California Native Grasslands Association

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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Send submissions to:
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All submissions are reviewed by the *Grasslands* Editorial Committee for suitability for publication.

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From the President's Keyboard

Wade Belew

I've just been back a couple days from "Grasslands of the California North Coast: A Symposium," held up in the Eureka/Arcata area, our first event in the North Coast region in nine years. What a terrific event! Thursday and Friday mornings we had an impressive slate of speakers, followed by field trips in the afternoon. I really liked the format as it kept everyone engaged and moving in the afternoon, when most conferences bog down.

Thursday after lunch we headed about 20 miles up the coast, inland and up to about 2,000 ft elevation, to the Bald Hills of Redwood National Park. Leonel Arguello was our host and explained efforts to manage grasslands that were being overtaken by invasive weeds like broom, and encroached upon by Douglas fir. We took respite from the unseasonable steady rain in a homesteader's barn built in the late 1800s entirely from split timber, not sawn lumber.

I would like to extend my sincere appreciation for the efforts of Administrative Director Judy G-Scott and especially Board Member Clare Golec, who also was our local host. This event reminded me why I love CNGA. Besides the excellent presentations and field trips, I love having the opportunity to meet new people and share stories. Stewarding the environment requires more than just information or technology, it requires passion and inspiration.

While we were out on the beautifully restored Lanphere Dunes on the field trip Friday afternoon, someone asked project manager Andrea Pickart what was the most important advice she could offer on her successful restoration. Her answer was … "be persistent." It reminds me of a conversation I had a number of years ago when I was learning hand percussion and drumming. I was talking to an experienced drummer about what it takes to be considered good at it. His response was … "be relentless." Not only do we have to be steady and moving forward in our day-to-day work, but also insistent that such efforts continue over time.

It can take many years to build the necessary momentum to get a program or project up and running on the way to success. Just as with the laws of physics, projects seem to operate with the same concepts of inertia and friction. It takes inputs of energy to move an object, or project, forward in space. In a vacuum, it would proceed without stopping, but here we have the effects of friction. The "friction" encountered in resource management can be lack of funding, upper management, or agency priorities or perceptions and public support.

What physics doesn't account for is the perseverance of the human spirit. One thing I most appreciate about the people I meet through CNGA is the passion they share for the sustainable management of our precious natural resources. It's this special energy that propels us through the challenges we face day to day and year after year. I'm proud that CNGA can serves as a nexus and a catalyst for stoking the passions of those stewarding our natural world.

Pleuropogon hooverianus and Caltrans Willits bypass project

Elizabeth Goebel, *CNGA Board Member*

Hoover's (or North Coast) semaphore grass (*Pleuropogon hooverianus*), a rare endemic species, was discovered late in the planning process for a California Department of Transportation (Caltrans) realignment project located near the city of Willits in Mendocino County. As the final Environmental Impact Report (EIR) had already been approved, Caltrans issued a *Draft Supplemental Environmental Impact Report* in November of 2009 to publically disclose impacts to and proposed mitigation for this state-listed threatened plant.

The CNGA Board found the Draft Supplemental EIR (DSEIR) submitted for this project to be inadequate in disclosure. In January 2010, CNGA President Wade Belew, California Native Plant Society (CNPS) Sanhedrin Chapter President Geri Hulse-Stephen, and CNPS North Coast Chapter Conservation Chair Jennifer Kalt each submitted comment letters during the DSEIR public review window.

Hulse-Stephen commented that information on the phenology and habitat included in the report was inaccurate, based on her observations. She also commented that simply preserving the species without knowledge of its ecology and appropriate management practices did not ensure ongoing survival.

Kalt noted that the DSEIR included inadequate mitigation measures and alternatives assessment and incompletely disclosed potential indirect impacts due to habitat fragmentation or changes in drainage patterns, soil moisture, and hydrology. She aptly said, "*It is unfortunate that presence of this species was discovered so late in the planning process, but that does not relieve the agency of its duty to conduct a thorough alternatives assessment that could potentially avoid impacts to North Coast semaphore grass.*"

Belew wrote, "[The] *DSEIR … is incomplete and fails to adequately show (1) that impacts to the species have been minimized and fully mitigated, and (2) that all mitigation measures are capable of being implemented.*"

He also noted the DSEIR's failure to discuss avoidance of impacts; provide a workable long-term management plan; identify appropriate hydrology and viable management options; required biotic and abiotic factors to support propagated or salvaged plants; and information on species location, habitat, and population size.

Lastly, He also noted there were few ecological and botanical citations and references in the DSEIR, nor was there botanical expertise in the personnel responsible for the document.

Upon receipt of these comment letters, Caltrans recognized that the inadequate disclosure in the DSEIR for the North Coast semaphore grass was problematic: primarily in the determination that "take" (killing or harm of individuals) would be adequately minimized, and fully mitigated, and would not jeopardize the continued existence of a state-listed species under the California Endangered Species Act (CESA) was inappropriate.

A subsequent focused field review was conducted, resulting in Caltrans securing botanical expertise to assess the impacted occurrence in relation to the current status of the species within it's range; estimate population sizes of occurrences to be protected and impacted; and collect associated habitat topography and hydrology data.

This additional botanical assessment will help to develop better protection and mitigation for this rare grass. The North Coast semaphore grass full assessment information, and protection and mitigation revisions, are undisclosed at press time.

Willard Schaff

1960–2010

At his home in Marysville, Willard Schaff died unexpectedly of heart failure on May 31, 2010. His quiet, direct demeanor will be missed.

Willard, a keen observer of plants and a unique producer of seed, distinguishing himself in business by starting and developing W.S. Seed, Inc., into the largest wild seed collection company in Northern California. At his death, Willard was in the process of harvesting approximately 30 specialty crops from his 35-acre farm.

Mainly in collaboration with Pacific Coast Seed, Inc., Willard produced more than 100 species annually from a broad array of environments. Collecting and growing rare seed for diverse projects, he pioneered the first large-scale production of *Deschampsia danthonioides, Pleuropogon californica, Ranunculus californica,* and many other natives, including vernal pool species.

Willard was born in Shields, North Dakota, and graduated from Flasher High School in 1978 and from Wahpeton State School of Science in 1981 with a degree in diesel mechanics. After a brief stint in the oil business, he became the farm manager for native seed producer S&S Seed, Inc. In 1999, Willard moved to Penn Valley and began collecting wild seed; in 2004, he relocated to Marysville where he expanded the seed processing and production part of his business.

Mr. Schaff is survived by his daughter Rachel Schaff-Eggebrecht, 26, of Santa Barbara, son Dusty Schaff-Hardin, 13, of Overton, Nevada, and friend and partner Patty Brennwald of Roseburg, Oregon. He is also survived by his mother, Caroline Schaff of Bismarck, North Dakota, and seven siblings: brothers Victor, Vernon, Harold, and Cletus, and sisters Sherry, Annette, and Betty. Willard's father William preceded him in death in 2000.

A gathering to remember Willard will take place later this year. Anyone interested in attending, please contact Rachel Schaff at 805-895-4056 or RACHELSCHAFF@YAHOO.COM.

An overview of North Coast grasses:

Diversity and distribution across the landscape[1]

Melissa Brooks Kraemer[2]

Photos: Andrea Pickart

The North Coast of California, praised for its majestic forests and spectacular coastline, is less well known for its diversity of grasses. Numerous interesting native grasses are found in all of the region's varied habitats, from coastal dunes to salt marshes to coniferous forests. Over one hundred grass taxa inhabit the North Coast, several of which are rare or endemic to the area. This article offers an overview of North Coast grasses through an exploration of the region's distinctive natural communities.

Coastal Dunes

Coastal dunes once were widespread along the West Coast, but through the combined impacts of development, off-highway vehicles, and the invasion of non-native species, only relatively small, fragmented patches of intact coastal dune habitat remain today. Although much of Northern California's dunes have been degraded, the North Coast is home to arguably the most pristine coastal dune ecosystem remaining in the Pacific Northwest. The Lanphere Dunes Unit of the Humboldt Bay National Wildlife Refuge, located west of Arcata on the North Spit of Humboldt Bay, contains approximately 475 acres of coastal dunes and estuary. The Nature Conservancy managed this area for over 20 years prior to its transfer to the U.S. Fish and Wildlife Service in 1998. On this distinctively undisturbed stretch of coastline along a beach that is remarkably free of the ubiquitous European beachgrass (*Ammophila arenaria*) occurs one of the last remaining intact stands of Northern Foredune Grassland on the West Coast (FWS 1998).

Characterized by native dunegrass (*Leymus mollis* ssp. *mollis*) as the sole or dominant species in this vegetation alliance (Sawyer et al. 2009), Northern Foredune Grassland is ranked by the Department of Fish and Game's California Natural Diversity Database (CNDDB 2003) as "extremely rare" at both the global (G1) and state levels (S1.1). Restricted to the coast on the seaward edge of coastal dunes, stands of native dunegrass grow in the same habitat as European beachgrass, which has reduced and replaced this vegetation type all along the West Coast (Sawyer et al. 2009). European beachgrass was heavily planted on the North Coast in the 1960s for sand stabilization.

Native dunegrass is a beautiful member of the wheat tribe that occurs as far south as California's central coast and as far north as Alaska and over to Asia. When not growing in pure stands on the primary foredune, native dunegrass can be associated with species of dune mat vegetation such as beach bursage (*Ambrosia chamissonis*), beach morning glory (*Calystegia soldanella*), European beachgrass, sand-verbena (*Abronia* spp.), sea-rocket (*Cakile* spp.), and large-flowered sand-dune bluegrass (*Poa macrantha*) (Sawyer et al. 2009).

In addition to the native dunegrass, a few other native grasses also occur on the coastal dunes of this region. Coastline bluegrass (*Poa confinis*), like large-flowered sand-dune bluegrass, is a dioecious *Poa* species of ocean bluffs and sand dunes. Both of these bluegrass species, occurring as far north as British Columbia, are at the southern extent of their range on the North Coast. Red fescue (*Festuca rubra*) often is found growing atop old relictual dunes that have not received fresh sand input for some time. Red fescue is relatively widespread across California in a diversity of habitat types, but distinct forms of the species occur on the North Coast on sand dunes, ocean bluffs, and in salt marshes (Hickman

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1. Updated reprint of an article originally published in Grasslands Vol. XVI, No. 3, Summer 2001.
2. Contact information: California Coastal Commission, North Coast District Office, 710 E Street, Suite 200, Eureka, CA 95501, mkraemer@coastal.ca.gov.

Foredunes at Lanphere Dunes, with a native *Poa* species dominant in the foreground.

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1993). In the hollows between dune ridges, awned bent grass (*Agrostis microphylla*) can be found. This species is at the northern extent of its range on the North Coast, occurring as far south as Baja California. Awned bent grass prefers thin soils, sometimes growing on serpentine substrates and sometimes in vernal pools (hence its occurrence in the seasonal wetland hollows).

In addition to European beachgrass, a number of other weedy nonnative grasses also invade coastal dune habitats. Silver European hair grass (*Aira caryophyllea* and *A. praecox*), quaking grass (*Briza maxima*), ripgut grass (*Bromus diandrus*), soft chess (*B. hordeaceus*), and annual fescue (*Vulpia bromoides*) are common invasives that occur not just on coastal dunes, but on roadsides, grasslands, and other disturbed habitats. The invasion of coastal dunes by nonnative annual grasses has been facilitated by the invasion of another nonnative species in the North Coast region: yellow bush lupine (*Lupinus arboreus*). Like European beachgrass, yellow bush lupine, which is native to California as far north as the Bodega Bay area, was heavily planted on the North Coast over 50 years ago by lumber companies and the California Department of Transportation (Caltrans) for sand-stabilization. As a member of the legume family, yellow-bush lupine has the ability to fix nitrogen in the soil, helping to make a normally inhospitable growing environment suitable for these invasive annuals. Fortunately, weed eradication efforts targeting yellow bush lupine, European beachgrass, weedy annual grasses, and other nonnative species have been successful. Native species naturally recolonize weed-free dunes, and much of the natural coastal dune habitat on the North Spit has been restored. Maintenance of the North Coast's pristine coastal dunes is a never-ending battle, however, in the midst of a sea of encroaching invasives.

Above: European beachgrass (*Ammophila arenaria*) covers the dunes at Mad River Beach.

Below: Dense-flowered cordgrass (*Spartina densiflora*) dominates the salt marshes of Humboldt Bay.

Coastal Salt Marsh

Most of the North Coast's salt marsh habitat is centered around Humboldt Bay (approximately 900 acres); another 20 or so acres inhabits the mouth of the Eel River south of the bay. Salt marshes in the Humboldt Bay and Eel River estuaries have been reduced by over 90 percent in the last 100 years, a trend that parallels salt marsh loss all along the West Coast. On the North Coast, the majority of the area that 100 years ago was tidal marsh has since been converted to agricultural pastureland (Pickart 2001).

In addition to the direct loss of salt marsh habitat through diking, draining, and filling, this area's salt marshes have further been degraded by the invasion of an aggressive, nonnative weed: dense-flowered cordgrass (*Spartina densiflora*). Unlike the salt marshes of the central and south coast regions that harbor California cordgrass (*S. foliosa*), the Humboldt Bay and Eel River estuaries originally had no cordgrass component (Pickart 2001). Dense-flowered cordgrass was most likely introduced in ship ballast in the mid-1800's during the lumber trade with Chile.

Dense-flowered cordgrass is capable

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of reproducing both vegetatively and by seed, and unlike most native salt marsh species, it does not go completely dormant during winter. Because of its year-round growth and relatively tall height and dense growth form, dense-flowered cordgrass has a competitive advantage over many of the native salt marsh species (Pickart 2001). It primarily inhabits the low- to mid-tidal elevations where it occurs in dense stands with common pickleweed (*Salicornia virginica*) (Sawyer et al. 2009; FWS 1998). Where openings in these stands occur, other salt marsh species, including tufted hairgrass (*Deschampsia cespitosa* ssp. *holciformis*), can also be found (Pickart 2001). Unfortunately, dense-flowered cordgrass can occur at higher tidal elevations as well, and it has been steadily increasing in these otherwise intact salt marsh areas (FWS 1998; Pickart 2001).

Saltgrass (*Distichlis spicata*) is a common native salt marsh species that occurs at low to high tidal elevations. The only species of the genus in the state, saltgrass is widespread across California, the United States, and throughout southern Canada in salt marshes and moist alkaline areas. Like many other salt marsh species, saltgrass has special adaptations for dealing with saline toxicity. In addition to C4 photosynthesis, which helps to reduce water loss, this species possesses specialized excretory glands that collect and concentrate salts, releasing them as brine to the outer surface of the plant (Barbour et al. 1993). Other species often associated with saltgrass in coastal salt marshes include pickleweed, jaumea (*Jaumea carnosa*), marsh rosemary (*Limonium californicum*), and arrow-grass (*Triglochin maritima*) (FWS 1998).

Sicklegrass (*Parapholis* spp.) is another type of salt marsh grass occurring around Humboldt Bay. There are two species of sicklegrass in California, *P. incurva* and *P. strigosa*. Both are of European origin. As with saltgrass, sicklegrass also possess specialized glands for isolating and excreting salts.

A number of rare plant taxa (not necessarily of the Gramineae) occur in salt marsh communities of the North Coast. Dwarf alkali grass (*Puccinellia pumila*) is a rare salt marsh grass of limited distribution in California, known from only a few occurrences in Humboldt and Mendocino Counties. It is more common in Oregon, Washington, and northeastern North America (CNPS 2010; Hickman 1993).

Tufted hairgrass (*Deschampsia cespitosa* ssp. *holciformis*) dominates a brackish marsh.

The Humboldt Bay owl's clover (*Castilleja ambigua* ssp. *humboldtiensis*) and the Point Reyes bird's beak (*Cordylanthus maritimus* ssp. *palustris*) are two rare hemiparasitic annuals of the broomrape family endemic to the North Coast. Both are rare and endangered in California and elsewhere. Annual plants are rare in salt marshes because they generally lack the adaptations necessary for tolerating salinity (Barbour et al. 1993).

Any discussion of salt marsh restoration must take into consideration these and other invaluable components of the ecologically unique salt marsh community.

Coastal Prairie

Coastal prairies in the North Coast region generally occur on uplifted marine terraces below 1,000 feet in elevation where the vegetation is strongly influenced by proximity to the ocean and associated factors, such as mild temperatures, moderate to high rainfall, persistent fog, salt spray, and wind. Most coastal terrace prairie stands are patchy and variable in composition, reflecting local differences in available soil moisture capacity (FWS 2003).

Grasses associated with coastal terrace prairies along the North Coast include several nonnative species, such as tall fescue (*Festuca arundinacea*), heath grass (*Danthonia* [*Sieglingia*] *decumbens*), bent grass (*Agrostis* spp.), velvet grass (*Holcus lanatus*), orchard grass (*Dactylis glomerata*), and sweet vernal grass (*Anthoxanthum odoratum*).

Native grass species tend to be less abundant than nonnatives in this habitat and include wild rye (*Leymus* spp.), California brome (*Bromus carinatus*), California oatgrass (*Danthonia californica*), and Pacific reed grass (*Calamagrostis nutkaensis*). The latter species is a beautiful native bunchgrass that ranges as far south as the San Francisco Bay Area and as far north as Alaska. On the North Coast it is commonly

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associated with the coastal prairie–Sitka spruce forest interface.

Much of the coastal terrace prairie habitat in California has been lost for a variety of reasons. In the North Coast region, residential and commercial developments have removed or degraded much of this habitat, and many coastal terrace prairie areas have been converted to agricultural uses, especially row crops and livestock grazing.

Although livestock grazing has replaced fire as a major disturbance agent in many areas, overgrazing of prairie habitat can lead to the decimation of native plant populations and the proliferation of non-native species. If grazing is moderate to light, however, and conducted with managed timing and frequency, the reduction of thatch and aeration of soils could have a beneficial effect on native plant and animal species by reducing or reversing the effects of succession (encroachment by trees and shrubs).

Prescribed burns also can benefit coastal terrace prairie ecosystems by clearing away overlying debris. For example, the endangered Behren's silverspot butterfly (*Speyeria zerene behrensii*) depends on coastal terrace prairie habitat for the caterpillar's host plant (*Viola adunca*), as well as adult nectar sources and courtship areas (FWS 2003). Managed grazing and prescribed fire have been shown to improve conditions for the host violet (FWS 2003).

Coniferous Forest

The fog belt that envelops the North Coast throughout the year has allowed for the predominance of redwood forest across the landscape. Typically dense with ferns, shrubs, and decaying woody debris, the redwood forest understory does not harbor a strong grass component. One species that is relatively common in the understory, however, is California sweet grass (*Hierochloe occidentalis*). Known for its showy flowers and sweet-smelling leaves, California sweet grass ranges as far south as southern California and as far north as Washington. Native Americans traditionally burned fresh sweet grass leaves as incense.

California sweet grass (*Hierochloe occidentalis*) spikelets

Other native redwood forest grass species that occur sporadically in the understory include onion grass (*Melica* spp.), crinkle-awn fescue (*Festuca subuliflora*), bearded fescue (*F. subulata*), and nodding trisetum (*Trisetum cernuum*). Mannagrasses (*Glyceria* spp.) can occasionally be found in mesic to wet partial openings or along watercourse margins. American mannagrass (*Glyceria grandis*), which occurs from the North Coast to British Columbia and also in the eastern United States, is listed by the California Native Plant Society (CNPS) as rare in California but more common elsewhere. More commonly encountered in this region are fowl mannagrass (*G. elata*), western mannagrass (*G. occidentalis*), and weak mannagrass (*Torreyochloa pallida* var. *pauciflora*).

The beautiful semaphore grasses (*Pleuropogon* spp.) are special to this region because four of the five species in the genus occur in temperate western North America (the fifth occurs in eastern Asia), and three are found along the North Coast. The rare North Coast semaphore grass (*P. hooverianus*) is endemic to the central and northern California coast, while the uncommon nodding semaphore grass (*P. refractus*) occurs as far north as British Columbia. The more common California semaphore grass (*P. californicus*) extends inland to the foothills of the Cascade and Sierra Nevada ranges.

Unfortunately, an overview of grasses of the redwood forest would not be complete without a mention of Pampas grass and jubata grass (*Cortaderia selloata* and *C. jubata*), two difficult-to-distinguish noxious weeds of California's coast and outer ranges. One effect of timber management activities on the species composition of redwood forests is an increasing dominance of cut-over areas by wind-dispersed, invasive, non-native species.

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Cortaderia is an especially aggressive weed that is ubiquitous in clearcuts, along logging roads, and in various other disturbed habitats. The plants are pistillate only and produce fruit asexually (Hickman 1993). They form giant tufts of basal leaves with razor-sharp edges (the genus is named for the Argentinean term for "cutting"), and inflorescences can stand over seven meters tall. *Cortaderia* is often found growing with other invasive, wind-dispersed species such as thistles (*Cirsium* spp.), European annual grasses, and hairy cat's ear (*Hypochaeris radicata*).

In addition to the expansive redwood forests, the western fringe of the North Coast, on the inland edge of coastal dunes and bluffs, is blanketed with forests dominated by other conifers including Sitka spruce, shore pine, and grand fir. A few of the native grasses found scattered in the understory of these forests include Hall's bentgrass (*Agrostis hallii*), western fescue (*Festuca occidentalis*), tall trisetum (*Trisetum canescens*), and California sweet grass.

Rare Grasses of the North Coast

Because grasses are so diverse and ubiquitous across the landscape, grass species, like all species in general, will inevitably be affected by land management practices, development, and habitat conversion—some species being more sensitive to impacts than others. CNPS maintains an inventory of rare, threatened, and endangered plants for the state, and 67 grass taxa are included in the latest edition (v7-1-b, online version). Each taxon is assigned a listing code, defined as follows:

CNPS List 1A: plants presumed extinct in California;

CNPS List 1B: rare, threatened, or endangered in California and elsewhere;

CNPS List 2: rare, threatened, or endangered in California, but more common elsewhere;

CNPS List 3: plants about which more information is needed; a review list;

CNPS List 4: plants of limited distribution; a watch list.

Each listing code is followed by a "threat code extension," which further defines the threat level for the taxon. A threat code of ".1" = seriously endangered in California; ".2" = fairly endangered in California; and ".3" = not very endangered in California.

Seventeen listed grass taxa are known to occur in the North Coast region (see Table 1). Half of these have highly restricted occurrences, half are endemic to California, and several are endangered throughout their entire range (refer to WWW.CNPS.ORG/INVENTORY for more details).

Conclusion

This article has presented an overview of some of the North Coast region's diverse and interesting grass taxa within just a sample of the region's habitat types. A

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Table 1. Rare grass taxa of the North Coast (Del Norte, Humboldt, Mendocino, and Sonoma Counties) as listed in the CNPS Inventory of Rare and Endangered Plants of California (v7-1-b, online version).

Scientific Name	Common Name	CNPS List	Habitat
Agrostis blasdalei	Blasdale's bent grass	1B.2	Coastal bluff scrub; coastal dunes; coastal prairie; 5–150 m
Alopecurus aequalis var. *sonomensis*	Sonoma alopecurus	1B.1	Freshwater wetlands; riparian scrub; 5–365 m
Calamagrostis bolanderi	Bolander's reed grass	4.2	Mesic forest openings; mesic meadows; freshwater wetlands; 0–455 m
C. crassiglumis	Thurber's reed grass	2.1	Mesic coastal scrub; freshwater wetlands; 10–45 m
C. foliosa	leafy reed grass	4.2	Rocky sites in coastal bluff scrub and North Coast coniferous forest; 0–1,220 m
C. ophitidis	serpentine reed grass	4.3	Serpentine sites in chaparral, lower montane coniferous forest, meadows, grasslands; 90–1,065 m
Dichanthelium languinosum var. *thermale*	Geysers dichanthelium	1B.1	Hydrothermally altered soil of forest and grassland (The Geysers, Sonoma Co.)
Elymus californicus	California bottlebrush grass	4.3	Forests and woodlands; 15–470 m
Glyceria grandis	American manna grass	2.3	Bogs and fens, meadows, streambanks and lake margins, mesic to wet roadside ditches; 15–1,980 m
Hierochloe odorata	sweetgrass	2.3	Mesic meadows; 10–1,895 m
Melica spectabilis	purple onion grass	4.3	Mesic sites in forests and meadows; 1,200–2,600 m
Pleuropogon californicus var. *davyi*	Davy's semaphore grass	4.3	Mesic sites in cismontane woodland, lower montane coniferous forest, and meadows and seeps; 150–610 m.
Pleuropogon hooverianus	North Coast semaphore grass	1B.1	Mesic forests openings to semi–openings; mesic meadows; freshwater wetlands; 10–671 m
Pleuropogon refractus	nodding semaphore grass	4.2	Mesic sites in forests and meadows; 0–1,600 m
Poa piperi	Piper's blue grass	4.3	Serpentine, rocky sites in chaparral and lower montane coniferous forest; 100–1,460 m
Poa rhizomata	timber blue grass	4.3	Lower montane coniferous forest, often on serpentine; 150–1000 m
Puccinellia pumila	dwarf alkali grass	2.2	Coastal salt marshes; 1–10 m

Lanphere Dunes field trip

Andrea Pickart, *Ecologist, Humboldt Bay National Wildlife Refuge*

The unseasonable June rain withdrew for the Friday field trip, held in conjunction with the 2010 CNGA Symposium, to the Lanphere Dunes, leaving us with an overcast day that was fine for viewing wildflowers and grasses.

We circled through the Lanphere Dunes Unit, hurrying through the forest to elude mosquitos. The dunes were lush from all the late rains, and we were able to view many annuals in flower, which would not have been possible in an average year. The endangered annual beach layia (*Layia carnosa*) grew among other annuals including *Lotus micranthus, Lupinus bicolor, Trifolium macraei,* and *T. microdon.* The colorful perennial beach pea (*Lathyrus littoralis*) was just past it's floral peak, but other flowering perennials included yellow sand verbena (*Abronia latifolia*), beach strawberry (*Fragaria chiloensis*), and beach evening primrose (*Camissonia cheiranthifolia*).

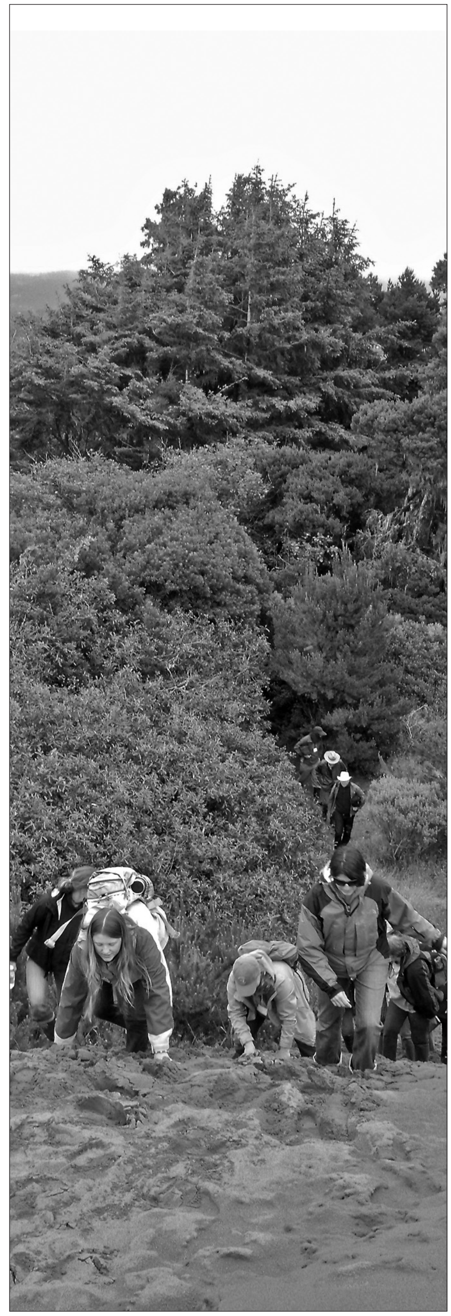
The native beach bluegrass (*Poa macrantha*) was fairly ubiquitous and in full flower. Red fescue (*Festuca rubra*), *Poa confinis,* and the featured native dunegrass (*Leymus mollis*) were all abundant.

In addition to the plants, some of us got a glimpse of a gray fox. We enjoyed strolling along the beach, and had a nice break and some discussion while perched on a high, mobile parabola dune with a sweeping view of the ocean and the dunes stretching to the south.

The Lanphere Dunes was one of the pioneering dune restoration sites in California, and particpants were able to view foredunes that were formerly stabilized by European beachgrass over a decade after restoration, and contrast this sight with the homogenous stands of *Ammophila arenaria* north of the boundary.

Humboldt Bay National Wildlife Refuge: www.fws.gov/humboldtbay/.

Leymus mollis **… the successful dune restoration efforts at Lanphere Dunes.** *Photo: Kelley Garrett*



Out of the dense upland coniferous forest that emerges from a thin layer of soil on an older, stabilized dune—up and over the steep slipface of the advancing parabola dunes. *Photo: Wade Belew*

Bobcat Ranch grassland restoration

Photos: Elizabeth Goebel

Alex Palmerlee, *Manager, Audubon Bobcat Ranch*

Tour members walking back across Maxwell Flat, an area of restored grassland on Bobcat Ranch.

This year's Yolo County Resource Conservation District rangeland and riparian restoration tour brought participants out to the 6,800-acre Audubon Bobcat Ranch near Winters, California, where, starting in 2003, Audubon restored 98 acres of native grassland and 96 acres of riparian habitat.

Spring is certainly the time to tour Bobcat Ranch. Pockets of relict *Nassella pulchra* stand out over the grazed hills, their seed heads nodding easily, and lupine (*Lupinus* sp.), mariposa lilies (*Calochortus* sp.), and owl's clover (*Castilleja* sp.) break the green with splashes of color. Along the riparian corridors, buckeyes (*Aesculus californica*), elderberry (*Sambucus* sp.), and buckbrush (*Ceanothus cuneatus*) are flowering, and the leaves on the oaks are fresh and soft.

This year's tour focused on many of the challenges of native grass, tree, and shrub establishment and the techniques that Audubon has found to work best through past successes and failures. Attendees included landowners and representatives from various agencies and local nonprofits.

Our first stop was the restored grassland in the open fields of Maxwell Flat. Management of these grasslands has been limited to post-installation grazing, and at the time of the tour, cattle had just finished their two-week stint in the grassland.

In the adjacent riparian area, attendees saw firsthand the damage from rodents and deer on habitat plantings. Much of this was due to direct browsing of the plants and from damage to the irrigation system. The browsing damage was due in large part to the height of the tree shelters used on the project. All oaks were planted in four-foot Tubex tree tubes and staked with six-foot bamboo stakes. Because of the failure of the bamboo stakes during high winds, rodents and deer had access to the exposed oak seedlings and many were girdled. The benefit of these tall four-foot tubes is that they push oaks above the browse line quickly. If this is necessary, then a T-post at every tube would also be called for instead of flimsy bamboo stakes. Rodents, namely ground squirrels and voles, also ate through the aboveground irrigation system, leading to further oak mortality.

The tour continued downstream following Dry Creek out of Bobcat Ranch and onto an adjacent property where grasses, trees, and shrubs were installed in 2007. This site, a 25-acre grassland and riparian project, had the full benefit of all the lessons learned from four years of restoration on the upstream Bobcat Ranch. This grassland, similar to those of Bobcat Ranch, is dominated by *Nassella pulchra,* with hints of *Elymus glaucus* and *Elymus trachycaulus*. A species that was not used in the Bobcat plantings, *Vulpia microstachys*, dominates underneath the bunchgrasses.

Along the banks of Dry Creek, native trees and shrubs stand tall and thick over their protective tubes—well on their way to providing a dense corridor along the now-barren creek. Using shorter, two-foot tubes and burying the drip system from the beginning were the main differences in the success of the tree/shrub planting. This downstream site had far less ground squirrel pressure, and deer pressure was largely absent. This site has no relict riparian vegetation, whereas the site on Bobcat Ranch is within a moderately covered corridor. These site-specific details no doubt play an important role in deciding the restoration techniques used for a given project.

Outside of Bobcat Ranch on the Dry Creek site, Alex went over how Audubon practitioners learned from restoration projects on Bobcat and applied these lessons to this Dry Creek site.

Nassella pulchra and spatial patterns in soil resources in native California grassland

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Abstract

Plants influence soil resources over a range of spatial scales. Here we investigate how the above-ground presence of the native perennial bunchgrass *Nassella pulchra* is spatially associated with soil properties at the centimeter scale. We found that in a naturally occurring remnant stand of perennial bunchgrass, *Nassella pulchra* individuals were associated with "islands of fertility"—areas of high nitrogen (N) and organic matter. The patterns in soil resource heterogeneity associated with *Nassella pulchra* demonstrate that the belowground resource landscape of a perennial-dominated grassland is patchy, much like the aboveground plant cover. In California grasslands, the historical shift in grass dominance from perennial to annual that occurred with the invasion of Eurasian annual grass species may have led to changes in the small-scale spatial structure of soil proerties and processes.

Introduction

The presence and activity of individual plants can strongly affect the soils in which they grow (Chapin et al. 2002). Localized uptake of water and nutrients, exudation of compounds into the rhizosphere, modification of the microclimate through shading, rainfall interception, and litter production all influence the spatial structure of soil properties and processes. The result is that both soil resource availability and soil organisms are remarkably patchy (White et al. 1987, Robertson et al. 1988, Jackson and Caldwell 1993, Parkin 1993, Ettema and Wardle 2002). This patchiness, in turn, feeds back to the plants that created it, affecting seedling establishment, growth, and long-term plant survival (Franco and Nobel 1989, Penridge and Walker 1986, Maestre et al. 2003), and through these, overall community structure and ecosystem function (Casper et al. 2000, Fitter et al. 2000, Wilson 2000). The spatial heterogeneity of soil resources may also play an important role in promoting plant species coexistence (Levin and Paine 1974, Chesson 1986, Hutchings et al. 2003), population persistence (Ellner 2001), and invasions (Davies et al. 2005, Melbourne et al. 2007).

Plants affect soil structure at various temporal and spatial scales. At large scales, plant community composition exerts a strong control over soil genesis (Jenny 1941), and can influence the development of soil over vast areas. At fine scales, individual plants can produce hot spots of organic matter and nutrients. For example, islands of fertility form around widely spaced plants in arid climates as nutrients and moisture accumulate directly underneath plant canopies (West 1981, Crawford and Gosz 1982, Garner and Steinberger 1989, Schlesinger et al. 1996), whereas barren interspaces are scoured by wind and water (Rostagno 1989). In other environments, localized plant uptake of nutrients leads to significant drawdown in the soil, producing "zones of depletion" immediately adjacent to plant roots (Mengel and Kirkby 1979).

The homogenization of soil resources and processes on a small scale could promote the establishment and growth of annual seedlings, leading to a positive feedback for invasive annual grasses.

California grassland communities currently support over 500 native and non-native grass species (Peterson and Soreng 2007). Observations of relict purple needlegrass (*Nassella pulchra* [Hitchc.] Barkworth) stands in the San Joaquin Valley (Clements 1920 and 1934) have fueled the idea that California's pre-invasion grasslands were once dominated by *N. pulchra* and other bunchgrass species (Burcham 1957, Heady 1977). More recent reviews and original research have demonstrated that in many sites in California, perennial grasses may have been less common in some areas than previously thought (Hamilton 1997, Holstein 2001, Minnich 2008). California grasslands currently contain a rich forb flora; forb species richness can outnumber that of grasses by four to one (Sims and Risser 2000).

In many locations that are not heavily invaded by invasive annual grasses from Eurasia, a variety of forb species can be found between *N. pulchra* individuals. Despite the evolving view of California grassland community composition as a whole, the historical dominance of *N. pulchra* remains a good assumption for many grasslands throughout the state (D'Antonio et al. 2007). Because of its long-lived bunchgrass growth form, *N. pulchra* is likely to strongly determine the structure of soil resources where it is found.

A major focus of recent management, conservation, and research efforts in California grasslands has been the restoration of native perennial bunchgrass stands in areas currently dominated by invasive annual grasses (Corbin and D'Antonio

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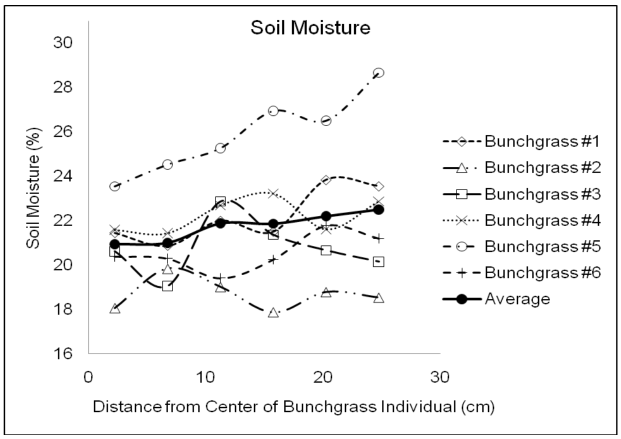
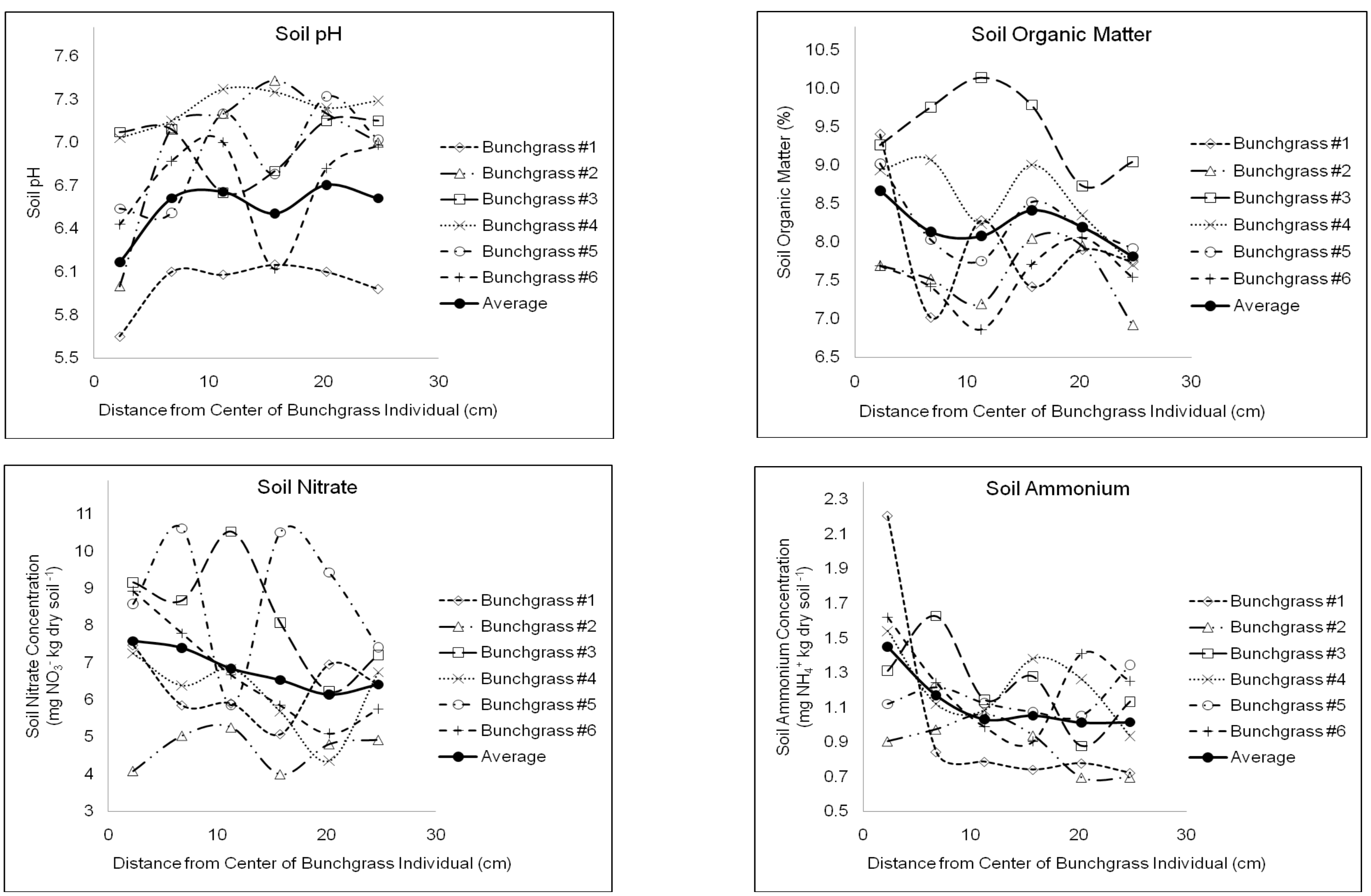
2004, Moyes et al. 2005, Young et al. 2005). Understanding the spatial structuring of soil resources in non-invaded grassland sites could provide valuable information to those interested in perennial bunchgrass restoration.

The goal of our study was to test whether, in a perennial bunchgrass-dominated ecosystem in California, *N. pulchra* individuals are associated with discrete patterns in soil properties that both influence and are influenced by plant growth.

Figure 1. Changes in soil properties with distance from the center of a perennial bunchgrass. Open symbols and dashed lines represent the values collected from soils near each of the six bunchgrass individuals. The filled circles and bold solid line represent a mean of these values.





Methods

This research was conducted at the University of California Sedgwick Reserve, 50 km from the Pacific Ocean in the Santa Ynez Valley (43º42´30´´N, 120º2´30´´W), in a Mediterranean climate with hot dry summers (high temperatures range from 32 to 34ºC) and cool wet winters (Nahal 1981). Average yearly rainfall at the reserve is 380 mm/yr, but yearly precipitation totals vary greatly. The soils are Argixerolls with nearly flat (less than 2 percent) slopes.

The study site is a naturally occurring grassland dominated by the perennial bunchgrass *Nassella pulchra*. Plant cover between the bunchgrasses consists primarily of annual forb species. Soils were collected on March 15, 2004, during the middle of the growing season. Six bunchgrass individuals, each located at least 50 cm from the nearest bunchgrass neighbor, were chosen for the experiment. A single sampling transect was established, starting at the crown of each chosen bunchgrass individual and stretching out into the interstices between the grasses towards the nearest neighboring bunchgrass individual. Six soil cores from 0 to 10 cm deep were sampled at 2.25 cm intervals along each transect.

All soils were transported to the

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laboratory for processing, where they were sieved to 4 mm. Rocks and roots were removed, and the soils were stored at 4ºC to slow microbial activity prior to analysis. Gravimetric soil moisture was measured by drying at 80ºC for 48 hours. Soil pH was measured in a 1:2 soil to water suspension, and soil was allowed to settle before measurement. Organic matter content was measured by combustion at 450ºC.

Dissolved inorganic nitrogen (DIN) was extracted from a 10 g subsample of each soil with 40 mL of 0.5 M potassium sulfate (K_2SO_4). Samples were filtered prior to freezing and subsequent analysis on a Lachat Autoanalyzer. Ammonium (NH_4^+) was analyzed with the diffusion method (Lachat method 31-107-06-5-A, Milwaukee, WI), and nitrate (NO_3^-) was analyzed using Griess-Ilovsay reaction after cadmium reduction (Lachat method 12-107-04-1-B, Milwaukee, WI).

To test whether *N. pulchra* individuals were associated with discrete patterns in soil properties, we combined data from all six soil transects in general linear model (GLM) analyses to test the contribution of distance from the center of a perennial bunchgrass to each of the following soil properties: percent soil moisture, soil pH, percent organic matter, soil NO_3^- concentration, and soil NH_4^+ concentration. To account for underlying differences between each of the six transects for each of the soil properties measured, we included a categorical variable "individual plant influence" in the analysis. This variable was calculated as a mean value for each measured soil property of all six samples taken from a single transect. This approach allowed us to incorporate data from all of the soil transects into a single statistical analysis to test whether *N. pulchra* individuals were associated with spatial patterns in each of the soil resources.

Table 1. **Results of general linear model analysis testing the contribution of individual plant influence (mean value of each response variable in a transect) and distance from the center of a perennial bunchgrass on: (A) soil moisture, (B) soil pH, (C) percent organic matter, (D) soil nitrate (NO_3^-) concentrations, and (E) soil ammonium (NH_4^+) concentrations. Statistically significant results at $p \leq 0.05$ are shown in bold.**

Source	Df*	MS*	F*	p*
(A) Soil Moisture				
Distance	1	11.055	10.588	**0.003**
Individual Plant	5	35.385	33.890	0.000
Error	29	1.044		
Multiple $r^{2*} = 0.861$				
(B) Soil pH				
Distance	1	0.584	7.169	**0.012**
Individual Plant	5	1.085	13.323	0.000
Error	29	0.081		
Multiple $r^2 = 0.718$				
(C) Percent Organic Matter				
Distance	1	1.217	4.624	**0.040**
Individual Plant	4	3.889	14.775	0.000
Error	30	0.263		
Multiple $r^2 = 0.680$				
(D) Soil Nitrate				
Distance	1	8.404	5.948	**0.021**
Individual Plant	5	13.358	9.455	0.000
Error	29	1.413		
Multiple $r^2 = 0.647$				
(E) Soil Ammonium				
Distance	1	0.590	7.830	**0.009**
Individual Plant	5	0.127	1.681	0.171
Error	29	0.075		
Multiple $r^2 = 0.359$				

df = degrees of freedom; MS = mean square; F = F-test; p = probability; Multiple r^2 = multiple regression correlation coefficient

Results and Discussion

All soil properties measured had spatial patterns that correlated with the aboveground presence of *Nassella pulchra* individuals. With increasing distance from the center of the bunchgrass plants, soil moisture and pH increased, whereas DIN and organic matter content decreased (Fig. 1). These trends were significant at $p < 0.05$ for all soil properties using GLM analysis (Table 1).

The lower soil moisture found directly underneath perennial bunchgrasses was likely caused by water uptake by *N. pulchra*. The low soil pH measured under perennial individuals may result from root exudation of organic acids, and by the high organic matter content from regular inputs of leaf and root litter over time. Less intuitive is the presence of relatively higher concentrations of NO_3^- and NH_4^+ directly underneath the bunchgrasses. These DIN hot spots could have been caused by differences between the bunchgrasses and surrounding vegetation, similar to how the islands of fertility (Crawford and Gosz 1982, Schlesinger et al. 1990) associated with shrubs in desert ecosystems are N-rich relative to their surrounding soils.

In the grassland, forbs growing between the bunchgrasses were green at the time of sampling. We suspect that relatively

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higher rates of nutrient uptake by forbs would leave less N in their associated soils, which would make bunchgrass soils appear N-rich in comparison. In addition, species differences in root exudation may contribute to differences in the priming effect on soil decomposition under bunchgrasses and forbs (Cheng et al. 2003).

The larger roots and longer root systems of bunchgrasses are likely to exude more labile carbon substrates (Xu and Juma 1994, Patterson and Sim 2000) that stimulate microbial growth (Clarholm 1985) and N mineralization (Hungate et al. 1996 and 1997, Kuzyakov et al. 2000, Hu et al. 2001), leading to an increase in soil DIN under bunchgrasses.

Conclusion

Nassella pulchra individuals created notable spatial patterns in soil properties and resources. The accumulation of organic matter and the reduction in pH is likely to alter both nutrient availability and cycling, and the composition of soil bacterial communities, which are very sensitive to pH (Fierer and Jackson 2006).

The change from perennial to annual dominance with invasion may therefore have altered established spatial patterns in resource use and N cycling. An evenly spaced carpet of annual grasses could reduce the occurrence of the N and organic matter hot spots generated by perennials, producing more homogenous soil resources within the grassland.

A shift in the scale of soil heterogeneity can lead to consequences for seedling establishment and survival, which can feed back to produce changes in the plant community composition, and thus spatial structure, over time.

It is possible that the homogenization of soil resources and processes on a small scale could promote the establishment and growth of annual seedlings, leading to a positive feedback for invasive annual grasses.

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unique assemblage of native grasses occurs in the varied, distinctive natural communities that characterize the region; many have been impacted and degraded due to development, nonnative species (especially weedy grasses), altered hydrology, grazing, trampling, and other disturbances.

By working to protect and restore the remaining intact coastal and inland habitats of the region, ecological integrity and biological diversity on the North Coast will be sustained.

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Bringing native bees and forbs back to agricultural landscapes

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Diversity and value of pollinators

Pollinators are of unquestionable value to humankind. Roughly 75 percent of the world's flowering plants and 30 percent of our global crop production depend in part on the pollination services provided by animals (NRC 2007, Klein et al. 2007).

The European honey bee remains the most relied upon crop pollinator; however, managed honey bees have declined by more than 50 percent since the 1950s (NRC 2007). More recently, the phenomenon termed Colony Collapse Disorder (CCD) has lead to dramatic honey bee losses. No single cause for CCD has been identified (vanEngelsdorp et al. 2009). Instead, research suggests that pesticides, new pathogens or parasites, and existing stresses such as pollen and nectar scarcity may act synergistically to cause CCD (vanEngelsdorp et al. 2008).

A *Bombus californicus* collecting pollen from *Phacelia tanacetifolia.* *Photo: Katharina Ullmann*

There are an estimated 20,000 bee species worldwide, 17,000 of which have been described (Michener 2000). Studies in both temperate and tropical regions have shown that wild bees can increase crop production if their habitat needs are met (see Ricketts et al. 2008 for a review). However, in recent years, wild bee populations have declined (Biejsmeir et al. 2006). Wild native bee species are threatened by agricultural intensification and the resulting loss of flower resources, nesting habitat, and other factors (NRC 2007, Carvell 2007).

Enhancing pollinator habitat

Intensive agriculture, of the type common throughout much of California, transforms landscapes containing mixtures of natural habitat and diverse cropping systems into landscapes consisting of large monocultures and little natural habitat (Tscharntke et al. 2005). In these degraded landscapes, floral resources are limited to short temporal pulses that do not persist throughout the season. As a result, there are times of the year when few flowering plant species provide pollen and nectar that bees rely on for food. Native flowering forbs provide these resources and have been shown to attract many wild bee species (Tuell et al. 2008). Enhancing degraded agricultural areas with native forbs and shrubs may therefore increase native bee populations and the pollination services they provide.

Ongoing research

In response to recent declines in managed and wild bee populations, a number of research groups in California are partnering with local seed growers, farmers, industry, nonprofits, and federal agencies to determine which native flowering plants

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are the most attractive to native bees and will also grow well in the Central Valley climate. This partnership includes scientists from the University of California, Davis; the University of California, Berkeley; the Xerces Society for Invertebrate Conservation; and the Natural Resources Conservation Service.

A research team from the UC Davis Department of Entomology is using data on bee visitation to native plants in natural and disturbed habitats to identify a set of plant species most preferred by wild bees. From this palette of plants they have designed a set of forb mixes that can tolerate the dry, hot conditions of Central California and provide flowers throughout the growing season. The team is testing how well the different mixes support wild bees and how well the plants perform over multiple seasons. Once the best mixtures of plants are identified, they will be planted alongside agricultural fields and monitored to determine how they impact local bee populations and the pollination of the neighboring crop.

This research project is part of a national effort supported by the National Fish and Wildlife Foundation and Syngenta Crop Protection AG to identify native plant species that can be grown to bolster bee populations and enhance pollination in agricultural landscapes. Researchers at the University of Florida, Gainseville, and Michigan State University are developing similar mixes for the Midwestern and Southeastern regions of the United States.

A _Megachile_ sp. visiting _Madia elegans_ at Hedgerow Farms in Yolo County, California. _Photo: John Anderson_

Conclusion

More and more restoration practitioners are incorporating forbs into native grass plantings, despite the challenges of managing broadleaf weeds. Results from these studies will provide restoration practitioners and growers with practical information and simple guidelines to enhance pollinator habitat in agricultural landscapes.

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California poppy and native lupines are some of the early blooming species found in a pollinator mix being field tested by a UC Davis research group led by Dr. Neal Williams. The best pollinator mix will be planted alongside agricultural fields in Yolo County and monitored to determine its impact on local bee populations. _Photo: Neal Williams_

CNGA Fall Workshops

Using California Native Grasses in the Water Conserving Landscape

Friday, October 1

Landscaping that conserves water is fast becoming the number-one focus of conservation programs. Not merely a passing trend, water conservation is the future of urban landscape principles in "thirsty" California. Are you ready to meet this challenge?

Let the experts from CNGA show you how to use native grasses, sedges, and rushes successfully in a variety of settings to create beautiful residential, commercial, and public landscapes. Besides saving irrigation water, native grasses can rebuild soil and prevent erosion, enhance wildlife habitat, and lower maintenance costs. The latest applications of native grasses for treatment, attenuation, and infiltration of stormwater in bio-swales will be addressed.

This workshop is appropriate for landscape architects and contractors, engineers, planners, parks and recreation staff, biologists, regulatory staff, land and resource managers, nursery practitioners, and homeowners.

Instructors: Steve Nawrath, David Amme, and Wade Belew

Co-sponsor: East Bay Municipal Utility District

Location: Oakland

Enrollment: limited to 40

Registration Fees: $75/CNGA members; $115/nonmembers

Grassland Restoration Field Practices Workshop

Thursday, October 28

Fall is the time for planting native grasslands!

This field course will provide attendees with real-world, hands-on experience in grassland restoration.

Instructors will demonstrate tools and techniques for:
(includes 1-yr complimentary membership); $50/students.

- site preparation,
- planting, and
- establishment.

Demonstrations will be applicable to large- and small-scale restoration projects.

Be prepared to get dirty!

Physical participation is highly encouraged.

Instructors: J.P. Marie and Bryan Young

Co-sponsor: ?

Location: Davis

Enrollment: limited to 50

Registration Fees:

- $50 member,
- $70 non-member,
- $35 student

Registration Form: CNGA Fall Workshops | 2010

Mail to: CNGA, P.O. Box 8327, Woodland, CA 95776 Secure fax to: 530-661-2280

Participant's name (print or type please) ____________________

Participant's organization or agency (optional) ____________________

Mailing Address: Street ____________________ City ____________________ State ____ Zip ___

Preferred phone ____________________ ____________________ Preferred e-mail ____________________

Registration Fees : *1. Using California Native Grasses in the Water-Conserving Landscape* .... ☐ $75/CNGA members ☐ $115/nonmembers* ☐ $50/students

2. Grassland Restoration Field Practices Workshop.. ☐ $50/CNGA members ☐ $70/nonmembers** ☐ $35/students

* One year of complimentary CNGA membership benefits is included with registration at nonmember rate.

**Nonmember registrants entitled to 50% off 1-year CNGA membership?

☐ Payment by check made payable to California Native Grasslands Association

☐ Payment by credit card (please check type) ☐ Visa ☐ MasterCard ☐ American Express

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Questions concerning registration? Please contact CNGA by phone/fax: 530-661-2280, or e-mail: ADMIN@CNGA.ORG.

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Item (All prices include tax. Call for combined shipping.)	**Price**	**S/H**	**Qty**	**Total**
CNGA Logo Items				
SALE! **Sturdy canvas tote,** natural w/green logo, 13x15x7	$15	$4	__	____
Baseball cap, tan w/black logo, adjustable, was $20	$15	$4	SOLD OUT!	
SALE! **Crush hat** (aka **bucket hat**), green, S/M only, was $20	$10	$4	__	____
Tees unisex heather-green, short-sleeve (S/L/XXL/XXXL)	$15	$4	__	____
NEW! unisex natural, short-sleeve (S/M/L/XL)	$20	$4	__	____
NEW! women's, army-green, short-sleeve (S/M/L/XL/XXL)	$25	$4	__	____
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CNGA Workshop Binders				
Restoration and Revegetation	$60	$6	__	____
Ecology/Management Vernal Pool Grasslands (supply limited)	$35	$5	__	____
Native Grasses/Graminoids Urban Landscape	$35	$5	__	____
Grass Identification	$25	$4	__	____
Posters: Grasses of CA 24x36, laminated	$25	$4	__	____
(CNPS) set of 4, each different, 24x36, unlaminated	$20	$4	SOLD OUT!	
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Complete set of back issues (1991–2009)	$60	$10	__	____
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Make check payable to California Native Grasslands Association (or CNGA) or you may authorize payment by (circle one): Mastercard / Visa / AMEX

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MANY HANDS, continued from page 18

control efforts only allow for roadside hand-pulling. The weed is at a level that requires control with a combination of tools and methods, not just hand pulling. Therefore, the CNGA Board and the Central Sierra Partnership Against Weeds have written to Forest Service management to ask for an EIR for a weed hot-spot program along Highway 120 (Stanislaus National Forest) so that appropriate mechanical, biological, and chemical tools are also available to stop this advancing weed. We put in a volunteer weed-pull day, too.

Making a difference wherever you are

In addition to reaching out to policy makers, native grassland conservation moves forward in direct, everyday steps, too. Because of extensive loss of California's native grassland systems over the last two centuries, protecting one more patch of native grassland within your County can make a difference.

I work in a large public infrastructure agency. With a little training in grass identification, one begins to spot the more common native grasses out on the landscape. I've worked with planners to add grassland protection to construction plans and specifications. As a field landscape architect, I've worked with construction managers to put up "ESA fencing" around a healthy prairie of *Danthonia californica* (California oatgrass) so that heavy equipment drove and parked on already compacted and degraded land instead.

Sometimes everyday conservation comes by chance, a little footwork, and a phone call. Years ago, on a drive back from a job site, I caught sight of the flowering inflorescences of our state grass, *Nassella pulchra,* on a serpentine plateau on Highway 280 above the Crystal Springs Reservoir. A subsequent call to the area roadside manager and the vegetation crew leader led to installation of a simple field sign (a highway-approved flexible paddle and made of recycled plastic) to direct heavy highway mowing equipment around this fragile serpentine prairie. It turns out that this remnant serpentine prairie also supports "species of concern" and abuts a rare serpentine seep hosting *Cirsium fontinale* (fountain thistle).

Adding simple field conservation measures (to contract specifications, the construction job site, and to land management practices) is doable and costs relatively little. Speaking for the wildland beauty of our state is a right and privilege. The payoff, in what could be the next step in an enlightened conservation policy, is to continue to benefit from the scenic beauty and ecosystem services contained in our state's diverse native landscape systems, and that includes our native grasses, grasslands, prairies, and meadows.

We welcome your suggestions and stories on preserving our state's native prairie and meadow communities. If you're taking action to raise awareness of California's native grasslands in your area, first, hats off to you, and please keep us posted by e-mailing a note to the CNGA office at admin@CNGA.org.

Reference

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Detach and mail this form with a check made out to CNGA. | Send to: CNGA, P.O. Box 8327, Woodland, CA 95776. | Students, send photocopy of current ID.

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CNGA members have voting status, and receive the "Grasslands" newsletter, a monthly e-blast, and discounts to CNGA events.

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