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GRASSLANDS

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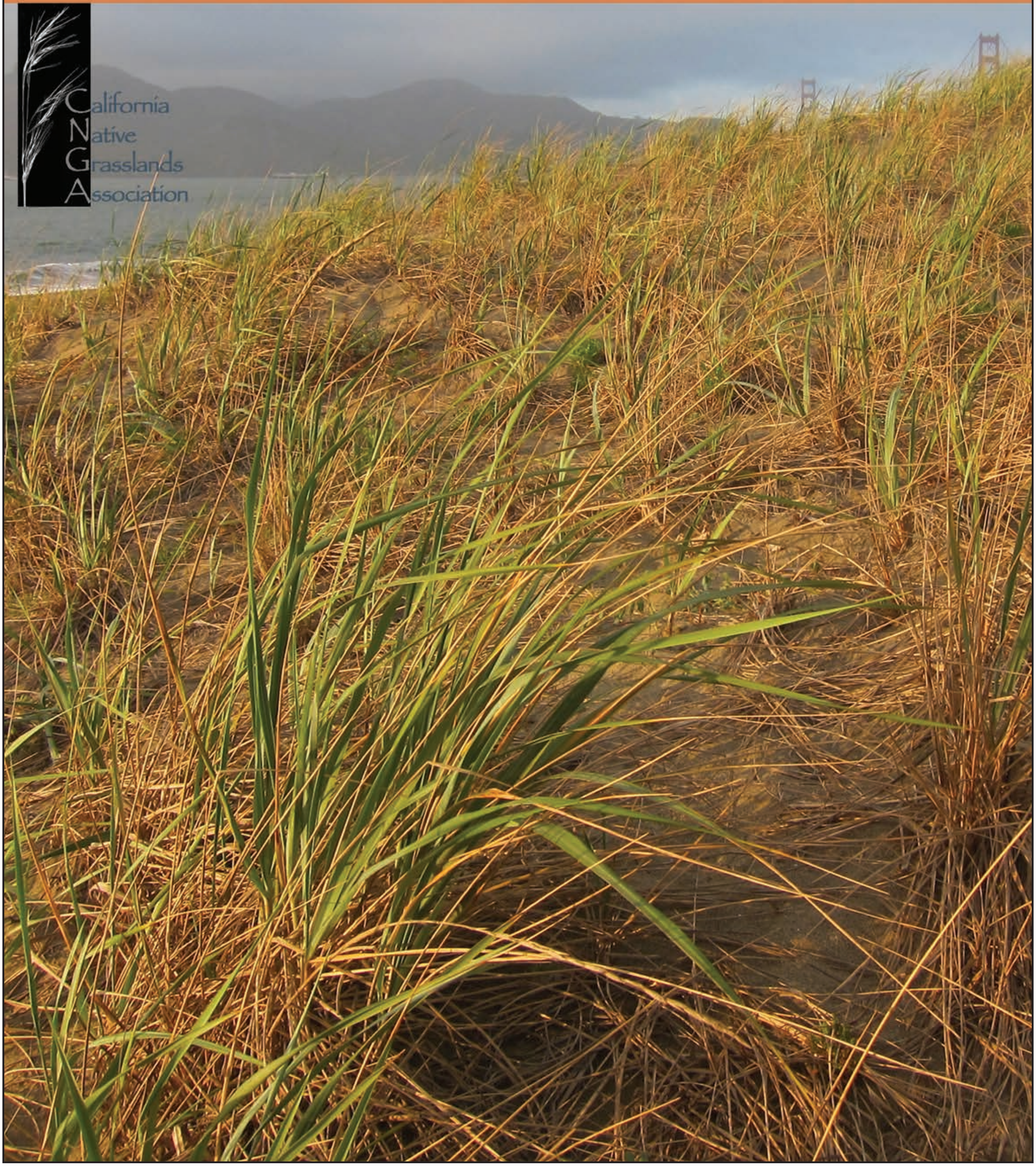

California
Native
Grasslands
Association

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.

P.O. Box 8327, Woodland, CA 95776
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From the President's Keyboard

What still needs to be done for California's native grasslands *by Jim Hanson, President*

Following closely on CNGA's 20th anniversary in 2011, the 2012 Board of Directors began working on new program ideas for the next 10 years. Usually meeting in the Davis area, the Board devotes part of each 1-day quarterly Board Meeting to exploring and prioritizing what still needs to be done to further the CNGA mission: To promote, preserve, and restore the diversity of California's native grasses and grassland ecosystems.

We have heard from participants at CNGA-sponsored workshops and from emails sent in by members. And at the close of 2010, over 90 of you took time to send in specific, thoughtful responses to survey questions sent out to the membership.

Some of the project ideas that have come forth include:

- Helping the public, land managers, and environmental planners become more comfortable identifying native grasses in the landscape,
- Reporting on case studies of grassland restoration projects,

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Grasslands Submission Guidelines

Send written submissions, as email attachments, to grasslands@cnga.org. All submissions are reviewed by the *Grasslands* Editorial Committee for suitability for publication. Contact the Editorial Committee Chair for formatting specifications: grasslands@cnga.org.

Written submissions include peer-reviewed research reports and non-refereed articles, such as progress reports, observations, field notes, interviews, book reviews, and opinions.

Also considered for publication are high-resolution color photographs. For each issue, the Editorial Committee votes on photos that will be featured on our full-color covers. Photos are selected to reflect the season of each issue. Send photo submissions, as email attachments, to Cathy Little at grasslands@cnga.org. Include a caption and credited photographer's name.

Submission deadlines for articles:	**Winter 2013** — Nov 15, 2012	**Summer 2013** — May 15, 2013
	Spring 2013 — Feb 15, 2013	**Fall 2013** — Aug 15, 2013

President's Keyboard continued

- Researching and distributing information on management methods and timing for native grass landscapes,
- Stimulating greater public awareness of our state's diverse native grasses and grasslands,
- Providing information on the grassland ecology of the Sierra-Nevada foothills, the North, and the South, and
- Encouraging the conservation of "old growth" native prairies across the state.

This is important and needed work. At the same time, just putting together a grant application to fund any one of these needs requires many hours of writing and organizing, as well as resources to underwrite those hours.

Despite today's difficult employment environment, in fact because of it, I believe this is the time to invest in California's real gold: the long-term natural beauty and ecological richness of our state. They are the drivers to over 800,000 tourism industry jobs and central to a valued quality of life in each region of our state.

I encourage you to invest in California's ecological wealth with any resources you have in this coming year and in the years ahead. It can be as simple as following national and regional natural resource issues, speaking up at a public hearing or calling an elected official about your environmental concerns, and renewing your membership with CNGA and other environmental organizations.

Please also consider making an investment of "seed money" to CNGA before the end of the year to sponsor — at any level — the work that still remains to be done for native grasses and grassland ecosystems in the years ahead.

Each of these are wise long-term investments that will enable all of us to continue to be renewed by the economically valuable and ecologically rich quality of life we have been gifted with in the State of California.

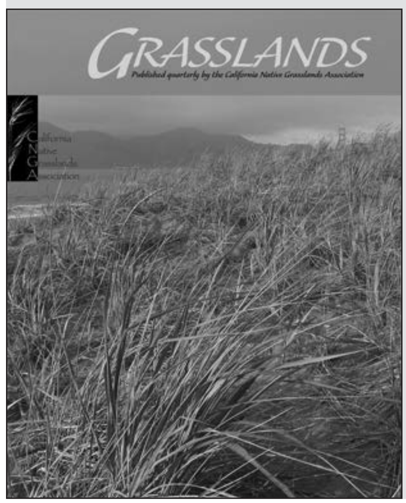
Grasslands Editorial Committee Update

by Ingrid Morken

We hope that you enjoy the variety of articles, news announcements, educational opportunities, and other noteworthy information covered in each issue of *Grasslands*. We are proud of the depth and breadth of the various topics related to California's native grasses and grassland ecosystems addressed in *Grasslands*, and we invite members to get involved with the *Grasslands* Editorial Committee to share their talents and expertise.

Working behind the scenes to put together the newsletter four times each year, the *Grasslands* Editorial Committee solicits and reviews submissions to the newsletter and establishes themes and topics for each issue. Recently we identified several topics that we seek to address in *Grasslands* on a regular basis to respond to the interests of our members. These topics include the following: botany and taxonomy, grassland ecology and restoration, ranch and livestock management, conservation and advocacy, Native American relationships with grasslands, landscape design and plant propagation, and public access and recreational opportunities. We invite any interested CNGA members to get involved in the committee and contribute to the content of the newsletter. Please contact the committee chair, Cathy Little, at cathy.little.cnga@gmail.com if you are interested. Thank you for your support!

In this issue



SPECIES SPOTLIGHT:

California Red-legged Frog

by Jeffery T. Wilcox, Managing Ecologist, Sonoma Mountain Ranch Preservation Foundation, Petaluma, CA. jeff@sonomountainranch.org

One warm night in August, I was out surveying for California red-legged frogs (*Rana draytonii*) at a pond on the Sonoma Mountain Ranch Preservation Foundation near Petaluma in Sonoma County. Late in the summer, *R. draytonii* tadpoles are transforming, through metamorphosis, into juvenile frogs. They are plentiful around pond edges where cattle come in to drink. At least half of the dozen frogs I found that night, including one large adult, were hunkered down in the deep hoof prints that cattle leave in shoreline mud after drinking. These moisture-retaining spoor provide shelter from predators, a place from which to ambush prey, and a place for frogs to regulate temperature and humidity — all of which are functions critical to frog survival. Because the historic habitat for special-status species such as *R. draytonii* and the California tiger salamander (*Ambystoma californiense*) has been converted by residential, agricultural, and commercial development, the creation of stock ponds to support livestock grazing in open grasslands has unexpectedly provided surrogate habitat. Land managers must understand that cattle and grazing are not only compatible with some special-status species; they can be a necessary component for survival in altered landscapes.

Deergrass (*Muhlenbergia rigens*). *Photo: Mary Fahey*

Deergrass: Beautiful and Functional

by Mary Fahey, Watershed Coordinator, Colusa County Resource Conservation District, mary.fahey@ca.nacdnet.net

Deergrass, or *Muhlenbergia rigens,* saved my creek banks after the winter of 1997. The 1997–1998 water year was the most recent El Nino outbreak in the Sacramento Valley, bringing 32.25 inches of rainfall to the Valley. In October of 1997, just prior to the rainy season, I moved to a small 10-acre farm in Arbuckle, California. A seasonal stream runs through the middle of the property, and the banks at the time were completely void of any vegetation. The heavy rains that season caused massive bank erosion, which took out many feet of fencing and half of a sheep shed, not to mention the loss of land and the sediment load that travelled downstream.

Not long after that winter, I contacted the Colusa County Natural Resources Conservation Service (NRCS), and we put together a plan to solve the erosion problem on my property. The plan was to plant grasses, mainly deergrass, along the banks on both sides of the creek. This was new to me at the time, and I had my doubts that a few grasses could help the situation, but the folks at NRCS seemed very confident. So we planted hundreds of grass plugs along the creek. I still had my doubts. With a little irrigation, however, it didn't take long for the deergrass to take off, and its effectiveness at stabilizing the stream banks amazed me.

Since establishing this beautiful and multi-beneficial native grass, I have had no erosion issues, and my creek is a sight to behold with large bunches of deergrass lining its banks. So, in honor of deergrass and all it has done for my land, I wanted to share some facts about it.

Description

General: Grass Family (Poaceae). Deergrass is a perennial bunchgrass obtaining heights of 5 feet when in bloom. It is part of the largest genus of warm season grasses in North America. The bunchgrass is found in dense, large clumps, but it can occur as a continuous cover in areas that are subjected to light and frequent ground fires. The dense, basal foliage is tufted and these large tufts, up to 6 feet across, are a distinguishing feature of the grass, along with the whip-like flower stalks.

Uses

Ethnobotanic: Deergrass is a significant basketry material to central and southern California Native Americans who utilize the flower stalks in the foundations of coiled baskets. Thousands of flower stalks are often needed for the completion of each basket. Culms (jointed stems) are gathered in late spring while still green, or in summer or early fall when golden brown depending upon the tribe, individual family preference, and elevation of the deergrass site.

The flowering stalks of deergrass are valued for their flexibility and length. When immersed in water, baskets made from deergrass stalks expand until they become watertight, making them ideal for water jugs and cooking baskets. California native basket weavers managed large stands of deergrass to produce the best material for

continued next page

Deergrass: Beautiful and Functional *continued*

their baskets. They carefully tended deergrass stands to produce long, straight stalks with no side branches. Also important, grassland areas were carefully burned by tribes such as the foothill Yokuts, Luiseño, Kumeyaay, and Mono, every 2–5 years in order to clear out dead material, eliminate insect pests, recycle plant nutrients, and thin other competitive shrubs that blocked the sunlight.

Today, deergrass habitat has been altered due to cattle ranching, agriculture, fire regulations, and an increase in invasive grass species. Natural populations of deergrass are difficult to find. Sadly, this means that the continuation of the weaving tradition, and the vast cultural and ecological knowledge associated with it, is increasingly difficult to maintain.

Wildlife: In California, dense patches of deergrass provide cover during the fawning period of mule deer in mountain meadows and grassland openings. The younger palatable tufts are grazed by deer, horses, and cattle and can remain palatable if continually grazed. Deergrass is particularly sought for forage by animals when it first resprouts after a burn. Older tufts are poor feed for livestock. The seeds provide food for songbirds and probably other birds as well. In sunny openings where deergrass occurs, it forms a larval food plant for one of the Satyrid butterflies, the California ringlet, and for the umber skipper. Massive numbers of ladybugs overwinter in deergrass clumps.

Conservation: Deergrass is a valuable stream bank stabilizer, as it has an extensive root system, and if grown in dense enough colonies, it can be an effective weed suppresser. Its long, slender culms and tall tufts make it an attractive plant for the garden.

References

US Department of Agriculture, Natural Resources Conservation Service National Plant Data Center. 2012. Online: **www.nrcs.usda.gov/wps/portal/nrcs/main/national/plantsanimals**

Reid, S., V. Wishingrad, and S. McCabe. 2009. "Native American Uses of California Plants—Ethnobotany," UC Santa Cruz Arboretum.

California Grasslands and Air Quality

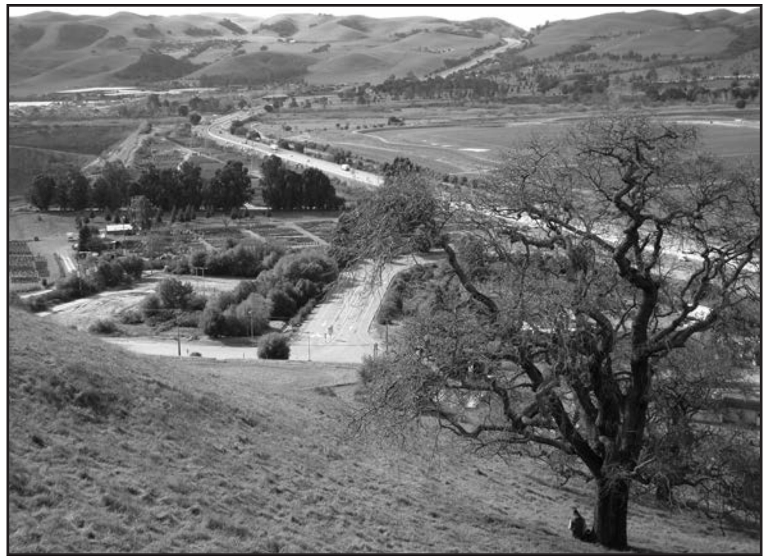
by Elise M. Tulloss, Ph.D. Candidate, Graduate Group in Ecology, UC-Davis, emtulloss@ucdavis.edu

When you think of poor air quality, you might think of cities, factories, and freeways. Perhaps the smog of Los Angeles or "Spare the Air" days in Sacramento come to mind. Grasslands surround many of these urban centers and freeways. When Sacramento air is pushed toward the Sierra Nevada, for example, the air quality is often decreased in the foothill grassland areas to the east of the city (Franchi et al. 2011).

Air quality has been shown to have an important influence on human health, affecting everything from asthma to heart attacks. But plants are also sensitive to air pollutants. Ozone exposure to sensitive species such as Jeffrey pine causes declines in photosynthesis and increased needle abscission (Patterson and Rundel 1995). Ozone impacts are not limited to certain types of plant species, but seem to be widely distributed among physiognomic groups (Paoletti and Grulke 2010).

Aside from ozone, other forms of air pollution can also harm plants. Particulates of heavy metals and nutrients such as nitrogen are deposited from the atmosphere to the ecosystem. Atmospheric deposition is a natural process that transfers materials between ecosystems; on a geologic time scale, this helps build soil. But human activities, such as fossil fuel combustion and fertilizer use, add to atmospheric deposition, and as a consequence, nutrients and pollutants enter natural ecosystems at unnatural levels.

One consequence of atmospheric deposition is that it tends to acidify soil, and that can cause leaching and loss of soil nutrients.



San Francisco Water Company site overlooking I-680. A golf course, gravel pit, and plant nursery are also visible. This photo was taken in early February before the Italian thistle that is present had come up. *Photo: Elise Tulloss*

A second consequence is that atmospheric deposition adds nutrients to soils and favors fast-growing, weedy species (Vitousek et al. 1997). Stuart Weiss (1999) found that the invasive grass *Lolium multiflorum* increased on serpentine soils in the Bay Area in response to nitrogen deposition. Increased competition from invasive grasses was harming the rare native plants and the endangered Bay checkerspot butterfly, which depends on the native plants.

To understand the effects of atmospheric deposition on grassland community dynamics, I measured nitrogen deposition at several sites around north-central California from 2008–2010. I used a passive air sampler to measure concentrations of gaseous nitrogen-containing pollutants (NO_x and NH_3). I also used ion-exchange

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Facing away from the freeway, the grassland community is more diverse, and native species are present. Most of the site looks like this. *Photo: Elise Tulloss*

California Grasslands and Air Quality *continued*

resin columns to collect nitrogen deposited to the ground layer in rainwater. Rainwater percolates through a column filled with resin; the nitrogen in the rainwater binds to the resin and can be extracted and analyzed in the lab.

Ion-exchange resin columns were placed beneath oak trees, collecting rainwater that passed through the oak canopy and in the open grassland. I found a wide range of rates of nitrogen deposition, depending on how close grasslands were to sources of air pollution. Here, rather than describing data and results, I will describe some observations from one of my study sites. The San Francisco Water Company (SFW) property is near Sunol in Alameda County. The site makes up part of the watershed from which San Francisco gets much of its drinking water. The part of the site I studied sits on a hill overlooking I-680. In such a location, air quality can often be poor, but it is also a beautiful place, full of native plant diversity and grazing cattle.

During my visits to SFW to collect nitrogen deposition samples, I noticed two patterns. First, the closer I got to the freeway, the worse the air quality, even on a scale of only a few hundred meters. My air quality data showed that concentrations of NO_x gases, which are precursors to ozone formation, were 60% greater at sampling locations closest to the freeway compared with sampling locations farthest from the freeway. Sampling locations ranged from about 1–2.5 km from the freeway. Second, the closer the sampling to the freeway, the more weeds were present, particularly under the oak trees. Oaks are hotspots of atmospheric deposition because their large surface area can capture gases and particles in the air and then deposit them to the understory during rains (Callaway and Nadkarni 1991). Nitrogen deposition beneath oaks was also highest under oaks closest to the freeway. Farther away from the freeway, the dense stands of weeds disappeared, the wildflowers and native grasses flourished, and the cows grazed.

The linkage between air quality and weed presence is only observational for this site at this time. Higher weed density near the freeway could be explained by reduced grazing, topography-driven soil differences, or other environmental factors aside from air quality. Additional experimental work currently ongoing is establishing the role of nitrogen deposition in determining community composition.

California is aggressive about air quality regulations compared with other states, and concentrations of harmful gases and particles are decreasing statewide (Fenn et al. 2003). However, freeways are still hotspots of air pollution. Grasslands surrounding these hotspots feel the effects in terms of prevalence of weeds. Grassland supporters should continue to look for ways to improve air quality for the sake of native species diversity in grasslands. Readers interested in seeing data analysis and results from this project should look for an upcoming publication of my dissertation research.

Above: Italian thistle and ripgut brome infest the understory of an oak tree near the freeway. *Photo: Elise Tulloss*

Right: Thistle threatens to engulf the author. *Photo: Abraham de Buys*

References

Callaway, R.M., and N.M. Nadkarni. 1991. "Seasonal patterns of nutrient deposition in a *Quercus douglasii* woodland in Central California." *Plant and Soil* 137(2): 209-222.

Fenn, M.E., R Hauber, G.S. Tonnesen, J.S. Baron, S. Grossman-Clark, D. Hope, D.A. Jaffe, S. Copeland, L. Geiser, H.M. Rueth, and J.O. Sickman. 2003. "Nitrogen emissions, deposition, and monitoring in the Western United States." *BioScience* 53: 391-403.

Franchi, B.W., A.H. Goldstein, and R.C. Cohen. 2011. "Observations of the temperature dependent response of ozone to NO_x reductions in the Sacramento, CA urban plume." *Atmospheric Chemistry and Physics* 11(14): 6945-6960.

Paoletti, E., and N.E. Grulke. 2010. "Ozone exposure and stomatal sluggishness in different plant physiognomic classes." *Environmental Pollution* 158(8): 2664-2671.

Patterson, M.T., and P.W. Rundel. 1995. "Stand characteristics of ozone-stressed populations of *Pinus jeffreyi (Pinaceae)* – extent, development, and physiological consequences of visible injury." *American Journal of Botany* 82(2): 150-158.

Vitousek, P.M., J.D. Aber, R.H. Howarth, G.E. Likens, P.A. Matson, D.W. Schindler, W.H. Schlesinger, and D.G. Tilman. 1997. "Human alteration of the global nitrogen cycle: Source and consequences." *Ecological Applications* 7(3): 737-750.

Weiss, S.B. 1999. "Cars, cows, and checkerspot butterflies: Nitrogen deposition and management of nutrient-poor grasslands for a threatened species." *Conservation Biology* 13(6): 1476-1486.

Ongoing Study of Grassland Restoration Effects on Regionally Important Ecosystem Services in the Sacramento Valley

by Andrew P. Rayburn[1], Heather Spaulding[2], Jessica Musengezi[3], Toby O'Geen[4], Craig Schriefer[5], and Emilio A. Laca[6]

Introduction

California grasslands have been degraded by multiple agents, including exotic species invasion, conversion to agriculture and urban land uses, and overgrazing, which have adversely affected their ability to provide socially beneficial ecosystem services. Restoration of grasslands through integration of weed control, tillage, and seeding of native plants offers the potential to enhance the provision of ecosystem services. However, the difficulty and expense of grassland restoration, in combination with the lack of private economic benefit, limit its adoption (Kroeger et al. 2009). Ecosystem service markets, subsidies, and Payment for Ecosystem Service (PES) schemes may motivate future grassland restoration efforts, but will require quantitative information about restoration effects on ecosystem services (Palmer and Filosa 2009, Bullock et al. 2011). Such considerations reflect a broader-scale interest in cost-benefit analyses of restoration efforts, which though previously rare, are increasing in conjunction with studies of restoration effects on ecosystem services (Bullock et al. 2011).

In 2011, with funding support from the US Department of Agriculture, our research group at the University of California Davis initiated a large-scale observational research project in the Sacramento Valley designed to quantify grassland restoration effects on a suite of variables that reflect the provision of regionally important ecosystem services. These include forage production and utilization, native plant diversity, soil seed banks, above- and below-ground arthropod diversity, water infiltration, and soil carbon and nitrogen. Over the past year and a half, we have established a network of monitoring plots in both restored perennial grasslands and unrestored annual grasslands. Our long-term goal is to quantify restoration effects on selected ecosystem services and to develop predictive models to identify potential restoration sites with the greatest probability of success relative to restoration costs.

Site selection: Sacramento Valley grassland restoration sites

Site selection began in 2010 and continued through fall 2011. Sites were selected according to the following criteria: a) prior to restoration, sites must have been annual-dominated plant communities with no recent history of farming; b) sites must have been restored to perennial grasslands using native California species; c) there must have been a nearby unrestored site that was representative of the previous state of the restored site; and d) land owners and/or managers must be willing to allow researchers access to their property to install plots, collect data, and in some cases, engage in ongoing collaborations with researchers. Within a given site, one unrestored field could serve as a basis of comparison for multiple restored fields, depending on field characteristics. In total, 22 restored fields and 12 unrestored fields were identified at 9 diverse sites across the Sacramento Valley, including active fruit and nut farms, livestock ranches, University of California and multi-agency land preserves, and Sacramento

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UC Davis researchers Jessica Sharkey (left), Craig Schriefer (middle), and Heather Spaulding (right) harvest biomass in 2012 from a restored Central Valley grassland site under the watchful eyes of the resident livestock herd. The grazing exclosure visible on the left allows researchers to quantify forage production and utilization in grazed sites. *Photo: A.P. Rayburn*

[1]Postdoctoral researcher studying the restoration of California ecosystems in the lab of Emilio A. Laca, Department of Plant Sciences, UC Davis. [2]Junior Specialist in the lab of Toby O'Geen, Department of Land, Air, and Water Resources at UC Davis; her work focuses on quantifying restoration effects on insects and soil. [3]Economics of Ecosystems Fellow for Defenders of Wildlife and a postdoctoral researcher in the Emilio A. Laca lab; her current work focuses on payments for rangeland ecosystem services. [4]Soil Resource Specialist in UC Cooperative Extension whose research focuses on soil-landscape relationships and soil management. [5]Lab manager for the Laca lab and also assists with data collection and sample processing. [6]Professor in the UC Davis Department of Plant Sciences, whose research focuses on spatial ecology of grazed ecosystems.

County properties. Approximately one-third of the sites are actively grazed by cattle or sheep, with substantial variation in stocking rates.

Data collection: Variables that reflect ecosystem services

In fall 2011, five 10-m^2 research plots were established in random locations in each restored and unrestored field to account for variability within fields. Grazing exclosures (1-m^2) were constructed in one corner of each plot to allow for calculations of forage production and utilization. For sites that are not actively grazed, we still included exclosures to account for native ungulates and to remain experimentally consistent.

Plant sampling consisted of lists of all species present in each plot and biomass harvests from selected locations within each plot. Species lists were obtained through timed richness surveys on all plots in March and again in June 2012 to capture later-emerging species, in order to provide a more thorough accounting of species present in restored and unrestored locations. At approximately the peak of the growing season from early May to early June, we harvested vegetation from five 1-ft^2 quadrats in each restored and unrestored plot, including one from each grazing exclosure. These samples were hand-sorted by species in our laboratory and then weighed by species after drying. This sampling method was designed to assess vegetative production and the relative abundance of species by mass, and it allows for calculations of species diversity.

We used two complementary methods to sample arthropods. First, we installed pitfall traps that were monitored weekly from early April to early May 2012 in a subset of plots from 5 locations (25 restored and 25 unrestored plots). Second, we collected soil and litter samples from the same subset of plots and used Berlese-Tullgren funnels to extract arthropods in the laboratory during May 2012.

Data from plant samples are being used to estimate production, abundance, and diversity of both native and exotic species. We quantify diversity both as species richness, the number of species in each sample, and with indices that account for differences in relative abundance. Plant species diversity influences many services that are important to society, including resistance to weed invasion, nutrient and water cycling, forage for livestock, and habitat for wildlife and insects. Biomass production is another critical ecosystem service provided by California grasslands, since forage from grasslands supports the multi-billion dollar California livestock industry.

In addition, arthropods have numerous functions in the provision of ecosystem services in grasslands, including the conditioning of soils, nutrient cycling, herbivory, pollination, and as food for birds and other wildlife. Arthropod diversity will be analyzed similarly to plant diversity, and we are also exploring methods to use different functional classifications (e.g., predators, herbivores, and decomposers) as an assessment of soil ecosystem health and to enhance our understanding of how arthropods respond to grassland restoration. For example, preliminary data from one site suggest that spiders were more abundant in the restored field, while springtails, the most numerous decomposers collected, were more abundant in the unrestored field.

Data collection will continue through fall 2012, beginning with soil sampling in all plots to compare carbon storage and nitrogen cycling in restored and unrestored sites. Total organic carbon (TOC) refers to the pool of carbon stored in soil organic matter, and it is one of the most important soil characteristics that affect the provision of ecosystem services. Organic carbon influences physical structure, water-holding capacity, and cation exchange capacity of soils. Organic carbon is also the primary source of energy and nutrients for soil microorganisms, and supplies nutrients to plants. Total soil nitrogen refers to the combined pool of both organic and inorganic nitrogen; inorganic nitrogen is readily available to plants in the form of nitrate (NO_3^-) and ammonium (NH_4^+). The organic N pool represents N associated with organic matter that becomes available to plants as microbes decompose plant residues.

Within the same subset of plots as discussed above, we will also sample soil seed banks in fall 2012 to determine the relationship between existing above-ground vegetation and species present as seeds in the soil. Seed banks can serve as important reservoirs of biodiversity, especially for species whose seeds can remain viable underground for more than one growing season. Later in the fall, we will use in-field methods in the same subset of plots to measure water infiltration rates to determine if restoration of perennial native bunchgrasses has the potential to decrease surface runoff. Water from rainfall that infiltrates soil potentially becomes available for uptake by plants, while water that is not absorbed can contribute to runoff that may lead to soil erosion, which decreases productivity and soil health.

Economic analysis of restoration

At the same time as we are conducting biological measurements, we are assembling a database of site characteristics (e.g., site history, pre/post restoration management, and seed mixes used in restoration) and economic costs associated with restoration efforts. Direct restoration costs include native seed or seedlings, the initial seeding or planting effort, and site management before and after seeding or planting, while indirect costs might include the risk of restoration failure and the need to rest grazed fields during the establishment period (Jacobs et al. 1999). For each pair of restored and unrestored fields, the costs of restoration will be

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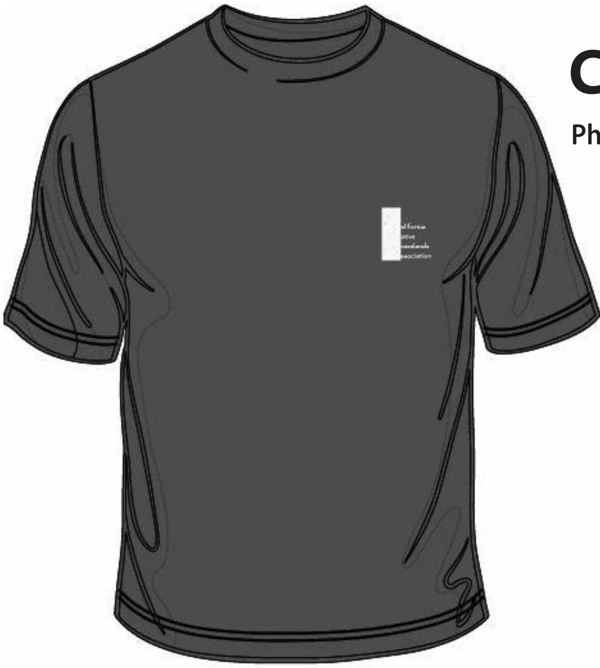

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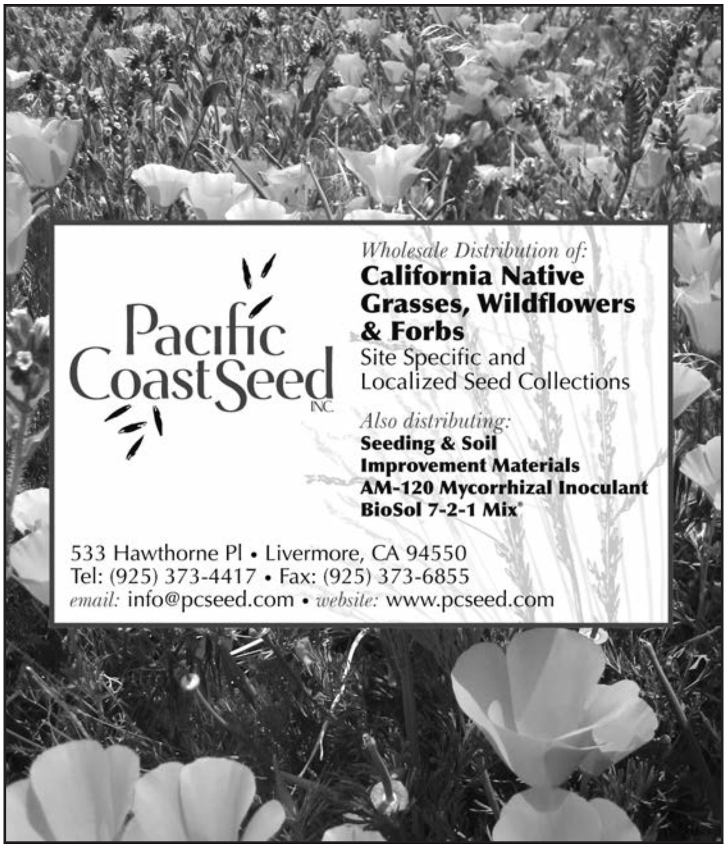

Grassland Restoration Effects *continued*

quantitatively compared to the benefits obtained through restoration in terms of ecosystem services. While not all motivations for ecological restoration may comfortably fit within a cost-benefit framework (e.g., landscape aesthetics, community development, or education), quantitative comparisons of the economic costs and benefits of restoration may eventually lead to financial incentives for increased adoption of restoration as a management option in California and elsewhere.

Conclusion

Studies of restoration effects on ecosystem services can improve our understanding of how ecological communities change in response to human intervention. Comparisons of the costs and benefits of restoration may also help justify the expense of restoration by emphasizing the numerous societal benefits resulting from increased provision of ecosystem services. Studies such as ours require significant collaboration between a diverse group of researchers in order to interpret and synthesize the different kinds of ecologic and economic data associated with restoration activities. However, the result should be a more complete understanding of restoration as a management option for California grasslands.

References

Bullock, J.M., J. Aronson, A.C. Newton, R.F. Pywell, and J.M. Rey-Benayas. 2011. "Restoration of ecosystem services and biodiversity: Conflicts and opportunities." *Trends in Ecology and Evolution* 26:541-549.

Jacobs, J.S., M.F. Carpinelli, and R.L. Sheley. 1999. "Revegetating noxious weed-infested rangeland." In *Biology and Management of Noxious Rangeland Weeds*, R.L. Sheley and J.K. Petroff, 133-141. Corvallis: Oregon State University Press.

Kroeger, T.F., F. Casey, P. Alvarez, M. Cheatum, and L. Tavassoli. 2009. "An economic analysis of the benefits of habitat conservation on California rangelands." Washington, DC: Defenders of Wildlife.

Palmer M.A., and S. Filosa. 2009. "Restoration of ecosystem services for environmental markets." *Science* 325:575-576.

CNGA presents: Grassland Restoration Field Practices

A One-day Workshop, Thursday, October 25, 2012
8700 Franklin Blvd., Elk Grove, 8:30am–4:00pm

Workshop size limited to 40; registration deadline October 15 or until filled.

Fall is the time to plant native grasslands! This field course provides attendees with hands-on experience in grassland restoration. Instructors will demonstrate tools and techniques for site preparation, planting, and establishment.

Demonstrations will be applicable to large- and small-scale restoration projects. Be prepared to get dirty! DPR and SRM CEUs are pending. Includes morning refreshments and lunch; check-in at 8:30am.

Your workshop site is the 2,650-acre Bufferlands, which surrounds the Sacramento Regional Wastewater Treatment Plant — a phenomenal wildlife area that is seldom open to the public.

Instructors:

Bryan Young *is Natural Resource Supervisor of the Sacramento Regional County Sanitation District. He has more than 20 years experience in habitat restoration, including the establishment of hundreds of acres of native grasslands.*

JP Marié *is Steward, UC Davis Putah Creek Riparian Reserve, where he manages the day-to-day operations of the Reserve. JP has 17 years of experience in restoration implementation and weed control.*

Registration Form: Grassland Restoration Field Practices | October 25, 2012

Mail to: CNGA, P.O. Box 8327, Woodland, CA 95776 Fax to: 530.297.0500

Participant's name (print or type) ____ Vegetarian ☐

Affiliation ____

Street Address ____

City ________________________________ State ____ Zip____________

Preferred phone ____________________ ____________________ Preferred email ______________________________

Registration Fee: ☐ $85/CNGA members ☐ $100/non-members ☐ $50/students w ID

Payment: ☐ **Check** *Payable to California Native Grasslands Association*

☐ **Credit card** *Check type:* ☐ Visa ☐ MasterCard ☐ American Express

Card number: ________________________________ Expiration date: _____/_____

Billing Address (if different than above): ________________________________

Billing Zip Code: _____________

Questions? *Contact Diane Crumley, Administrative Director, by phone/fax: 530.297.0500 or email: admin@cnga.org.*

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CNGA's Bunchgrass Circle

As a nonprofit organization, CNGA depends on the generous support of our Corporate and Associate members. Through their donations, these farmers, ranchers, companies, and agencies advocate for the preservation and stewardship of our state's native grasses and the mission of CNGA. If you are interested in regular giving at a higher level — either as an individual, agency, or company—please contact Administrative Director Diane Crumley at 530.297.0500 or admin@cnga.org. *Your support is deeply appreciated.*

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Muhlenbergia rigens ($1,000/yr)
Hedgerow Farms

Stipa pulchra ($500/yr)
Delta Bluegrass Company
Pacific Coast Seed
S & S Seeds

Poa secunda ($250/yr)
Dow AgroSciences
Hanford Applied Restoration & Conservation
Restoration Resources
Sun City Lincoln Hills Community Association

Associate Members ($125/yr)
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California Native Plant Society, Los Angeles Chapter
Carducci Associates Inc
City of Davis
Contra Costa Water District
Erdman Farms
Integrated Environmental Restoration Services Inc
Irvine Ranch Conservancy
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Orinda Horsemen's Association
Peninsula Open Space Trust
Pure Live Seed LLC
Quailbrook Farm LLC
Ransom Seed Laboratory
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Sacramento Regional County Sanitation District
San Luis National Wildlife Refuge
Security Seed Services
Solano County Water Agency
Stone Lakes National Wildlife Refuge
Thomas Klope Associates
Truax Company Inc
Westervelt Ecological Services
Wildlands
WRA Environmental Consultants
Yolo County Resource Conservation District
Zentner and Zentner

CNGA Membership Application

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

Name ____________________ Title ____________________

Organization ____________________

Street ____________________

City ____________________ State__________ Zip__________

Phone ____________________ Fax ____________________ E-mail ____________________

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

Individual Membership

❒ **Regular member:** $45/year ❒ **Student:** $30/year ❒ **Retired:** $30/year ❒ **Life member:** (one-time payment) $500

Individual Joint Membership

❒ **CNGA + SERCAL*:** $70/year ❒ **CNGA + CAL-IPC**:** $75/year ❒ **CNGA + SERCAL* + CAL-IPC**:** $105

**SERCAL = California Society for Ecological Restoration **CAL-IPC = California Invasive Plant Council*

Corporate Membership and Benefits

All employees of a corporate member receive member pricing when registering for CNGA events.
All membership benefits are good for one year from the month of purchase.

	Membership Level	Annual Cost	Online (color) Ads w/link to member website[1]	*Grasslands* (b&w) Ads currently 4 issues per year	Employee Memberships[2]	*Grasslands* Subscriptions[3]
❒	*Muhlenbergia rigens*	$1,000	Half page (570 x 330 pixels) at top of CNGA sponsor page	Half page (7.625 x 4.375) 300 dpi jpeg, tif or pdf file	6	4
❒	*Stipa pulchra*	$500	Quarter page (256 x 296 pixels) below *Muhlenbergia* listings	Quarter page (3.75 x 4.375) 300 dpi jpeg, tif or pdf file	5	3
❒	*Poa secunda*	$250	Bus.-card size (129 x 200 pixels) below *Stipa* listings	Bus.-card size (3.5 x 2.25) below *Stipa* listings	4	2
❒	*Associate/Agency*	$125	Text listing below *Poa* sponsors for 1 calendar year	Text listing published in *Grasslands* for 1 calendar year	3	1

[1]If there is more than one sponsor per level, the sponsors will be listed alphabetically by the sponsor's name. [2]Employee memberships include all the benefits of an individual membership, except that a personal copy of Grasslands is not guaranteed. [3]Company may opt for fewer subscriptions.

California Native Grasslands Association

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Register now for Oct. 25 Grassland Restoration Field Practices Workshop!
see page 12

Front cover: American dune grass (*Elymus [Leymus] mollis* ssp. *mollis*) growing on the foredunes at Baker Beach, Presidio of San Francisco, Golden Gate National Recreation Area. This restoration project incorporated numerous native dune plants. *Photo: Morgan Trieger*

Back cover: *Asclepias fascicularis*, Bufferlands, Elk Grove, CA. *Photo: Roger Jones*