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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

At our 2008 Annual Meeting in Santa Rosa, the status and preservation of California’s coastal prairie was a hot topic, spurred on by the Sonoma–Marin Coastal Grasslands Working Group. Kathleen Kraft and Linda Esposito of the Ocean Song Farm and Wilderness Center joined with Claudia Luke at the UC Davis Bodega Marine Laboratory to organize the first Coastal Prairie Workshop on November 6th, 2006, and published the proceedings in June 2007. Last year, Drs. James Bartolome and Peter Hopkinson of UC Berkeley were asked by the Sonoma County Agriculture Preservation and Open Space District to write a review of coastal prairie management, which is presented in this issue of Grasslands (see p. 5).

Native coastal prairie grasslands once covered much of the terraces and grassy plains of coastal California from the Del Norte coast, south through the San Francisco Bay region, and as far south as San Luis Obispo and Santa Barbara Counties. Prior to the entrance of the white man, elk were the primary ungulates that grazed in both the forest edges and the adjoining coastal grasslands. The morphology of the mouth of elk is similar to that of cattle, so grazing of cattle in these remnant grasslands can have a similar effect on the habitat if properly managed. The following quote (William Heath Davis, Seventy-five Years in California, 1889) gives a glimpse of the past:

“On Mare Island I often saw in the years from [1840] to ’43 as many as two or three thousand elk, it being their habitat to cross and recross by swimming between the island and the mainland, and I remember one occasion, when on the schooner Isabella, of sailing through a band of these elk, probably no less than a thousand, which were then crossing from Mare Island to the mainland. It was a grand and exciting scene. The captain of the boat wanted to shoot at some of them, but I prevented him from doing so because we could not stop to get the game on board and I did not like to see the elk wantonly destroyed.”

Big Sur coastal prairie

Photo: David Amme
The California coastal prairie plant community shares many of the same plant species of the mid- to higher-elevation slopes of the Sierra Nevada. The same genera and species of grasses, sedges, shrubs, and trees found on Tuolumne Meadows in Yosemite National Park are found on the Fort Bragg coast. The prairie grassland and associated forest, wetlands, and slack-dune vegetation are representative of northern Arcto-Tertiary flora. Examples include California oatgrass, tufted hairgrass, red fescue, fir, spruce, lodgepole pine, corn lily, Labrador tea, manzanita, ceanothus, and oso berry, to name a few.

California oatgrass (Dactylium californica) epitomizes the coastal prairie grassland as far inland as the cool, foggy coastal environment from the bald hills of Northern California to Rio Vista in the Sacramento River Delta and south to coastal prairies of San Simeon in San Luis Obispo County. Dactylium is perhaps the only native perennial bunchgrass that has seed that lives for many years in the soil seed bank. Soil compaction, periodic close grazing, disturbance, and fire are processes that encourage the establishment and vigor of turf-like stands of this tasty grass (Amme and Micallef, Grasslands, Summer 2008).

There has been an alarming loss of diversity in key coastal grasslands over the last 30 years. Few extensive coastal prairies still exist. But more and more “postage-stamp”-sized prairies are the norm, islanded by development with their original crucial soil profile still intact.

It is important to note that coastal prairie has no legal protection status in California. Intact prairie areas may be wantonly disrupted by agriculture expansion or development with only a token, if any, offer of limited mitigation, which may or may not be carried out. Primary threats to the coastal prairies are (1) invasive European perennial grasses, (2) land development, (3) erosion, (4) non-grass invasive species such as gorse and French broom, and (5) poor or no management (permanent rest). The proper management of this valuable plant community is extremely important.

The coastal prairie includes an incredibly rich assortment of 28 perennial grasses: Agrostis blasdalei (Blasdale’s bentgrass), A. densiflora (California bentgrass), A. pallens (Seashore bentgrass), Alopecurus aequalis var. sonomensis (Sonoma shortawn foustail), Bromus maritimus (maritime brome), Calamagrostis nutkaensis (sand reedgrass), Calamagrostis stricta inexpansa (Thurber’s reedgrass), Danthonia californica (California oatgrass), Deschampsia caespitosa bolcifomis (tuffed hairgrass), D. caespitosa beringensis (Bering hairgrass), Elymus glaucus (Blue wildrye), E. virescens (maritime wildrye), Festuca idahoensis roemeri (Roemer’s fescue), Festuca rubra (red fescue), Hordeum brachyantherum (meadow barley), Koeleria macrantha (junegrass), Leymus mollis (dune wildrye), L. pacificus (Pacific wildrye), Nassella lepida (foothill needlegrass), N. pulchra (purple needlegrass), Panicum acuminatum (Pacific panicgrass), Phalaris californica (California canarygrass), Pileum alpinum (alpine timothy), Poa unilateralis (seabluff bluegrass), P. confinis (beach bluegrass), P. douglasi (Douglas’s bluegrass), P. macrantha (seashore bluegrass), and Trisetum canescens (nodding trisetum).

The growing list and rapidly expanding populations of naturalized perennial and annual exotic grasses constitute a major threat to the survival of this precious resource, including: Ammophila arenaria (European dunegrass), Agrostis capillaris (browntop), Anthoxanthum odoratum (sweet vernalgrass), Arrhenatherum elatius (tall oatgrass), Brachypodium distachyon (annual false brome), Briza maxima (rattlesnake grass), Bromus diandrus (ripgrit), B. bordeaeus (softchees), Cortaderia jubata (Pampas grass), Erharta erecta (panic veldtgrass), E. calycina (perennial veldtgrass), Festuca arundinacea (tall fescue), Holcus lanatus (velvetgrass), Lolium multiflorum (annual ryegrass), Nassella Manitca (South American needlegrass), and Pennisetum clandestinum (Kikuyu grass). Perhaps the most endangering exotic grass to the coastal prairie is velvetgrass (H. lanatus).

Field Notes

Recently, we received an interesting short note from Marsha Sleeth of Seaside, California, that fits in our Grasslands “Field Notes” category: experimental trials and layman efforts to figure out how grasses and grasslands tick (see p. 11). This kind of article wouldn’t stand up to the rigor of scientific scrutiny but nonetheless makes one take notice and try new techniques.

Since moving to the Monterey Peninsula, Marsha has become impassioned about the restoration of natives, the organic management of pests, and incensed about the wastefulness of water. She began studying horticulture and landscape design and recently launched a business: Water-Wise Garden Design. She is developing a nursery that will focus on native plants and has begun a native grass research project driven by the need for a turf replacement (Amen, that). She is expecting that water rationing will begin to hit the Monterey Peninsula and is hoping to identify native grasses that will be effective for replacing the water-guzzling lawn. (Marsha Sleeth at Water-Wise Garden Design & All Organic Pest Management can be reached at sleethdesign@att.net.) —DA

Grazing California Grasslands—Take Two: Mountain Meadows

In the last issue of Grasslands I wrote about the proper management of California grasslands, particularly the low- and mid-elevation grasslands of California, where properly timed grazing can be beneficial if not required to maintain grassland health
and diversity. The rules change when one climbs into the higher elevation grasslands and alpine meadows from 7,000 to 10,000 feet, such as exists at Highland Lakes where CNGA has been hosting our summer Sierran retreats. At these elevations, the meadows and grasslands have not been subject to grazing by large ungulates since the last ice age. The lush meadows stay green late into the summer and rarely are grazed by more than an occasional small, traveling deer herd. Many of the meadows are de-facto bogs and fens where the soil has turned into peat, the result of thousands of years of carbon sequestration. This is really sensitive habitat.

Many of these areas had been severely impacted in the late 1800s by uncontrolled summer sheep and cattle grazing, and by the 1930s there was a call to stop this type of grazing, when clouds of dust (soil) on the mountaintops could be seen for miles during drought years.

Today, our National Forests are still running high meadow grazing allotments in these sensitive high mountain meadows. Grazing for 3½ months from July to early October can certainly result in deleterious effects to these grassland meadows, especially if they are not deferred from grazing every 2 or 3 years to give the meadows time to recover and regenerate.

Twenty cows and their calves on a 30-acre allotment at 8,000 feet for 3½ months can significantly impact these wet meadows and the dryer surrounding forest meadows. Salt licks become ground zero. Over time, erosion and gullies begin to form, the meadows begin to dry out, impacting the riparian vegetation, water quality, and the structure of the bogs and fens. This is not good, especially on wilderness areas or sensitive sites that do not have wilderness status.

This type of livestock grazing is taking place on and off wilderness lands where grazing allotments have been grandfathered into the landscape. The Wilderness Act of 1964 states: “A wilderness, in contrast to those areas where man and his works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor and does not remain.” Unfortunately, this does not apply to man’s livestock. —DA

Letter to the CNGA President

Dave,

It occurs to me that a lot of people, such as the woman who quit CNGA over a disagreement on grazing policies (see “From the President’s Keyboard,” Grasslands, summer 2009), don’t understand the conditions that typically prevail in what we would call pristine, intact grassland ecosystems: namely, herds of ungulates that stay tightly together, always on the watch for large carnivores, quickly eating much of the forage in a given spot and moving on, only to return after the area recovers from the grazing event.

Stephen W. Edwards has painted an instructive picture of such pristine California grassland conditions in some of his articles, such as “Observations on the Prehistory and Ecology of Grazing in California” (Fremontia, Vol. 20, No. 1, January 1992).

California grasslands of the most recent fossil record are comparable in diversity of megafauna with present-day East African grasslands—and, for the vegetation, holistic grazing mimics such “pristine grassland ecosystem conditions.” Our early European history shows a diversity of native grazers (pronghorn, elk, deer) in large herds with plenty of grizzlies and mountain lions to keep them alert and on the move. Any California grassland without herds of grazing ungulates is aberrant—an extremely recent “unnatural” phenomenon.

An understanding of healthful grassland dynamics, especially ungulate grazing and browsing impacts, is so important that it might be worth a place of some honor on the CNGA Web site.

This understanding could also be a bridge for relating to people who are not environmentalists. The vision of a bio-diverse world that we can live in and on, with mutual benefits for humankind and animal and plant life, is a hopeful one.

The super-overgrazed hills of Stanford, down to a few tough and utterly depauperate annuals, or the ungrazed long-dead standing annual grass in non-serpentine corners of Jasper Ridge—I find both extremes equally repulsive and dull!

I suppose that nothing would do more for Californian grassland preservation and biodiversity and aesthetic values than simply saner and sounder grazing on agricultural lands and wise management of grazing and browsing on preserves.

It has saddened me to see areas formerly grazed “preserved” without grazing, soon losing some of their native species cohort, which was, naturally, species that did well with grazing (even of the all-too-common poorer sort).

David Theodoropoulos (author of Invasion Biology: Critique of a Pseudoscience) points out, in his critique of our criticizing feral wild pig impacts, that the California grizzlies dug up far more extensive areas than the pigs do now—an historic disturbance regime that promoted biological diversity and productivity. We forget about things that are gone—grizzlies and badgers and before them even things like giant ground sloths and mammoths and saber-toothed tigers and camels and horses that went extinct.

Best regards,
Jeffrey Caldwell
State of the Coastal Prairie
California’s coastal prairie is patchily distributed from Humboldt County in the north to San Luis Obispo County in the south, generally within several kilometers of the coast. Native perennial grasses are often the dominant form of plant life, with forbs making up a significant proportion of the species richness (Hayes and Holl 2003a). Compared to other Californian grassland types, coastal prairie contains more native species and more perennials and should, therefore, exhibit a more predictable response to protection and management under its wetter and more temperate climate (Bartolome et al. 2009). Coastal prairie vegetation needs better descriptions to determine the variations among sites (Ford and Hayes 2007). Until quite recently, the coastal prairie received less basic and applied research attention than California’s inland grassland type, Valley grassland.

Like most of California’s grasslands, the coastal prairie has been altered through conversion to agriculture, development, invasion by non-native plant species, and human-caused changes in nutrient and hydrological cycles and in disturbance regimes (e.g., fire, soil movement, herbivory). Nonetheless, a comparison of coastal prairie to other grassland types in the western U.S. found that coastal prairie has almost double the number of species of any other type (Stromberg et al. 2001), and generally the coastal prairie’s cover of native plants is greater than that of Valley grassland. A 2008 survey of California State Parks grassland properties found that five of seven coastal prairie units had high levels of native cover (>50%) (Hopkinson et al. 2009). In addition, sensitive wildlife species rely on coastal prairie habitat, including several butterfly species (Ford and Hayes 2007). Given its exceptionally high level of biodiversity and the development pressure facing California’s coastal region, the coastal prairie deserves protection.

Primary management problems facing the coastal prairie include: (1) invasion by non-native perennial grasses and other weeds, (2) the encroachment of native and non-native trees and shrubs into the grassland (Ford and Hayes 2007), and (3) the disruption of grazing and fire regimes and other ecosystem processes. These problems can result in reduced cover of native grassland plants, local loss of species, altered ecosystem processes, and reduced wildlife habitat values. Several conservation management tools are available to address these problems: livestock grazing, prescribed burning, herbicide application, and mowing and hand or mechanical removal; however, formal tests of their effectiveness in the coastal prairie are few.

Management Tools: Grazing
Grazing is one of several tools that grassland managers can employ to combat weed invasion, encroachment by trees and shrubs, and the disruption of ecosystem processes in the coastal prairie. Grazing has received the greatest research focus, probably because it is the management tool most easily implemented over large areas. In addition, grazing may cost less per unit area to implement than other management techniques.

Grazing by native herbivores is an important and complex coastal prairie ecosystem process with a long evolutionary history (Hayes and Holl 2003a). Although the large native herbivores were extirpated over millennia, culminating with market hunting during the Gold Rush, small native grazers like voles, ground squirrels, and pocket gophers continue to have a strong influence on community structure (Schiffman 2007). The most important large native grazer, tule elk, which has behavior and grazing preferences similar to cattle (Jackson and Bartolome 2007), has been successfully reintroduced to portions of the coastal prairie.

Livestock grazing is a complex ecosystem process for which management involves site-specific control of intensity, timing, and distribution (Jackson and Bartolome 2007). This complexity has reduced the generality of results from grazing experiments. An evaluation of 30 grazing studies in California grasslands showed that results were primarily dependent on soil properties and weather, with variable and probably site-dependent effects of grazing treatments (Huntsinger et al. 2007).

Two recent studies examined the effects of grazing in the coastal prairie. One evaluated cattle grazing in 25 locations along the coast from Mendocino to San Luis Obispo (Hayes and Holl 2003a), the other tule elk grazing at Tomales Point in Marin (Johnson and Cushman 2007). Both studies came to similar conclusions: grazed areas had greater abundance and species richness of native annual forb and non-native annual grass and forb species. Native annual forbs are an important component of the coastal prairie’s species richness, and an increasing number of them are considered rare and endangered (Ford and Hayes 2007). The findings fit with theoretical predictions that grazing removes biomass and opens up microsites favorable to annual, short-statured plants.

In contrast to the annual plants, perennial forbs, especially native species, had greater abundance and species richness in ungrazed sites. Hayes and Holl (2003a) note that some of the native perennial forbs in their study were tall species that do not reproduce when clipped.

Both studies found that native perennial grass abundance and species richness did not differ between grazed and ungrazed sites. However, other studies have shown that grazing may have effects on the abundance of specific perennial native grass species. Frustratingly for the development of simple management prescriptions, these
Coastal prairie, continued from page 5

effects can vary from site to site (Hayes and Holl 2003b).

_Nassella pulchra_, the most intensively studied native grass species, has shown inconsistent responses to grazing: increasing in abundance in some areas, decreasing in others, or exhibiting no change (D’Antonio et al. 2002). These studies were conducted variously in coastal prairie and Valley grassland. Inconsistent results probably reflect site- or time-specific factors often not evaluated in the studies. D’Antonio et al. (2002) make it clear that carefully controlled, manipulative experiments replicated across the state and over at least several years are necessary to establish the relationship between grazing and _N. pulchra_. And of course, this level of research effort is almost certainly necessary to elucidate the effects of grazing on other native grass and forb species.

In most studies, _Danthonia californica_ (California oatgrass), one of the dominant coastal prairie species, has increased in abundance with livestock grazing (Hatch et al. 1999; Hayes and Holl 2003a). In a survey of 17–25 coastal prairie sites, Hayes and Holl (2003a) found that _D. californica_ was twice as abundant in grazed sites as ungrazed sites. In a recent update of their experimental work, Hayes (pers. comm., fall 2008) and Holl found that at a site with initial 18 percent relative cover of _D. californica_, the bunchgrass dramatically declined in plots that were released from grazing. After nine years, _D. californica_ was reduced to less than 2 percent in undisturbed plots, whereas disturbed plots (mowed or grazed) maintained or increased _D. californica_ cover.

Grazing has proven an effective method of reducing cover of invasive weeds and slowing or preventing encroachment of shrubs and trees. Elk grazing greatly reduced the cover of _Holcus lanatus_ (velvetgrass), one of the most troublesome perennial grass weeds in the coastal prairie (Johnson and Cushman 2007). The cattle grazing survey also found significantly reduced _H. lanatus_ cover on grazed coastal prairie sites (Hayes and Holl 2003a), which confirms findings from Europe and Australia, although there is some evidence from Europe and Canada that low-intensity grazing can encourage the spread of _H. lanatus_ (Pitcher and Russo 1988). Livestock trampling also reduces _H. lanatus_ cover (Pitcher and Russo 1988).

Based on evidence from the United Kingdom, _Anthoxanthum odoratum_ (sweet vernalgrass), another non-native perennial grass invading the coastal prairie, may be controlled with grazing before seed development, although the grass is considered poor forage (DiTomaso and Healy 2007). Grazing can help maintain open grassland, free of shrubs and trees. Coastal prairie intergrades with several shrub and forest community types, all of which tend to encroach upon open grassland in the absence of fire or grazing. The native shrub _Baccharis pilularis_ (coyotebrush) is a primary offender in this regard, and grazing animals significantly reduce cover of _B. pilularis_ in open grasslands (Johnson and Cushman 2007; Ford and Hayes 2007; McBride 1974).

Other Management Tools

Little research has been conducted on the efficacy of other management tools that are practical for large-scale application. Prescribed burning can be applied on a large scale, but evidence suggests that burning does not reliably halt shrub encroachment because many shrubs, including _Baccharis pilularis_, are able to resprout following a fire and quickly reestablish pre-burn cover (Ford and Hayes 2007). However, limited evidence suggests that fire in two consecutive years kills _B. pilularis_ (Havlik 1984); high shrub mortality would likely inhibit rapid reestablishment of shrub cover. Havlik’s (1984) observations need to be confirmed. A University of California, Berkeley–East Bay Regional Park District multiyear study designed to evaluate the effect of consecutive burns on _B. pilularis_ was initiated in spring 2009.

Prescribed burning also does not consistently increase cover of the dominant native perennial bunchgrasses (Bartolome et al. 2004; Hatch et al. 1999). There are conflicting results for the dominant species at different sites (Fehmi and Bartolome...
Acknowledgments

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References


A Wind-blow Garden on a Sea Ranch Bluff

Russell A. Beatty

This article has been excerpted and adapted, with permission, from the July 2009 issue of Pacific Horticulture.

The elements of wind, wave, and salt that lash the Sonoma Coast challenge the making of a garden—at least, a garden in the traditional sense. The crashing surf and the incessant winds batter the sea bluffs and everything that grows on them. The property is perched on a bluff above the crashing surf with spectacular views up and down the rugged coast at The Sea Ranch. The property is situated on the north (windward) side of an old, declining hedgerow of Monterey cypress (Cupressus macrocarpa)—a Sea Ranch signature. A fenced garden between the original house and the hedgerow was lush with mature specimens of myoporum (Myoporum laetum), a beautiful, white-flowering, tree-like ceanothus (Ceanothus thursiflorus ‘Snow Flurry’), and ferns. A few other plants were sheltered by the house from the strong and incessant winds that sweep down the coast. A few straggly cypresses grew atop the bluff.

The original structure was torn down and replaced with a new house and garage. The new, two-story house was located in roughly the same position as the previous one. To help break the wind, a new garage was sited on the windward side of the front driveway and connected to the house by an arbor-covered walk. The fenced south garden was similar in size and location to the original garden, sitting between the tall house on the windward side and the cypress shelterbelt. As with most new construction, the soil, though naturally friable, was heavily compacted, and existing vegetation had been removed. The soil was rototilled to a depth of about 10 inches throughout the site, then raked smooth after weeds and old roots were removed.

The Conceptual Plan

Working closely with the clients, I prepared a plan for a garden of California native plants that incorporated several outdoor sitting areas: two decks attached to the house and two flagstone terraces, one on the bluff and one in the lee of the existing screen of small cypresses on the west side. The Sea Ranch Association requires that any plants outside fenced areas be native plants that relate to the region’s four landscape zones: bluff top, meadow, foothill, and forest. Within courtyards or behind fences, non-native plants that are visually compatible with the landscape character may be planted. Few houses at Sea Ranch have well-defined gardens; landscapes usually comprise volunteer or seeded native grasses, a few scattered, coast-tolerant shrubs, and, where appropriate, a few cypresses or shore pines (Pinus contorta).

My clients wanted a natural, yet carefully designed landscape and enclosed garden. Most of the landscape was either within the fenced garden or along the bluff top hidden from public view. Based on clues from the previous garden, the side garden was designed to be a quiet, flower-filled garden with a bench situated out of the wind. Low-growing, colorful perennials would highlight the two sitting areas on the ocean side. Elsewhere, a meadow of suitable native grasses would reflect the native grassland.

A filigree screen of flowering currants lining the walkway under the arbor added depth to the entryway and defined the walk. A dense planting of shade-tolerant herbaceous plants lined the other side of the walk at the base of the house. To reflect the informality of the setting and harmonize with the colors of the house, gray flagstone paved the walkways, sitting areas, and deck aprons; brown crushed rock was used for the casual paths.

The Reality of Ceaseless Wind

After almost four years and a number of refinements, the garden has begun to stabilize. Plants that failed were replaced; in some cases the replacements, though...
carefully considered, performed poorly and have also been replaced. The coastal winds, for much of the summer, lash the site with incredible force and in unexpected patterns. The house, garage, and fences altered the winds so that they battered areas thought to be sheltered. The considerable pruning of dead wood from the decrepit cypress shelterbelt resulted in an unintentional opening of gaps for the wind to surge through—even though the trees are on the leeward side of the property. In the side garden, the building and fences forced the wind into tunnels or vortexes, severely burning even such tough coastal plants as silk tassel (*Garrya elliptica*) and wax myrtle (*Myrica californica*), and decimating the taller ceanothus, vine maples, and flowering currants.

In front of the house, simple grassy mounds of Molate fescue (*Festuca rubra* ‘Molate Blue’) with some California oatgrass (*Dantbonia californica*) reinforced with silk tassel, toyon (*Heteromeles arbutifolia*), and ceanothus blend the new landscape into the adjacent meadows. All of the shrubs have experienced tip burn but have gradually filled in to create a wind-sheared “critical mass” that has accomplished the intended screening. The fescue has flourished, and although the oatgrass has grown well, the wind shatters its seed heads.

The arbor-covered walkway along the house has been a big success. Native ground covers of wild ginger (*Asarum caudatum*) and redwood sorrel (*Oxalis or-egona*) have filled the shady strip, complemented by lady fern (*Athyrium felix-femina*), sword fern (*Polystichum munitum*), and maidenhair fern (*Adiantum pedatum var. aleuticum*). Flowering currant (*Ribes sanguineum*), underplanted with foothill sedge (*Carex tumulicola*), and Douglas iris, now provide the intended screening between the walk and driveway.

Success on the Bluff Top

On the ocean side of the house, the landscape of meadow and sitting areas has been a great success. The Molate fescue meadow, planted with plugs at eight-inch centers filled in rapidly to form a billowing foreground to the coastal views.

The two flagstone seating areas have become attractive places to relax and enjoy the views. Gracing the edge of the terraces is a thriving mix of tough seaside plants: Douglas iris, seaside daisy, sandhill

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**Lessons Learned from a Coastal Garden**

As with any landscape project, we learn from experience. (That is why it is called landscape architectural practice!) Here are some key lessons from this challenging coastal garden project:

- Observe wind patterns carefully after all buildings and other structures have been built, with as many site visits in as many conditions as possible. Annotate a plan, diagramming wind currents using a hand-held anemometer, or simply with flagging tape, to illustrate the patterns.
- Observe plants in similar environmental situations nearby.
- Plant from one-gallon containers (five-gallon containers at the largest). Patience will be rewarded, as the smaller plants will more easily acclimate to the site conditions.
- Plant in fall, if possible, just before the winter rains.
- Reduce summer irrigation after the initial period of establishment (about one year); harden off plants in late summer by reducing irrigation.
- Avoid fertilization that will promote rapid growth.
- When raised in the incubator-like protection of a nursery, even plants known to be tolerant of coastal winds will struggle when first planted; cages of wire fencing and shade cloth may be required for the largest plants.
- If a mature windbreak is present, retain even the old dead branches, which can be nearly as important as live ones in buffering the wind.
sage (Artemisia pycnocephala), tufted hairgrass (Deschampsia caespitosa ‘Shell Beach’), and low-growing Ceanothus glorigosus ‘Anchor Bay’. The wind-protected north patio contains more color with yarrow (Achillea millefolium), sea thrift, Douglas iris, and several grasses, such as tufted hairgrass and Pacific reedgrass (Calamagrostis nutkaensis). The small cypress windbreak has been reinforced with wax myrtle, silk tassel, and Ceanothus gloriosus var. exaltatus. A broad band of ‘Anchor Bay’ ceanothus aligns the top of the bluff, linking the two sitting areas.

One problem that baffled me was at the base of the walls of the house, where the meadow grasses (Festuca rubra ‘Molate Blue’) were beaten down in a band extending six to eight feet from the house. As the wind hits the walls it plunges downward, smashing the plants. The grasses here have finally been replaced with a combination of dwarf coyote bush (Baccharis pilularis ‘Pigeon Point’) and sandhill sage.

A garden is never really done. That is why the term gardening describes a process, one that is ongoing. In such a harsh environment as California’s North Coast, the process can be daunting. With patience and perseverance on the part of the client, the designer, and the maintenance crew, stability was eventually achieved. Nowhere is the phrase “nature abhors a garden” more a reality. Working with nature, however, it is possible to achieve the semblance of “garden” by capturing the essential character and quality of the surrounding natural landscape.

A note from the clients says it all:

I wish you could be here to see this gorgeous view; the light is just coming onto the not-so-small grass plugs and the place is literally singing with all the attention. We can’t believe our eyes when we look over the beautiful garden you designed for us. It truly surpasses anything we could have envisioned; you have put the wrapping and ribbon on the most beautiful package anyone could have dreamed of…. For two people who don’t know one darn grass from another, there was no way we could really envision what you had in mind….

And that is why we make gardens!

Visit HTTP://WWW.PACIFICHORTICULTURE.ORG/ for additional photographs and a complete list of the most successful plants used at this Sea Ranch garden.
FIELD NOTES: Greenhouse Germination of California Oatgrass (*Danthonia californica*) with Potassium Solution

**Marsha Sleeth**, Water-Wise Garden Design, Seaside, CA; sleethdesign@att.net

In preparation for planting 2 dozen 3-×-6-foot research grass plots on the Monterey Peninsula this fall, on June 30 I seeded flats of several native perennial grasses and sedges purchased from Larner Seeds, Hedgerow Farms, and Pacific Coast Seed. The seeded flats were kept in a greenhouse for a month before putting them in an outdoor “baby nursery.” The summer weather is temperate, and keeping a close eye on their water needs has been sufficient for most species.

The only one to get my goat was California oatgrass (*Danthonia californica*). I was grateful to learn it is difficult to germinate. I began researching *Danthonia* germination and found in a mid-century botanical journal that using potassium nitrate on *Danthonia spicata* (poverty oatgrass) helped the germination process (Dobrenz and Beetle 1966).

I couldn’t find potassium nitrate where I live, so I bought a quart of “natural liquid potassium fertilizer” by Earth Juice, derived from sulfate of potash. The only difference between this and potassium nitrate is that potash is added to calcium nitrate to make potassium nitrate. Potash is the only ingredient that separates potassium nitrate from calcium nitrate, and is also the ingredient from which potassium is derived.

By August 15, the *Danthonia* flats, which were not doing as well as some of the other flats, were moved into a larger greenhouse. I over-seeded the *Danthonia* flats that had not germinated for 6 weeks since they were planted. I soaked flats with water and misted with a mild solution of diluted potassium (½ teaspoon/gallon) on a Saturday. On Monday there were fresh, new shoots ½–1 inch tall; it was like an emerald carpet I could gently run my hand over. Knowing it wasn’t possible for the new seeds to have germinated so quickly, I realized the original seeds, planted 2 months previously, must have been in some suspended stage of germination, just waiting to be rescued by this potassium. However, the new seeds began to germinate within 10 days. Considering the amount of new seed I applied, it appears to be a low germination rate so far, but I am continuing to experiment with soaking the seeds and planting them wet, and soaking them and letting them dry as some botanists have been doing with cool-season grasses.

All but one species of the other grasses (*Poa secunda secunda*) began to germinate within 3–4 days, and I can’t help thinking the mild solution of potassium may have helped them along too.

**Reference**

**Comments deadline: Oct. 21**

**Screening Plant Imports: New USDA Guidelines**

**Doug Johnson**, Executive Director, California Invasive Plant Council

Dear California plant conservationists,

We have a great opportunity to make a difference on a critical national policy issue.

USDA has published new guidelines for screening plant imports—a critical aspect of preventing new invasive plant introductions to the country. Under the current system, plants can be imported with virtually no oversight of whether they might be invasive, and as you know, many of the wildland weeds we already have were originally introduced intentionally, often as ornamentals.

We need to make sure USDA hears from all of us working on the ground to control invasive plants that preventing the introduction of invasive plants is important. Comments are being taken until Oct. 21. We’ve set up a web page at WWW.CAl-IPC.ORG/POliCy/FEDeRAL/Q37.PHP with a sample letter, instructions on sending it and submitting a formal comment, and background info.

Please send a letter from your organization, and submit a formal comment! Our campaign to revive California’s Weed Management Area funding in 2006 was successful because over 100 organizations sent letters to state decision makers. Let’s make sure our federal decision-makers know how important it is to prevent the introduction of more invasive plants. Know of another organization that should voice an opinion? Please send this request to them!

Feel free to contact me at DWJOHNSON@CAL-IPC.ORG with any questions or comments.
Summary Notes on Selected Native Grasses as Reported in the Soil Conservation Service Technical Reports: 1944 To 1960

Cynthia S. Brown, Dept. of Agronomy and Range Science, U.C. Davis (1992)

Introduction

Cynthia Brown joined CNGA in its formative early years. She was a Principal Researcher at the Department of Agronomy at the University of California at Davis (UC Davis) between 1993 and 1999. In 1998 she earned her Ph.D. in Plant Restoration Ecology. Between 1992 and 2001 Cynthia completed a variety of native and exotic grass research, collaborating with Kevin Rice, Robert Bugg, John Anderson, and Vic Claassen.

Cynthia is an assistant professor in the Department of Bioagicultural Sciences and Pest Management at Colorado State University, Fort Collins. In 1992 she completed a $3,000 CNGA Management at Colorado State University, for the Department of Bioagricultural Sciences and pest restoration ecology. Between 1992 and 2001 and 1999, in 1998 she earned her Ph.D. in plant of California at Davis (UC Davis) between 1993 the Department of Agronomy at the University of California at Davis (UC Davis) between 1993 and 1999.

California Brome

(Bromus carinatus)

General

Though some ecotypes of California brome (Bromus carinatus) are biennial or perennial, the accession used most widely by the Soil Conservation Service (SCS), P-1117, was an annual. Bromus carinatus was treated as an annual, not a perennial, throughout the SCS Plant Materials Center Technical Reports. [Note: Accession P-1117 was later given the common name Cucamonga Brome.]

Observational Studies and Pure Stand Trials

B. carinatus was considered one of the early-maturing annual grasses of possible value for use as a self-seeding covercrop. B. carinatus was expected to be used in deciduous fruit orchards and vineyards. It successfully perpetuated itself under a clipping program, which simulated moderate utilization.

At San Fernando, Los Angeles County, B. carinatus was comparable to B. hordeaceus. In the second year, B. hordeaceus and Lolium subulatum stands were better than B. carinatus. [Note: L. subulatum aka L. rigidum is an introduced annual ryegrass.] In 1959, the performance of B. carinatus was comparable to B. hordeaceus over all three years. B. carinatus responded more to fertilization than did B. hordeaceus. Both species set heavy seed crops.

Seed Production

The annual B. carinatus is a prolific seed producer.

Seed Pellet Trials on Burned Sites

B. carinatus was used in trials using clay seed coatings. The purpose of the grass was to reduce desiccation of the seed in dryland range conditions. Trials were conducted in the greenhouse and on two southern California sites. Results were inconclusive. The greenhouse reached

SCS TECH REPORTS: 1944–1960, continued on page 13
very high temperatures and the field site conditions were unfavorable.

**Mountain Brome**

*Bromus marginatus*

**General**

*Bromus marginatus* is included in the short-lived perennial species group in the Soil Conservation Service (SCS) Plant Materials Center Annual Technical Reports.

When fertilizing, the SCS found it was best to drill the fertilizer below and to the side of the seed. Fertilizer benefited seedling establishment as did reduction of weedy competition.

Seed was planted into flats, then seedlings were transplanted bareroot after six weeks in the greenhouse with very little mortality.

Rust was a common disease problem with mountain brome.

**Observational Studies and Pure Stand Trials**

*B. marginatus* is mainly self-pollinated. Many accessions were collected for the Pleasanton, Alameda County, 1945 nursery. P-10708 emerged as an outstanding accession of *B. marginatus*.

In 1945 when most species were seeded and established, they continued growing throughout the year, one accession of *B. marginatus* went dormant in August and another went semi-dormant in September. Many accessions planted in 1943 died in 1945.

Two main accessions of *B. marginatus* were identified as particularly successful. Accession P-12985 was described as a “very early, vigorous and rapid-developing perennial suited to thin upland soil. Its early, rapid growth will provide better cover and it can be grazed several times during the rainy season due to its strong recovery after cutting. It will maintain its stand well both by survival of mature plants and by reseeding vigorously.” *B. marginatus* P-10385 was described as a “vigorous, high producing strain by reason of its recovery after cutting. A second and third cutting or grazing is possible without irrigation on good soil. It also recovers early in the fall and so provides ample cover for erosion control on sloping fields.”

Bromar, P-3368, a certified strain of *B. marginatus* developed in Pullman, Washington, performed best in 1946. Accessions P-5722 and P-10708 were the next best accessions in 1946. All three strains are rust resistant. There were several good strains of *B. marginatus*, which persisted through the summer drought. Bromar was slow in fall recovery and grew less, later in the winter, than other accessions.

In 1947 six excellent strains of *B. marginatus* had been identified which had different maturity dates. Strains which developed later were more productive than Bromar at Sunol, Alameda County.

At the San Fernando Plant Materials Center, Los Angeles County, production from pure stand trials planted in 1944 were too small by 1947 to be measured. This was generally attributed to competition from annual weeds and drought. In plots seeded in 1946, a very difficult establishment year, only *B. marginatus* and *B. catharticus* (rescue grass) produced satisfactory stands [rescue grass is from Chile].

*B. marginatus* was successful in spring seedings during the difficult year of 1947–48 and in 1948–49 at San Fernando. The stands were described as “effective” but were not productive enough to have measurable yields in 1947–48. 1948–49 stands were rated excellent.

Perennial grasses planted in San Fernando in 1950 produced less than 760 pounds per acre the first year. The nursery recommended that perennials be protected from grazing the first year when establishment was poor. Of six accessions of *B. marginatus* tested at Sunol in 1952, only three survived.

**Creeping Wildrye**

*Leymus triticoides*

**General**

The Soil Conservation Service (SCS) found rust and lack of viable seed were problems in the propagation of *Leymus triticoides*.

**Observational Studies and Pure Stand Trials**

Accessions of *L. triticoides* were reported to vary in color from blue to green and in height from 24 to 36 inches. Most accessions were affected by leaf and stem rust.

In 1948, at the San Fernando nursery, Los Angeles County, accession P-9951 from Kern County, near Gorman, had less rust than other accessions of *L. triticoides* and was described as a “vigoros grower” and “strongly rhizomatous.” It is a tall, erect, hay accession but produces little viable seed. SCS growers planned to propagate it by divisions “for use as forage in mountain meadows and for waterway vegetative means.” Third year stands of *L. triticoides* were from 70 to 100 percent. All were at least slightly affected by rust. Seed production was from 500 to 2,330 pounds per acre. [Note: in the late 1960s the cutivar ‘Rio’ was selected by Lockeford PMC from the San Joaquin Valley. ‘Rio’ produced abundant seed and is now widely sold.]

In 1949 at the San Fernando nursery, *L. triticoides* and *Melica imperfecta* performed nearly as well as native *Stipa* (aka *Nassella*). They were all considered drought resistant and adapted to dryland use. *L. triticoides* P-9951 was outstanding in yields, “the only good cool weather growing sod-former.” In trials investigating species for stabilization of banks and waterways, *Cynodon dactylon* (Bermuda grass) was judged the best but, because of its poor reputation, *L. triticoides* was suggested as the best substitute. *L. triticoides* plots sown in this year had only 8 percent survival and were not vigorous. *L. triticoides* plots planted in 1948 had survival of only 10 percent and 12 percent in June and July, respectively. In summary, *L. triticoides* is a cool season, sod-forming grass that can be propagated with rhizomes or plant divisions. Propagules should be planted in late fall to late winter. *L. triticoides* will spread...
rapidly once it is established. Though it performed well at San Fernando in 1949, it did not at Little Rock, in the Mojave Desert region of Los Angeles County.

None of the thirteen accessions planted at Pleasanton in 1958 bore seed. Only P-9951 was not affected by rust. All produced strong rhizomes. P-9951 continued to perform well at Pleasanton in 1958.

In 1959 in Pleasanton, all accessions produced strong rhizomes and seed heads but very little filled seed. Accession P-9951 produced the best seed (about 50% glumes filled) and forage (0.5 ton/acre). It had excellent spring recovery and growth. All accessions had 100 percent stands and spread into the alleyway by the end of the season. _Leymus triticoides_ is good for stream bank stabilization.

### Mixture Trials

In 1946 mixture trials at Sunol, Alameda County, _L. triticoides_ failed to become established. _L. triticoides_ was described as being of two main types: the lowland type and the inland or continental type. The lowland type is green and occurs in low wet sites and alkaline flood plains and seldom sets good seed. The inland or continental type is bluish-green and occurs at higher elevations on floodplains and hill slopes and usually produces good seed crops.

### Blue Wildrye

(_Elymus glaucus_)

#### General

The main problems with the establishment and growth of _Elymus glaucus_ were competition from weeds and rust (for at least some of the accessions).

### Observational Studies and Pure Stand Trials

_E. glaucus_ was better than other species at withstand competition from annuals. The Soil Conservation Service (SCS) found _E. glaucus_ to be mainly a self-pollinated species.

Accession P-10128 (from near Sebastopol, Sonoma County) was found to be outstanding in yield and performance. This accession seemed to have a wider range of adaptation. Other accessions were not as successful. [Note: This accession was increased but not released by the SCS under the name tentative name “Lomas grass”].

Three distinct growth forms of _Elymus glaucus_ were identified. They were (1) Hay type: erect vigorous, high yielding, (2) Hay and pasture type: intermediate height, vigorous and leafy, (3) Pasture type: dwarf, poor seed production, and very leafy. Early and intermediate maturity accessions of the hay type and early, intermediate, and late maturity accessions of the other two types were identified. Overall, these accessions had good seedling vigor and fall recovery.

Several mixtures were tested for hay production in the fog belt region of California. _E. glaucus_ was used in one mixture; which included _Dactylon glomerata_ ( Orchard grass), _Sanguisorba minor_ (burnnet), and _Medicago sativa_ (alfalfa). The production of this mixture was about 2,000 pounds per acre.

Trials showed that it is best to fallow for 1 year before establishing a dryland pasture mix. It was also found to be best to drill fertilizer below and to the side of the seed.

Many accessions of _E. glaucus_ show poor recovery in the fall, which could reflect lack of ability to survive summer drought.

In Southern California, _E. glaucus_ did not perform as well as the _Nassellas_ and _Bromus carinatus_. _Melica imperfecta_ (fothill melic) and _L. triticoides_ were also better performers.

_E. glaucus_ was short lived under dryland conditions, though it might be suitable on better sites. Some _Melica_ species performed better than _E. glaucus_ in years that they were compared at Pleasanton and Sunol, Alameda County. These were rated better than Lomas grass in fall and spring recovery, amount and quality of forage, and seed production.

At Sunol, after 8 years of establishment, stands of _E. glaucus_ began to die out._

_E. glaucus_ has potential to be used successfully on range and dryland pasture areas on sites too dry for _Phalaris tuberosa steno-aper_ (Harding grass, aka _P. aquatica_). It may not be suitable for sites which are too dry. _Nassellas_ can be used in these drier sites.

### Cultural Trials

_E. glaucus_ was seeded in alternate rows with a mixture of Harding grass, burnnet, and _Trifolium subterraneum_ (Subterranean clover). This was not found to be advantageous for establishment of either the mixture or the grass. Fertilizing with ammonium phosphate did not increase stands of the species.

### California Oatgrass

(_Danthonia californica_)

#### Observational Studies and Pure Stand Trials

Accessions of _Danthonia californica_ from coastal Oregon and California, the Cascade, Sierra Nevada, and Coast Range Mountains were planted at Corralitos and transplanted to Pleasanton, Alameda County, in 1945. The Soil Conservation Service considered it an important species for revegetation in the “coastal and semi-fog belt” regions. _D. californica_ was described as slow growing and did not produce seed until the second year._

_D. californica_ performed poorly at Sunol, Alameda County, in 1947 having no plants in two of three fertilized plots and two of three unfertilized plots. The stands were not significant in the plots, which had plants.

In 1958 at Sunol, _D. californica_ planted in the spring of 1952 had a 70 percent stand, fair fall and spring recovery, and produced 1,679 pounds per acre of forage. _D. californica_, which had been planted in the 1951–52 crop year, persisted in 1960 at Sunol.

### Seed Production

_Danthonia californica_ did not produce seed until the second year. In 1946 at Pleasanton accessions produced up to

_SCS Tech Reports: 1944–1960_, continued on page 15
Californica Melic  
(Melica californica)  

Observational Studies and Pure Stand Trials  

Melica californica and M. bulbosa (oniongrass) were better adapted to domestication and were higher in forage and seed production than other species of Melica tested. Melicas in general had weak seedling vigor and slow development but were very cold tolerant. All had relatively low forage production and short seasons of use. Fall recovery started after the first winter rains and growth was slow during December, January, and February. The most rapid growth occurred during March, April, and May. For all Melica species, all accessions averaged about 4 months from time of range readiness until maturity.

Nineteen accessions of M. californica were tested in 1951 at Pleasanton, Alameda County. Survival ranged from 35 percent to 100 percent. Flowering occurred from the end of April to the end of May. Most accessions had medium to high forage production. Seed production varied from low to very high. The most outstanding accession was P-11256 from Watsonville. Six others were close seconds so M. californica was by far the best of the Melica genus.

In 1953 at Pleasanton, M. californica P-15375 was the best accession. It maintained a satisfactory stand and produced more forage and seed in uniform seed heads than other accessions. The plants were larger and more robust than the others. None of the Melicas performed as well as Elymus glaucus but M. californica was the best of the Melicas.

In 1959 at Pleasanton, M. californica, M. nitens (Texas tall melic), and M. imperfecta (foothill melic) were the only two Melica species to survive and were rated as equal. Only Texas tall melic and M. californica produced a significant amount of seed. M. californica had fair spring recovery, maintained a 100 percent stand and produced 1,426 pounds per acre of forage. Other Melicas produced more forage.

Seed Production  

M. californica was the only native Melica species which produced reliable amounts of viable seed.

Nodding Needlegrass  
(Nassella cernua)  

General  

In the Soil Conservation Service (SCS) Annual Technical Reports, Nassella cernua was included with the drought tolerant, long-lived bunchgrasses. Overall, this species was well adapted to the medium to low rainfall areas in California. It had greater persistence than may other species under range conditions. [Note: before 1947 N. cernua was included with N. pulchra.]  

Observational Studies and Pure Stand Trials  

1948 at the San Fernando Plant Materials Center, Los Angeles County, was an extremely dry year; the Nassellas performed very well and the growers concluded that “the native Nassellas flourish, relatively, in dry years and are partially suppressed or depressed in wet years.” This was due to increased competition from volunteer annuals in years with greater precipitation. Nassellas were described as the most outstanding in 1949 as well, also a very dry year. They “recovered in the fall and matured in the spring more consistently than the best accessions of any other species.” Though Nassella yields decreased over these dry years, the stand percentages did not, in contrast to other species. The best N. cernua described in 1949 were P-985, high yield, fine leaved, from University of California (Love 43-8), and P-9477, intermediate hay type, early and robust, local accession from San Fernando Valley.

Spring seeding of N. cernua during 1949 at San Fernando resulted in a satisfactory stand, which persisted but did not produce seed or grow much vegetatively. In 1949, only one of the N. cernua accessions planted in 1945–46, which started out having 100 percent stands was still alive with excellent vigor. N. cernua accessions, which survived two seasons to 1949, had poor to fair stands. Spring seeded N. cernua stands from the same year had poor to fair stands.

In years when poor stands of perennials were established, growers suggested protecting the plants from grazing until the second season.

In 1958 at Sunol, Alameda County, after 7 years, N. cernua had 75 percent stand, fair fall recovery, good spring recovery, and produced 1,679 pounds of forage per acre.

Mixture Trials  

1946 Sunol, fertilizing (200 lb per acre) increased annual stands, which led to a decrease in seeded perennials, including N. cernua. N. cernua stands increased in unfertilized plots only. Growers concluded that “annuals utilized the fertilizer more readily than the slower developing perennials in the establishment year.” N. cernua is included in the group of grasses that performed very well at Sunol (about 15 inches of annual precipitation, minimum temperature 23˚F). In 1947 at Sunol, N. cernua had fair stands but plants were small.

Field Evaluation Plantings  
(Outlying Nurseries)  

King City, Monterey County, 1951, N. cernua was rated as one of the best perennials but stands were disappointing. 1952 plantings of N. cernua resulted in poor stands. N. cernua was seeded in 1950 and was one of the few which survived in a year with such low rainfall that annuals in the trials did not produce seed. In a fall seeding in 1956 at King City, N. cernua produced a good stand with “slender, vigorous plants.”

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Calendar

Send calendar entries and announcements for the winter ’10 issue by Dec. 29, to admin@cnga.org.

October
Wed.–Fri., Oct. 14–16
Developing a Sustainable Grazing Plan to Manage Native Grasslands: People, Planning, and Profit. CNGA workshop, Hastings Reserve, Upper Carmel Valley. $245/CNGA member; $285/nonmember. Instructors: Richard King, Ecologist, USDA/NRCS, and Kent Reeves, Natural Resources Division Manager, Yolo County Parks & Resources. SRM CEUs approved. Go to www.CNGA.org for lodging information. Check with Judy at admin@cnga.org for available space.

Thurs.–Fri., Oct. 22–23
Using Grasses and Graminoids in Restoration and Revegetation. A CNGA workshop in Davis. $100/student; $175/CNGA member; $215/nonmember. Proven techniques and strategies using native species; site and species selection, site preparation, planting techniques, weed control, and long-term management. Classroom and field study. Check with Judy at admin@cnga.org for available space.

Fri., Oct. 30
CNGA Board of Directors Meeting. Woodland, CA; 10 a.m.–3 p.m. Interested CNGA members may contact CNGA Administrative Director, Judy G-Scott, at admin@CNGA.org.

December
Sun.–Wed., Dec. 13–16
Grazing Lands—A Winning Hand: 4th National Conference on Grazing Lands, Reno/Sparks, NV. Presented by the Grazing Lands Conservation Initiative. Infor available at www.glcic.org, or contact John Peterson, Conf. Manager, at 703-455-4387 or jwpeterson@cox.net.

2010 CNGA Workshops and Events
See additional details in upcoming issues of Grasslands and at CNGA.org.

February
Using Native Grasses and Graminoids in the Water-Conserving Landscape. Santa Rosa, CA. Examine the use of California native grasses and graminoids in a broad range of urban settings. The course will also examine the cultural requirements and adaptability of key native grass and sedge species as they relate to the soil and site parameters in shaping a sustainable, native, drought-tolerant landscape. Date TBD.

Developing a Sustainable Grazing Plan to Manage Native Grasses: People, Planning, and Profit. Hollister Ranch, Santa Barbara County. Participants will also examine how to develop, plan, write, and implement a successful sustainable grazing program. The workshop will include developing a shared vision that consists of social, economic, and ecological goals for the management of a grassland. Date TBD.

March
Creating a Native Meadow. Santa Rosa, CA. Whether starting from bare ground or replacing maintenance-hungry turf, learn to develop and maintain a native meadow on your own property. Date TBD.

April 16
CNGA Field Day at Hedgerow Farms. Winters, CA. Join us for this third annual opportunity for practical, hands-on, learning about native grasses and grassland restoration.


The American Meadow Garden: Creating a Natural Alternative to the Traditional Lawn

The traditional American lawn is a time-consuming, resource-wasting mistake. It’s time to replace the lawn and find new ways to create livable outdoor spaces. In The American Meadow Garden, John Greenlee offers homeowners a new model—the designed meadow, a vibrant, shimmering mini-ecosystem friendly to kids, pets, and butterflies. Even better, it requires minimal resources and absolutely no mowing. Gorgeous photography by Saxon Holt illustrates the message with stunning examples of meadow gardens from across the country. Hard cover $34.95, 280 pages, full-color throughout. TIMBER PRESS. (Check out the video at http://www.timberpress.com/books/).
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  - Hedgerow Farms

- **Nassella pulchra level**
  - Delta Bluegrass • Pacific Coast Seed • S&S Seed

- **Poa secunda level**
  - Elkhorn Native Plant Nursery • Restoration Resources • Shilling Seed

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- American River Parkway Foundation • Animal Science Department, California Polytechnic State University, San Luis Obispo • Audubon Canyon Ranch
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- Irvine Ranch Conservancy • Livermore Area Recreation and Park District
- Los Angeles Chapter, California Native Plant Society
- Oak Creek Energy Systems • Orinda Horsemen’s Association
- Sacramento Regional County Sanitation District
- San Luis National Wildlife Refuge • Sonoma County Ag Preservation and Open Space
- StopWaste.org • Sun City Lincoln Hills • Thomas Klope Associates
- Truax Company, Inc. • Wildlands, Inc.
- Yolo County Resource Conservation District • Zentner & Zentner

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Cover photos:  Front: View of coastal terrace prairie at Arroyo de los Chinos, Hearst San Simeon State Park. Grassland dominated by tufted hairgrass (*Deschampsia holciformis*). The mountain in the distance is Bald Top, the south end of the steep Big Sur coast. Photo: Dave Amme

Back: *Leymus mollis* ssp. *mollis* foredunes at USFWS Lanphere Dunes, Humboldt Bay. Photo: Clare Golec