — convinced me that good data and good management are not transferable unless there is seamless communication and understanding between researchers, land managers, stakeholders, and applicators. I see my research as supporting a more nuanced understanding with regard to how public and private parties approach these systems. In particular, I see this work benefiting the public land agencies that have already participated in my pilot study of these systems, as well as private landowners who may be interested in promoting native diversity on their properties.

Who has inspired you, including your mentors?

I've been fortunate to have so much support in my research interests and growth as a naturalist. My supervisor at GGNRA, Tom Reyes (now vegetation ecologist for CNPS) introduced me to these grassland systems. His Jepsonic knowledge and enthusiasm for California native plants were critical in getting me over the daunting hurdle of grass identification. I'm also so appreciative of Dr. Alison Forrestel, GGNRA's Chief of Natural Resources, for supporting my research pursuits, and for her advice on experimental design while I worked at GGNRA. Working at Point Reyes National Seashore under the Range Program Manager, Dylan Voller, provided me with keen insights into some of the broader implications of grassland conservation, which have greatly influenced the social dimensions of my work. The guidance of my Ph.D. advisor at UC Berkeley, Dr. Todd E. Dawson, has been invaluable in how I have developed my work



Photo courtesy Rita Ellen Pender Arena



Right: Arena's field site on Dias Ridge, behind Golden Gate Stables. In the distance, Muir Beach. *These three photos courtesy the author*

MEET A GRASSLAND RESEARCHER

Gregory Arena *continued*

through a lens of plant physiological ecology. I've also found inspiration in those people I know or have met who live and work in grasslands — colleagues from my time working in the National Parks, farmers, ranchers, and other long-time rural residents. There is something about the instinctive knowledge of a place, grown from spending enough time in that place, that can't be summarized in a journal article or spreadsheet.

How has or will your research align with the mission of CNGA “to promote, preserve, and restore the diversity of California’s native grasses and grassland ecosystems through education, advocacy, research, and stewardship”?

Grassland systems are an important resource and repository for our state's floral diversity, but they have long been an important resource for people as well. Unfortunately, so much of the natural history of these spaces and the traditional stewardship practices by the Miwok and Ohlone here in the Bay Area was obscured when the settlers carved the hills into ranches and townships. Investigating the physiological ecology of purple needlegrass and other native grassland species paired with traditional ground-truthing approaches, I hope to better piece together the natural history and relationship between native grasslands and adjacent plant communities. By scrutinizing management paradigms that have linked woody plant removal as key to the success of native grasses, more exact and effective management approaches may emerge that could benefit grassland diversity, restoration, and resilience.

Why do you love grasslands?

It's easy to be in awe of a redwood forest or stands of Joshua trees. These ecosystems have an ancient and seemingly eternal grandeur. But terms like old-growth don't apply to grasslands. The legacy of grasslands, particularly those I work with, endure in a different way. Whenever I see Douglas-fir or manzanita crowding the edge of a clearing I am reminded that often our grasslands are an inviting canvas for so much floral diversity and potential. For me, one of the joys of grassland is the ephemeral, evolving nature of these spaces. There's both an uncertainty and promise about what will take root that makes grasslands so dynamic and reminds me why grasslands are such a vital part of the California landscape.



References Cited

Arena, G. 2019. Impacts of coastal scrub on the diversity of introduced and native grass in southwestern Marin County. *Grasslands* 29(4):12–16.



David Amme. Photo by John Anderson

Whether you have been experimenting for a long time, or have newly retrofitted your front or back yard, we encourage you to send us your comments and experiences growing and tending grasses, sedges, and rushes in your garden by writing to admin@cnga.org or by participating in the on-line forum for members at www.cnga.org.



David Amme collecting *Festuca rubra* seed at Richmond's Pt. Molate, May 2002. Photo by Jim Hanson

An Introduction to Ornamental California Native Grasses, Sedges, and Rushes for the Landscape, by David Amme

by Jim Hanson, Landscape Architect/Land Conservation, former CNGA President and Conservation Committee Chair

The following article by David Amme, reprinted from an early CNGA workshop on urban landscaping in June 2006, is more than a concise description of several of California's native grasses, sedges, and rushes. David is a modern-day botanical explorer and field ecologist who takes us to the coastal bluffs and forest glades he walked to discover and describe the places these grasses evolved over several millennia. His article also touches on evolving taxonomic classifications of the time (some of which have changed since) in a process that continues today.

Native plants, including perennial grasses, sedges, and rushes, are showing up in residential gardens due to growing interest in habitat-supporting, lower water-use gardening. In addition, some of us help to "tend the wild" by removing invasive weeds from established native grasslands and wildflower fields, or by speaking up for native grassland conservation in meetings or emails to local government and land management agencies. This guide is just as useful today for folks working with and protecting native plants.

Ornamental California Native Grasses, Sedges, and Rushes for the Landscape *by David Amme*

This article is from a series of CNGA workshops on urban landscaping first presented during the “Using California Native Grasses in the Urban Landscape” workshop on June 2, 2006, at the Trudeau Center in Oakland.

Cool Season Grasses

Agrostis pallens (thingrass)



Thingrass, originally called *Agrostis diegoensis*, has been recently lumped under the *A. pallens* name. Formerly, *A. pallens* was called dunebent¹ (Hitchcock and Chase) and is found in moist sand dunes along the coast from Washington to central California. Rarely are flowering panicles found on dunebent, as the grass is found in moist swales associated with coastal freshwater springs and seeps. The lumping of *A. diegoensis* into *A. pallens* makes it difficult to reconcile the high elevation form (possibly the former *A. lepida*) with the lower elevation form commonly known as thingrass (a.k.a. *A. diegoensis*). The thingrass form is adapted to shady woodlands in the mountains and foothills and open, north-facing meadows along the coast from San Diego to Sonoma County. This form has underground rhizomes forming a solid meadow stand. Thingrass has several forms from northern to southern California. In southern California thingrass grows as a tall, pure-stand meadow (20–30 inches high) on north slopes mixed with the southern coastal scrub. In the Bay Area and the coastal mountains of northern California, thingrass is found in similar settings (north slopes, shady stands, etc.) and forms a grassy meadow approximately 12–14 inches in height. Thingrass is an excellent component of the native meadow landscape and is closely associated with red fescue and junegrass. As a single species,

David Amme is one of the founding members of the California Native Grasslands Association. David received a Master's Degree in Rangeland Management from UC Berkeley. He was involved in California grassland ecology as a private resource management consultant, state park resource ecologist, environmental planner for Caltrans, and as Vegetation Manager for the East Bay Regional Parks District.

He joined the CNGA Board of Directors in 1990 and served as president in 2009. The first issue of *Grasslands*, published in 1991, featured David's article, "Working with Native Perennial Grasses." David taught the CNGA Grass Identification class across California and wrote many articles on California's coastal native grasses, as well as native grasslands in general.

thingrass forms a lush natural meadow in the sun or filtered shade. A vigorous creeper of thingrass from the Berkeley Hills is currently being produced for seed. Thingrass seed has moderate seedling vigor and a good stand can be established without the use of plugs. For seeding a single-species meadow, sow at 1 ounce per 1,000 square feet.

Calamagrostis foliosa (leafy reedgrass) [CNPS California Rare Plant Rank 4.2]

Leafy reedgrass is a low-growing mounded bunchgrass with tightly set, bluish-green leaf blades. Leafy reedgrass is found from Del Norte County to Mendocino County, along the northern California coastal bluffs, coastal scrub, and serpentine barrens. It has arching flowering culms with a feathery compressed panicle.

Calamagrostis nutkaensis (sand reedgrass or Alaskan reedgrass)

Sand reedgrass² is a stout, densely tufted grass of California's north coastal plains and pine forests. It forms large pure stands or populations in moist soils of the open grasslands along the coast, often on north-facing slopes, and is a dominant grass in the Monterey pine and Bishop pine understory.

¹*Agrostis pallens*' current common name "dune bent grass" in Jepson eFlora.

²*Calamagrostis nutkaensis*' current common name is "Pacific reed grass" in Jepson eFlora.

continued next page

Ornamental California Native Grasses, Sedges, and Rushes for the Landscape *continued*

Danthonia californica (California oatgrass)

California oatgrass is a long-lived, medium-sized tufted bunchgrass. California oatgrass grows along California's north coastal prairie within the reach of the summer fog belt, from Oregon south to the coastal plain near Cambria, San Luis Obispo County, and is found in the mid-elevation meadows and forests of the Sierra Nevada, extending south from the Shasta Trinity National Forest.



Oatgrass is the most common grass along treaded paths on the coastal terraces, which otherwise are smothered by exotic grasses, such as bentgrasses (*Agrostis* spp.), velvetgrass (*Holcus lanatus*), sweet vernal grass (*Anthoxanthum odoratum*), and annual grasses and weeds. Even though California oatgrass is a bunchgrass, it can form a dense turf under moderate grazing by cattle. Oatgrass is one of the only perennial bunchgrasses with long-lived seed, and a stand can be rapidly revived from a latent seed bank with mowing, weeding, and clearing. With three or four spikelets per flowering stem, California oatgrass does not produce large amounts of seed, however, each stem contains many seeds hidden beneath the leaf sheath above each node. The flowering stems are easily broken off and spread by livestock grazing and trampling. The seed exhibits both embryo dormancy and seedcoat dormancy, defying efficient seed producing techniques; however, when the seed and straw are introduced to a site, it can gradually become a dominant grass with proper grazing or mowing management. Interest in growing California oatgrass for seed was strong in the mid 1940s, when U.C. Extension researchers Merton Love and Burl Jones identified oatgrass as one of the most outstanding native forage grasses in the state. Sixty years later, seed growers are now actively working to produce seed of this splendid native perennial bunchgrass. An oatgrass meadow works best as a pure stand, but will readily fill in along paths and in compacted areas with other meadow grasses. Unmowed, oatgrass is a sprawling, dense bunchgrass 10–12 inches in height and 14–16 inches across. Mowed or grazed plants can form tight turf-like stands no more than a few inches high. Establishing an oatgrass meadow requires patience. Seed over a year old germinates faster than fresh seed. *Danthonia* establishes very slowly but is a persistent grower. Its roots can eventually reach down to 3–4 feet. Because of its deep roots, oatgrass does not require frequent irrigation. It thrives in rich, loamy, and clay soils and is well adapted to the home garden setting, and stays green year-long if it is cut back and receives extra moisture. A good oatgrass “turf” can be established by planting plugs 8–10 inches apart. For seeding a single-species meadow, sow at 2 ounces per 1,000 square feet.

Deschampsia cespitosa (tufted hairgrass)

Tufted hairgrass is a medium-sized, densely tufted, coarse bunchgrass. It grows in moist meadows of the higher mountains in California and along the coast as far south as Santa Barbara County. There are three distinct varieties in California. The mountain meadow form (*D. cespitosa* subsp. *cespitosa*) grows in high- and mid-elevation wet meadows, seeps, and bogs, as well as in meadows of the North Coast Range. It is also found on meadows of the higher coastal terraces. This



form has an airy, expanded panicle. The coastal form (*D. cespitosa* subsp. *holciformis*) grows primarily along the lower coastal terraces and marshes from northern California as far south as San Luis Obispo County. Its panicle is strongly compressed, sometimes with one or two compressed lower branches. A third form not officially recognized in the Jepson Manual (*D. cespitosa* subsp. *beringensis*)³ is a dense, giant form found in scattered locations in the lower valleys of the North Coast Range (e.g., Napa Valley) and along the coastal waterways (e.g., Russian River, Drakes Bay, and the Sacramento Delta). Tufted hairgrass requires a moist (mesic) location or extra irrigation to maintain a stand in the garden, and ranges in size from large, erect forms, 18–20 inches in height, to sprawling, decumbent forms, 8–12 inches high. Because of its size and requirements, tufted hairgrass forms a cohesive “tufted hairgrass” meadow feature that tends to dominate other native perennial grasses and wildflowers. Meadow features can be created by planting plugs 8–16 inches apart. The farther apart they are planted, the larger they get. For seeding a single-species meadow, sow at 0.5 ounce per 1,000 square feet. An excellent example of a created tufted hairgrass meadow exists at the Crissy Field Commons in San Francisco.

Elymus californicus (California bottlebrush grass) [CNPS California Rare Plant Rank 4.3]

California bottlebrush grass has recently been moved into the wildrye group, having been considered a distinctive taxon (*Hystrix*

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³*Deschampsia cespitosa* subsp. *beringensis* is listed as one of the three subspecies in Jepson eFlora.

Ornamental California Native Grasses, Sedges, and Rushes for the Landscape *continued*

californica) for many years. California bottlebrush is a large grass that grows in shady forest settings and shaded banks near the north-central coast (Marin and Santa Cruz Counties). It is almost always associated with open, moist, Douglas-fir forests. Bottlebrush has a distinctive tall, arching, flowering culm with rigid spikelets perpendicular to the stem like a bottle brush.

Elymus glaucus (blue wildrye)



Blue wildrye is a large, short-lived bunchgrass with strong seedling vigor.

Generally, blue wildrye is an upright, tall grass that inhabits woodland areas of the foothills and high mountains; however, there are more compact, leafy varieties adapted to sunny grassland habitats. Blue wildrye grows where annual rainfall ranges between 10 and 40 inches, and is generally more drought-tolerant than common meadow barley and California brome. Blue wildrye is an excellent grass for re-seeding burned and disturbed areas in oak woodland and forested habitats. There are several varieties of blue wildrye presently available adapted to different elevations and regions in

California. The closely related Pacific ryegrass (*E. virescens*) is now considered a subspecies of *E. glaucus*. *Elymus virescens* is commonly found along the immediate coastal bluffs of northern California, often sympatrically with blue forms of *E. glaucus* with no apparent hybridization. Pacific ryegrass is very distinct from blue wildrye, as the florets have no or very short awns, the plants are deep green, and the culms grow close to the ground. Pacific ryegrass is also found higher in elevation on open serpentine soils and in damp forests.

Elymus trachycaulus [now *Elymus trachycaulus* subsp. *trachycaulus*] (slender wheatgrass)



Slender wheatgrass is a common native bunchgrass in the higher elevational areas of the intermountain west. Slender wheatgrass is very similar to blue wildrye in form and stature. There are three primary forms or ecotypes in California.

The mountain form of slender wheatgrass is rather sparse, usually with only two or three flowering culms. This form readily hybridizes with *E. elymoides* and *Hordeum brachyantherum* and is difficult to grow in cultivation. A variety (var. *majus*)⁴ is native to California's Central Valley region in Yolo

⁴*Elymus trachycaulus* var. *majus* is not listed in the current Jepson eFlora but *E. trachycaulus* var. *major* is a recognized synonym of *E. trachycaulus* subsp. *trachycaulus* in Flora of North America.

County, west of Davis. This form is much more robust and faster growing than typical western American plant material on the market. It is longer lived than typical blue wildrye and requires more moisture to persist. Variety *majus* has very strong seedling vigor and is a good weed competitor. A third form is found along the north and central coastal valleys of California. It is associated with serpentine soils as well as mesic, deep clay soils. This form has a small awn, slender leaves and is a prolific seeder with many flowering culms.

Festuca californica (California fescue)



This is a robust bunchgrass that grows on mesic hillsides associated with brushlands and deciduous oak forests. Deep green to steel blue ecotypes are found throughout its range. California fescue is an excellent grass for shady or filtered light settings. It grows in the North and Central Coast Ranges south to Santa Barbara County and found occasionally in the Sierra Nevada.

Festuca idahoensis (Idaho fescue)

Idaho fescue is a dense, fine-leaved bunchgrass with blue and green forms. It normally grows from 18 to 24 inches in height. There are two basic forms of Idaho fescue in California. The Great Basin form is found east of the Marble Mountains and Sierra crest as far south as the Lake Tahoe region. A second form, found in the North Coast Range extending down the coastal and inland hills and



mountains as far south as Monterey County, is adapted to both serpentine and sedimentary soils. This second form is also found in the Sierra Nevada west of the crest in Lassen, Plumas, and northern Tahoe National Forests. Unlike the Great Basin form, the Coastal and Sierran form has less summer dormancy and grows throughout the winter at lower elevations. Idaho fescue is similar in habit and form to the introduced hard fescues and sheep fescues (*F. trachyphylla*, *F. ovina*), however, most Idaho fescue ecotypes exhibit

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Ornamental California Native Grasses, Sedges, and Rushes for the Landscape *continued*

summer dormancy but are active during the winter, while the hard fescues will stay green in the summer as long as there is adequate moisture. Idaho fescue is found usually in pure stands on north- or east-facing slopes associated with thingrass, junegrass, and a rich assortment of native perennial wildflowers. Idaho fescue has good seedling vigor and can be established by either seed or plugs. For seeding a single-species meadow, sow at 2 ounces per 1,000 square feet.

Festuca rubra (red fescue)

Red fescue is a medium-sized, loosely tufted, fine-leaved grass that spreads by underground rhizomes. Red fescue is native to California, though many forms of red fescue have been introduced to California as a turf seed. Red fescue is native along the coast as far south as Big Sur, and is found in fertile valleys and moist meadows in the coastal mountain ranges and the higher mountains of the state. Pure colonies of low blue and green forms of red fescue inhabit the north coast terraces of Mendocino and Sonoma County, giving rise to several unique cultivars (Patrick's Point, Jug Handle, Point Arena) propagated by cuttings [divisions]. A hardy blue form from Point Richmond's Potrero Hills, called Molate fescue, is a very attractive ornamental grass that is aesthetically pleasing whether

mown or not. Its fine foliage and spreading character make it ideally suited to natural landscapes and low-maintenance buffer areas. Molate fescue can handle more heat and summer drought than the typical introduced turf varieties of red fescue, and is the most winter-active red fescue available in the world. Generally, red fescue does not thrive in the full sun and intense heat of the Central Valley, but it will do well with partial shade and some summer irrigation. However, the Molate Fescue form is proving itself in the Central Valley with irrigation. A mature Molate stand can reach heights of 12–14 inches. Molate fescue is extremely



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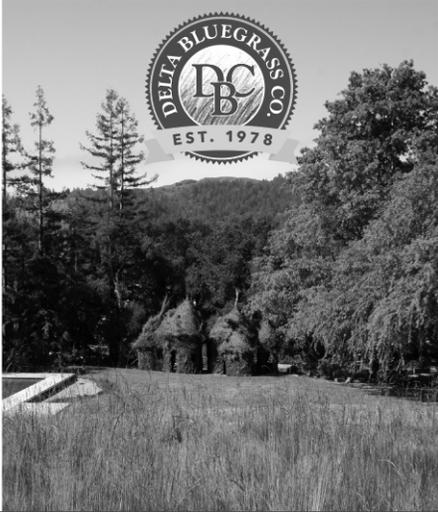
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Ornamental California Native Grasses, Sedges, and Rushes for the Landscape *continued*

variable, with many diverse forms, a virtual gold mine for the grass breeder or discerning gardener. There are green and blue ecotypes and both fast-creeping forms and erect, bunched forms that spread sparingly from the base. It is surprisingly drought-tolerant and develops a waxy coat on its leaves, giving it a distinctive blue-gray color in the late spring as the stand begins to dry out. Best of all, the seed is plentiful and easy to establish. For seeding a single-species meadow, sow at 2 ounces per 1,000 square feet.

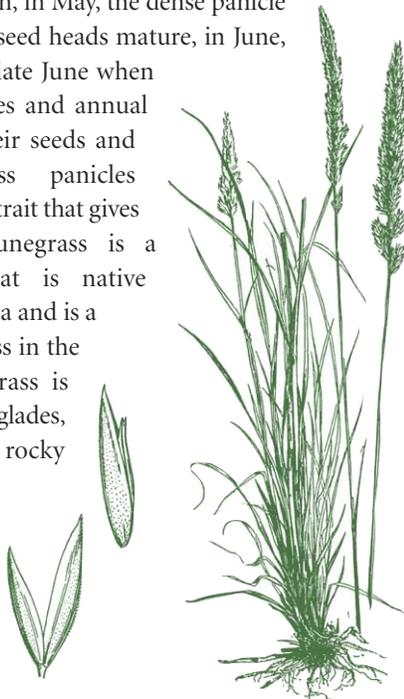
Hierochloë occidentalis [Now *Anthoxanthum occidentale*] (California sweetgrass)

California sweetgrass is a leafy bunchgrass found in the shade of the coastal redwood and Douglas Fir forests of central and northern California. It is found as far south as the Big Sur coast, commonly found in the shade of redwoods and tanbark oak stands. The dry leaves of sweetgrass have a fragrance of vanilla. The plants grow in forest duff and loose soils and are tolerant of dry conditions. It is distinguished by its delicate white flowers and deep green, wide leaves.



Koeleria macrantha (junegrass)

Junegrass is a long-lived, perennial bunchgrass that spreads by short underground rhizomes and has an erect, ornamental flowering panicle. During pollination, in May, the dense panicle spreads open; and as the seed heads mature, in June, the panicle closes up. In late June when most of the native grasses and annual grasses have dropped their seeds and fallen apart, junegrass panicles continue to stay whole, a trait that gives the grass its name. Junegrass is a circumpolar species that is native throughout North America and is a common cool-season grass in the mid-grass prairie. Junegrass is associated with woodland glades, grassland prairies, and rocky outcrops from the sea level to the highest mountains. Californian junegrass ecotypes exhibit some late summer dormancy, but will remain green



with supplemental irrigation. Junegrass grows 10–16 inches in height. It responds favorably to irrigation, but eventually needs a late summer/early fall rest. Junegrass has tiny seeds and establishes slowly from seed. For a garden meadow, Junegrass is most practically established by plugs. For seeding a single-species meadow, sow at 0.5 ounce per 1,000 square feet.

Leymus condensatus [now *Elymus condensatus*] (giant wildrye)

Giant wildrye is a stout, robust (4–10 feet) perennial that forms large clumps with short rhizomes. It grows primarily south of the Bay Area along the coastal bluffs, hills, and terraces. Inland, it is often found in the scrub and woodland plant communities of the coast range, San Jacinto, and San Bernardino Mountains. Variable hybrid forms of giant wildrye and creeping wildrye are found in the Bay Area and in the San Joaquin Valley (*L.* × *multiflorus*) [now *Elymus* × *gouldii*].

Leymus mollis [now *Elymus mollis* subsp. *mollis*] (American dunegrass)

American dunegrass is a tall, stout glaucous-blue grass with long rhizomes. It is well adapted to coastal foredunes of California, from the central coast north to Oregon and Washington State. It is always found closer to the high tide area, between the beach and the stabilized dunes covered with the introduced European beachgrass (*Ammophila arenaria*). In the southern part of its range, American dunegrass is found irregularly as far south as Point Conception. A unique look-alike *Leymus* is found on San Miguel Island's windward sand dunes, resembling a possible hybrid with *L. condensatus* [now *Elymus condensatus*]. This variety is now a horticultural selection sold from cuttings as Canyon Prince⁵. In California, American dunegrass rarely forms abundant seed, as this out-crossing species' isolated clones and populations are separated by long distances. In the northern part of its range, American dunegrass commonly hybridizes with creeping wildrye, forming a



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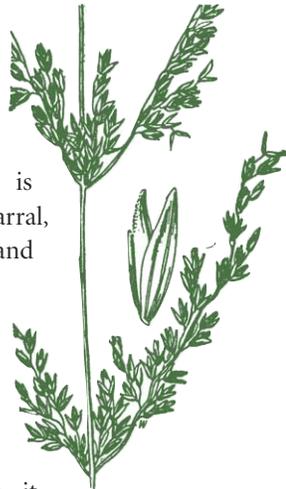
⁵From Calscape Canyon Prince Wild Rye, *Elymus condensatus* 'Canyon Prince' (calscape.org), Horticultural selection *L. condensatus*: origin = cuttings (1968) by Ralph Philbrick, Prince Island off San Miguel Island, Santa Barbara Co.; intro SBBG 1986. Tolerates almost any soil type. Prefers sun in coastal sites, and sun or part shade in inland sites. Selection of *E. condensatus* from Prince Island off of San Miguel Island. Introduced by Santa Barbara Botanic Garden.

Ornamental California Native Grasses, Sedges, and Rushes for the Landscape *continued*

distinct-looking species currently recognized as a hybrid, *L. × vancouverensis* [now *Elymus × vancouverensis*]. American dunegrass is closely related, if not identical, to the more compact circumpolar European dunegrass or lymegrass (*L. arenarius*)⁶.

Melica imperfecta (foothill melic)

Foothill melic is a medium-sized, loosely caespitose perennial bunchgrass with a branched, often reflexed panicle, especially in the lower branches of the panicle. It is associated with coastal sage, soft chaparral, and steep, rocky soils of the central and south coast range, from the San Francisco Bay Area south to San Diego County, as well as the foothills of the Sierra Nevada. It is found primarily in shady woodland sites, riparian areas, and on north and eastern exposures. In the Bay Area, it comes close to overlapping with the range of *Melica torreyana*, but is found on drier sites associated with sandy, well-drained soils and chaparral.



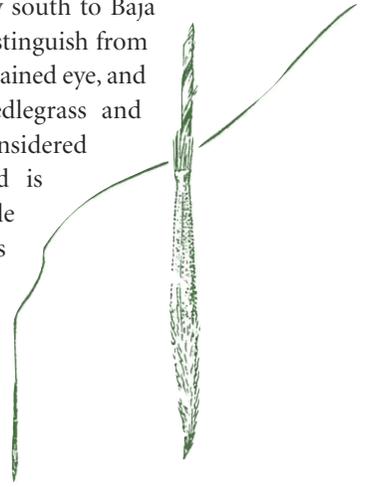
Nassella cernua [now *Stipa cernua*] (nodding needlegrass)

Nodding needlegrass, formerly *Stipa cernua*⁷, is similar to purple needlegrass in longevity and drought tolerance. Nodding needlegrass grows primarily in the central coast and inner coast

⁶Neither *Leymus arenarius* or *Elymus arenarius* are listed in Jepson eFlora but *L. arenarius* is a recognized name in Flora of North America.

⁷*Nassella cernua*, *N. lepida*, and *N. pulchra* were changed from *Stipa* to *Nassella* and are now back to *Stipa*.

ranges, from Tehama County south to Baja California. It is difficult to distinguish from purple needlegrass by the untrained eye, and for many years, purple needlegrass and nodding needlegrass were considered the same species. The seed is narrower than that of purple needlegrass, the awn is generally longer and thinner with a slight curl near the end, and the glume color is closer to pink (nodding needlegrass) than purple. Nodding needlegrass has a finer leaf, and is especially adapted to sandy, well-drained, loamy soils. Nodding needlegrass is a prolific seed producer and has strong seedling vigor. It is adapted to many harsh growing conditions including the sub-soils of road cuts and mining sites.



Nassella lepida [now *Stipa lepida*] (foothill needlegrass)

Foothill needlegrass, formerly *Stipa lepida*⁷ is a medium-sized, dense bunchgrass with fine leaves. It is common in and along the margins of soft and hard chaparral brushlands, the length of California's coastal ranges and in the central and northern Sierra Nevada foothills. Some ecotypes are adapted to serpentine soils. It establishes quickly on disturbed sites and is not as long-lived as purple needlegrass and nodding needlegrass.



continued next page

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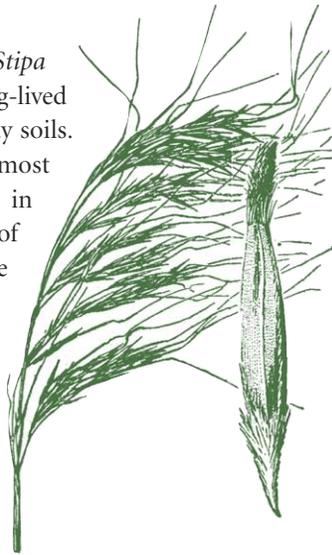
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Sierra meadow with *Deschampsia cespitosa* and *Castilleja miniata*

Ornamental California Native Grasses, Sedges, and Rushes for the Landscape *continued*

Nassella pulchra [now *Stipa pulchra*] (purple needlegrass)

Purple needlegrass, formerly *Stipa pulchra*⁷, is a medium-large, long-lived bunchgrass well adapted to clay soils. Purple needlegrass is the most widespread native bunchgrass in the lower elevational grasslands of California. It grows from the coastal prairie and inland grasslands of northern California, throughout the valleys of the coast ranges, to the coastal and mesa grasslands of San Diego County and Baja California. Purple needlegrass has earned the official title of the State



Grass of California. Purple needlegrass is tolerant to summer drought and heat. It will establish on disturbed cut slopes and in thin soils and is adapted to serpentine soils. As with many of the long-lived bunchgrasses, purple needlegrass grows slowly as a seedling and is susceptible to competition from weeds and fast-growing annual grasses. Purple needlegrass is a deep green, long-lived bunchgrass. It thrives on the sunny south-facing slopes and plains of the foothill grassland. It is also tolerant of serpentine soils. Purple needlegrass grows 18–24 inches in height and forms a deep root system 3–4 feet deep. It stays green into the early summer and gradually becomes dormant in mid- to late summer. Cut or grazed plants are the first to put on fresh green growth in the fall, whether it rains or not, tapping the moisture deep in the soil. Purple needlegrass will stay green or re-grow with extra summer irrigation. It has good seedling vigor and can be seeded or planted by plugs. For a single-species meadow, sow at 10 ounces per 1,000 square feet.

Poa napensis (Napa bluegrass) [CNPS California Rare Plant Rank 1B.1]

Napa bluegrass is extremely limited in distribution, found near the Myrtdale Hot Springs and one other local hot spring swale in the town of Calistoga, in the upper Napa Valley. Napa bluegrass is a very dense, productive bunchgrass and does not exhibit the extreme summer dormancy that is the characteristic of pine bluegrass (*P. secunda* subsp. *secunda*).



Poa secunda subsp. *juncifolia* (alkali bluegrass)

This taxon has recently been combined into the *P. secunda* group, which also includes two other ecotypes⁸: *P. ampla* (big bluegrass, a.k.a. Sherman big bluegrass) and *P. nevadensis* (Nevada bluegrass). Alkali bluegrass is a very dense bunchgrass that does not exhibit strong summer dormancy and is very different in appearance from the typical summer-dormant one-sided bluegrass. It is found in alkaline depressions, low meadows, and wet places mostly on the east side of the Sierra Nevada, associated with sagebrush shrubland and montane forest.



Warm Season Grasses

Aristida purpurea (purple threeawn)

Purple threeawn is a medium-sized, erect bunchgrass found in the Sonoran and Mojave Deserts as well as in the coastal mountains and interior ranges of southern California. It is adapted to sandy and rocky soils on slopes and plains. It has fine-textured leaves to 30 inches tall and purple flowers that are showy when the sunlight illuminates them in the summer and fall. The seedhead is narrow and nodding with lax, purplish branches. Three long bristles occur from each flower. It thrives in sunny, dry locations with minimal irrigation.



continued next page

⁸Jepson eFlora lists this unabridged note under *Poa secunda* subsp. *juncifolia*: "Several important ecotypes: 1: *Poa ampla* Merr. (big blue grass: plant 6–12 dm; leaf blade flat, generally glaucous; non-alkaline uplands); 2: *Poa juncifolia* Scribn. (alkali blue grass: ligule truncate, often alkaline); 3: *Poa nevadensis* Scribn. (Nevada blue grass: ligule long, acute; often alkaline also desert uplands). *Poa pratensis* × *Poa secunda* [*Poa fibrata* Swallen].

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Ornamental California Native Grasses, Sedges, and Rushes for the Landscape *continued*

Bouteloua gracilis (blue grama)

Blue grama is one of the more important warm season grasses of the mid-grass prairie of the Midwest and the Southwest. In California, it grows in the mountains of the Sonoran Desert. It is a medium-sized bunchgrass with gray-green foliage. The flowering panicle is made up of two to three one-sided reddish-purple racemes. It can be mowed and is often used as a coarse meadow lawn.



Muhlenbergia rigens (deergrass)

Deergrass is a stout and robust warm-season bunchgrass. It grows along streams, in seeps, ditches, and in wet meadows from southern California's mountains north to Monterey County along the coast, and in the Sierra Nevada foothills to Shasta County. The biggest stands of deergrass are found in meadows of San Diego County from the coast to the mesa backcountry and the Cleveland National Forest and Cuyamaca Mountains.



continued next page

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Ornamental California Native Grasses, Sedges, and Rushes for the Landscape *continued*

Sporobolus airoides (alkali sacaton)

Alkali sacaton is a large bunchgrass that grows in valley swales and seasonally moist sites and alkaline soils. It was once more common in the San Joaquin Valley grasslands. A few remnant stands still exist on undisturbed lands. Alkali sacaton is found in the desert regions of southern California and throughout the southwest. It has gray-green foliage and a delicate, airy panicle.



Sedges

Carex barbarae (Santa Barbara sedge)

Santa Barbara sedge is a common rhizomatous sedge in the coastal marshes and river systems of California. It can grow up to 3 feet high and is a vigorous spreader, forming large colonies. Santa Barbara sedge grows in the sun or in filtered light of valley oaks and other riparian tree species. It is an excellent sedge for stabilizing stream and river banks. It is best propagated from seed for plugs.

Carex pansa (Pacific dune sedge)

The common name of this sedge aptly describes its habitat but not its unmatched meadow-forming characteristics. Pacific dune sedge is found in scattered locations in mesic back dunes of central California. It is a strong creeping sedge and forms a dense, leafy cover 8–10 inches in height with no mowing. Dune sedge is well adapted to the garden setting. With adequate moisture, it grows well in all kinds of soils, stays green year-long, thrives in sunny sites, and is heat-tolerant. It germinates very slowly from seed, but spreads quickly when planted as plugs 6–8 inches apart.

Carex praegracilis (slender sedge)

Slender sedge is very likely a taller, closely related cousin to Pacific dune sedge. It inhabits mesic inland valley settings and grows up to 16 inches in height, spreading at a slightly slower pace. Like the Pacific dune sedge, slender sedge is best established by plugs 6–8 inches apart.

Carex tumulicola (foothill sedge)

Foothill sedge, also known as Berkeley sedge, is a large, deep-green bunch sedge that grows to 20 inches in height and sprawls wider. If kept small with periodic mowing at a 4- to 6-inch height, it

responds by putting out fresh new growth from the base, and gradually spreads, forming a durable carpet, depending on how often and closely it is mowed. Like the Pacific dune sedge, its seed is slow to germinate, but a stand is easily and efficiently established by plugs 8–12 inches apart.

Carex spissa (San Diego sedge)

San Diego sedge is a large, silver-gray sedge that grows along creek beds and washes from Baja California to San Luis Obispo County. It is a striking, robust, ornamental sedge and can be as large as 4–5 feet in height and spread, making it a good feature in any landscape design.

Rushes

Juncus patens (California gray rush)

California gray rush is a clumping perennial rush that grows up to 18–20 inches in height. It is found from Oregon to Baja California along the coastal mountains and plains. It generally grows in open grasslands on locally moist sites, seeps, and springs. It thrives in full sun and tolerates shade, poor drainage, and seasonal flooding. The foliage is gray-blue in color and has a yellow flower that gradually develops into dark brown seed pods. California gray rush contrasts well with the green and larger soft rush (*J. effusus*). *Juncus* is grown by division or by seed for plug planting.

Juncus effusus (soft rush)

Soft rush is also known as common rush. It has bright green foliage and is found in waterlogged habitat such as riverbanks, ditches, marshes, wet meadows, and riverbanks throughout the northern and southern hemisphere. It spreads from underground rhizomes and can form into large patches and attain heights up to 36 inches. There are at least four varieties in California. It contrasts well with *J. patens* in both color and size. It is easily grown from seed for plug planting, or by division.



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CNGA Grassland
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**JOANNA
TANG**

View of NCOS coastal sage scrub from the Mesa Trail, with popping bush sticky monkeyflower (*Diplacus aurantiacus*).

VISIT A NATIVE GRASSLAND: by Joanna Tang¹ Photos courtesy of the author

North Campus Open Space, Santa Barbara, California

North Campus Open Space (NCOS) consists of 136 acres of restored wetland, grassland, and coastal sage scrub ecosystems. It sits just one mile northwest of the University of California, Santa Barbara, campus, south of Highway 101, and is managed by UC Santa Barbara's Cheadle Center for Biodiversity & Ecological Restoration (CCBER). The site was gifted to UC Santa Barbara (UCSB) in 2013 after the Trust for Public Land bought it from the bankrupt Ocean Meadows Golf Course. The restoration was initiated by CCBER in 2017, with the goal of reinstating the historical wetland and upland habitat that had been converted into the golf course in the 1960s.

¹Joanna is a Ph.D. Candidate studying urban restoration ecology at University of California, Santa Barbara (Department of Ecology, Evolution, & Marine Biology). Her goal is to bridge the gap between academics and practitioners so that best management practices are informed by innovative research. joannatang@ucsb.edu

CCBER re-excavated the historical arm of Devereaux Slough, which allowed NCOS to reconnect with the surrounding Ellwood-Devereux Slough Open Space. Throughout 2017–2022, CCBER employed hundreds of restoration staff, UC Santa Barbara students, local volunteers, and K-12 students to install over 350,000 native plants and weed out thousands of invasive plants. NCOS just celebrated its ribbon-cutting ceremony on May 14, 2022, to open up a new public trail. The Mesa Trail invites visitors to hike up a mesa constructed out of the soil from the excavated slough arm, now planted with coastal sage scrub species bursting with color and aromas from bush monkeyflower (*Diplacus aurantiacus*), California fuschia (*Epilobium canum*), bush sunflower (*Encelia californica*), Santa Barbara honeysuckle (*Lonicera subspicata* var. *subspicata*), California sagebrush (*Artemisia californica*), and San Luis purple sage (*Salvia leucophylla*). Hikers atop the mesa enjoy a sweeping view of the rest of NCOS, including restored native perennial

continued next page



View of NCOS slough from the Marsh Trail, with giant wildrye (*Elymus condensatus*) in the grassland foreground.

North Campus Open Space, Santa Barbara, California *continued*

grassland jam-packed with purple needlegrass (*Stipa pulchra*), creeping beardless wild rye (*Elymus triticoides*), giant wildrye (*Elymus condensatus*), California barley (*Hordeum brachyantherum*), narrowleaf milkweed (*Aesclepius fascicularis*), Western blue-eyed grass (*Sisyrinchium bellum*), blue dips (*Dipterostemon capitatus*), California poppy (*Eschscholzia*

californica), Southern tarplant (*Centromadia parryi* ssp. *australis*), and, my personal favorite, dense flower owl's clover (*Castilleja densiflora*). Vernal pools are also nestled within the grassland, adding even more charismatic endemic species such as dwarf woolly marbles (*Psilocarphus brevissimus*), coyote thistle (*Eryngium*

continued next page



Grassland vernal pool, with endemic coyote thistle (*Eryngium vaseyi*) in the foreground, along with brown-headed rush (*Juncus phaeocephalus*) and common spikerush (*Eleocharis macrostachya*), and a robust field of purple needlegrass (*Stipa pulchra*) in the background.



Map of North Campus Open Space. Image courtesy ESRI.

North Campus Open Space, Santa Barbara, California *continued*

vaseyi), and coastal popcorn flower (*Plagiobothrys undulatus*) that pop to life after the winter rains. The Marsh Trail invites visitors to meander throughout salt marsh and sand dunes, which provide habitat for the threatened Western snowy plover (*Charadrius alexandrinus nivosus*), Belding’s Savannah Sparrow (*Passerculus sandwichensis*), and burrowing owl (*Athene cunicularia*), and crosses over the slough itself, which boasts endangered tidewater goby (*Eucyclogobius newberryi*). The Marsh Trail winds upland into chaparral and Coast live oak (*Quercus agrifolia*) woodland habitats, where it connects to Ellwood Mesa Open Space to the north and Coal Oil Point Preserve (a UC Natural Reserve System site) to the south.

NCOS is enjoyed by joggers and birders from the local community, students biking to campus, and dogwalkers and dogs (on a leash!) alike. NCOS is a special restoration site in that it is also a living laboratory and outdoor classroom for students, young and old. Wildlife photographers hone their skills while capturing soaring red-tailed hawks (*Buteo jamaicensis*) and turkey vultures (*Cathartes aura*), hunting great blue herons

(*Ardea Herodias*) and white-tailed kites (*Elanus leucurus*), flitting Western pygmy blue butterflies (*Brephidium exilis*) and monarch butterflies (*Danaus plexippus*), and even elusive bobcats (*Lynx rufus*)! UC Santa Barbara students and faculty conduct research on NCOS to better understand ecosystem dynamics and improve restoration success. CCBER even runs a Kids in Nature program that brings K-12 students out to NCOS to learn about environmental stewardship.

You can learn more about NCOS from CCBER’s website (<https://www.ccber.ucsb.edu/ecosystem/management-areas/north-campus-open-space>), watch the video of the transformation from a golf course to native habitat (<https://vimeo.com/270771011>), and come visit to see first-hand the wonderful wildlife and fabulous flora of this amazing restoration site!



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MEET A GRASSLAND RESEARCHER **Suzanne Ou**

PhD candidate at Stanford University studying how microbes mediate plant-soil feedback osuzanne@stanford.edu

What is your study system?

I work with annual plants that are native to serpentine grasslands in California. By the luck of Californian geology, serpentine grasslands are such unique biomes with many endemic species despite (or more accurately, because of) its low nutrient content and high calcium and magnesium ratio. Specifically, I have worked at UC Santa Barbara's Sedgwick Reserve, located on the unceded lands of the Chumash peoples, and Stanford's Jasper Ridge Biological Preserve, which sits on the ancestral land of the Muwekma-Ohlone Tribe.

What are your primary research goals?

My research investigates the interaction between plants and soil microbes. Plants shape the microbial community of bacteria and fungi, which in turn affects plant growth, together mediating the coexistence of different plant species across the landscape. To understand the relationship between aboveground and belowground dynamics, I conduct greenhouse experiments on native plants in soil collected from the field and sequence the soil microbes.

Who is your audience?

My work tests fundamental ecological theories and is largely geared towards both theoretical and empirical community ecologists.

Who has inspired you, including your mentors?

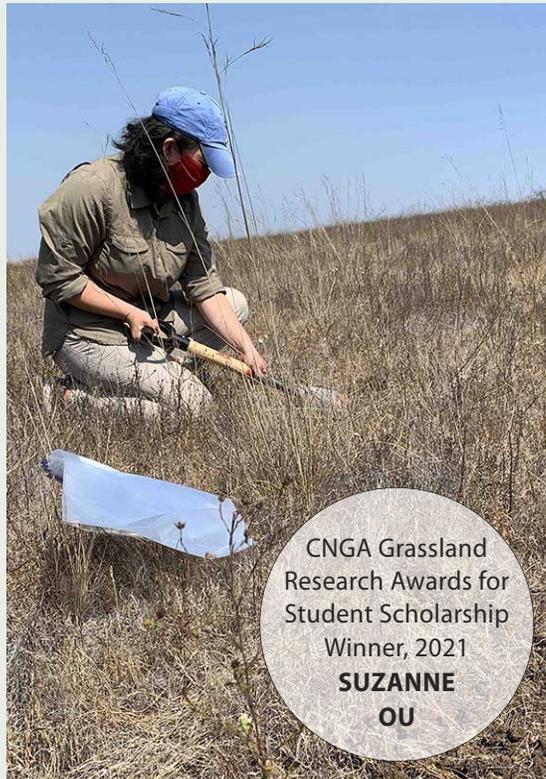
My collaborators Drs. Gaurav Kandlikar and Po-Ju Ke are great inspirations in their application of ecological theory to empirical work! I am particularly grateful for their mentorship as they can relate to where I am having recently been students themselves. I also greatly admire Dr. Jorge Ramos for his outreach work with Latino Outdoors.

How has or will your research align with the mission of CNGA "to promote, preserve, and restore the diversity of California's native grasses and grassland ecosystems through education, advocacy, research, and stewardship"?

I think CNGA is an incredible organization and unique in its dedication to a particular biome specifically in California. In my research, I have been able to mentor many undergraduates from minoritized and diverse backgrounds and bring them out to observe Californian grasslands.

Why do you love grasslands?

The short lifespan and easy germination of annual grasses offer a great tractable experimental system. Aside from appreciating the biological diversity in grasslands, the visually stunning response of green flushes and golden-brown landscapes in winter rain and summer heat are also vivid illustrations of seasonal changes. Finally, I am always in awe that the history of California is embedded within grasslands — from the stewardship of indigenous tribes to the rancho concessions to the climate change impacts of today.



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A Special Thank You to our Bunchgrass Circle Members!

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Grasslands Provide Resilience in a Changing World

Purple needlegrass (*Stipa pulchra*) plants at Pepperwood Preserve in March 2015. Photo: Michelle Halbur, CNGA Board Member

"The California Native Grassland Association's (CNGA's) leadership in the restoration of California grasslands has extended far beyond incorporating the latest science into restoration techniques, it's also pushed the frontiers of research—forging new directions and recruiting and collaborating with researchers to explore novel ways of understanding these grasslands, addressing critical knowledge gaps in our stewardship."

—Valerie Eviner & Michelle Halbur, 2021. Thirty Years of Changes in How We Understand and Steward California's Grasslands, *Grasslands* Vol. 31, No. 3. Summer 2021.

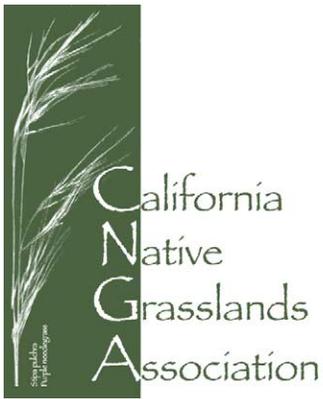
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Grasses, Sedges, and Rushes,
Oh My! David Amme's take on
using California native grasses in
the urban landscape (page 5)

Front cover: Bald Hills north of Pepperwood Preserve. Photo: Michelle Halbur, CNGA Board Member

Back cover: Upper Dersch Meadows of Lassen Volcanic National Park in a wetter seep near bedrock contact (2008). Species include arrowleaf ragwort (*Senecio triangularis*), California false hellebore (*Veratrum californicum* var. *californicum*), blue wildrye (*Elymus glaucus*), fowl mannagrass (*Glyceria striata*), smallwing sedge (*Carex microptera*), analogue sedge (*Carex simulata*), seep monkeyflower (*Erythranthe guttata*). Other species that may be present include common yarrow (*Achillea millefolium*), western needlegrass (*Stipa occidentalis*), pussytoes (*Antennaria* sp.), California brome (*Bromus sitchensis* var. *carinatus*), squirreltail (*Elymus elymoides*), blue wildrye (*Elymus glaucus*), common cowparsnip (*Heracleum maximum*), meadow barley (*Hordeum brachyantherum*), bigleaf lupine, (*Lupinus polyphyllus*), and yampah (*Perideridia* sp.). Photo by Kendra Moseley, CNGA Board Member

