California Native Grasslands Association

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.

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From the President's Keyboard

Adapting to the Drought with a "New Front Yard" *by J.P. Marié, President*

Once in a while, someone asks me about our mission statement and why we do what we do. Why is it important to promote, preserve and restore California's native grassland species and ecosystems?

Native grasslands provide us with a wide range of important ecosystem services, such as habitat for wildlife and pollinators, forage for livestock, soil stabilization, enhanced infiltration of rainfall, and aesthetic beauty. Unfortunately, most of our historic grasslands have been lost through conversion to other uses over the past 250 years. Those grasslands that remain have often been degraded by invasive species, over-grazing, fragmentation, and other stressors. In addition, the ongoing drought coupled with the broader impacts of climate change have created additional challenges to conserving our iconic grasslands. These threats make CNGA's mission more important than ever, and we are developing new tools and approaches to broaden our approach to grassland conservation.

The worst drought in recent history has resulted in local and state-wide regulations that severely limit water available for landscape irrigation. I have seen many landscapes abandoned, with bare ground and dying trees, and also seen lawns replaced by artificial turf. Although these practices do reduce water, they also reduce the potential benefits of built landscapes for wildlife, pollinators, and people.

With this in mind, CNGA has devoted substantial time and energy over the past two years to promoting a paradigm shift in how Californians view urban and residential landscapes. Thanks to the support of the California Department of Water Resources and the hard work of many Board members, staff, and volunteers, CNGA has just completed a successful series of "New Front Yard" workshops across the state. These workshops were designed to train homeowners, landscape contractors, landscape managers, and educators to convert high-water-use, conventional lawns into attractive, low-water-use landscapes using native plants, many of which are naturally found in California grasslands. The resulting landscapes are drought-tolerant, great for native wildlife and pollinators, low maintenance, and beautiful in appearance. Native turf can even be used to maintain the "green lawn" appearance while still saving water.

As we continue to work together to adapt to the drought and the future uncertainty of climate change, we encourage you to join the movement to convert urban and residential landscapes using water-wise native plants. There are attractive options available, even for the smallest of lawns. Implementing this conservation measure is another important dimension of promoting, preserving, and restoring California's native grassland species and ecosystems.

California's New Front Yard Workshops End on a High Note

by Diana Jeffery, Ph.D., CNGA New Front Yard Workshop Specialist[1]

In front of a sold-out audience at University of California Merced in March, CNGA recently presented the final workshop in a five-part series entitled *California's New Front Yard: Creating a Low-Water Landscape*. This successful event wrapped up a year and a half of workshops funded by the California Department of Water Resources as a direct response to the ongoing drought that has led to local and state-wide regulations severely limiting water available for landscape irrigation.

The pilot *New Front Yard* workshop was held at UC Davis in September 2014. The event sold out at 120 participants with over 35 people on the waiting list. The success of this workshop was largely due to the exceptional instructors, staff, and partners that all contributed to the event and to the skilled program development talent of CNGA's Rebecca Green. Building upon the success of the first workshop, DWR agreed to four additional workshops that were held in Fairfield (October 2015), Sacramento (October 2015), Santa Cruz (February 2016), and Merced (March 2016). All were well-attended with 85 to 100+ participants at each workshop.

In each geographic area, CNGA formed new partnerships with local water agencies, cities, counties, and universities to put on a high-quality workshop specifically tailored to each region. Our partners provided venues, helped with marketing and sponsorships, and participated in many other tasks. The Santa Cruz and Merced workshops were in communities relatively new to CNGA and where our organization was largely unknown. Setting up such programs in new areas created unique challenges, but the rewards were many. We made new contacts, forged new relationships, and enlisted local speakers that gave regionally-specific presentations on native landscape design and maintenance.

Each one-day workshop consisted of morning classroom sessions, a Q & A panel with the instructors, and afternoon break-out sessions that usually included field tours. Former CNGA board member Andrew Fulks charmed audiences as Master of Ceremonies and panel moderator. Classroom sessions provided participants with detailed, science-based guidelines for converting high-water-use conventional lawns into attractive, native, low-water-use landscapes appropriate for local climates. Four expert instructors presented step-by-step approaches to reimagining and redesigning lawns, including a comprehensive range of options and the advantages and disadvantages for each approach. Each instructor presented on one of four topics: inventory and design, native plant selection and location, lawn removal methods, and long-term care and maintenance including water-efficient irrigation.

After lunch, participants were divided into smaller groups for break-out sessions and walking field tours. At the Sacramento workshop,

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[1]DWR Contract Workshop Specialist Diana Jeffery is a plant ecologist and former CNGA board member.

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, Andrew Rayburn, 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. Send photo submissions (at least 300 dpi resolution), as email attachments, to Andrew Rayburn at grasslands@cnga.org. Include a caption and credited photographer's name.

Submission deadlines for articles:

❊ **Summer 2016** — May 15, 2016

❊ **Fall 2016** — Aug 15, 2016 ❊ **Winter 2017** — Nov 15, 2016 ❊ **Spring 2017** — Feb 15, 2017

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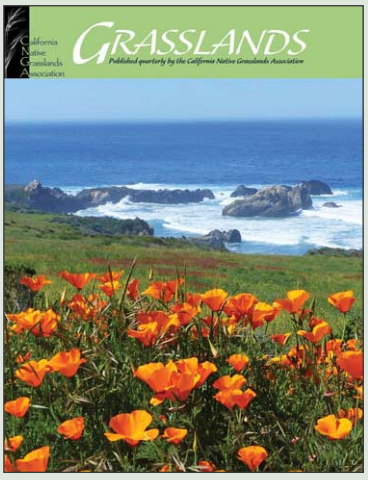

Dakotah Bertsch, Landscape Designer and Project Manager at Ecological Concerns, gives a morning presentation on lawn removal at the UC Santa Cruz Arboretum. *Photo: J.P. Marié*

Brett Hall, California Native Plant Program Director at the UC Santa Cruz Arboretum, leads a tour of the native plant garden. *Photo: J.P. Marié*

California's New Front Yard

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William Granger, Water Conservation Coordinator for City of Sacramento, took participants on a tour of nearby front yards that were recently redesigned. In Santa Cruz, UCSC Arboretum Director Martin Quigley and California Native Plant Program Director Brett Hall gave a tour of the Arboretum's plant gardens. Most recently, Monique Kolster, Interim Director and Naturalist Lecturer of the UC Merced Vernal Pools and Grassland Reserve, led a walking tour where participants learned about native plants in their natural setting.

The CNGA New Front Yard Team included board members (J.P. Marié, Emily Allen, Billy Krimmel, Jim Hanson, Robert Evans, and Jodie Sheffield), former board members (Andrew Fulks and Ingrid Morken), and administrative staff (Liz Cieslak, Diana Jeffery, and Rebecca Green).

The hard work of these individuals, as well as that of the instructors, volunteers, and other helpers was widely recognized by workshop participants. Claudia Boulton, owner of Wild Rose Landscape & Garden Design, noted that "As a landscape designer, member of APLD, and a Master Gardener, I attend several educational conferences each year. This was one of the most organized, informational and best-run seminars I've ever attended."

Now that the workshops have concluded, CNGA will compile and synthesize all of the content into an interactive educational module that will be available online in June 2016. We will also explore opportunities for similar workshops in the future, so keep an eye on our website (**www.cnga.org**) and our Facebook page for updates. Meanwhile, perhaps you have a lawn or greenspace that would make a good candidate for conversion to a native, low-water landscape?

9th Annual CNGA Field Day at Hedgerow Farms

Coping with Competition: Weed Control Strategies in California Grasslands

Friday, April 22, 2016 · Hedgerow Farms Inc.

8:45am–3:30pm — 8am check-in and refreshments

21905 County Road 88 in Winters

For the 9th consecutive year, CNGA is teaming up with Hedgerow Farms to provide an excellent opportunity for practical, hands-on learning about native grasslands.

New this year:

- Expert-led talks and demonstrations on a wide variety of weed control techniques and tools
- Lunchtime keynote by Dr. Joe DiTomaso**:** "Resources You Need to Know About for Weed Management in California Grasslands"
- Identification tips for non-native weeds and natives
- Post-burn seeding trials and results of sheep grazing
- Tours visit new restoration seeding trials
- And more!

Expert-led walking tours, hay ride tours, field lectures, and field demonstrations compliment this wonderful occasion to be immersed in the habitat and network with a diverse group of people that share a common interest in California grasslands.

Morning refreshments and lunch are provided, bring a water bottle and comfortable clothing for outdoor activities.

Registration Form: Field Day at Hedgerow Farms | April 22, 2016

Registration Fee (check one): ❍ $75/CNGA member | ❍ $90/non-member | ❍ $45/student

1 Register online with PayPal at **www.cnga.org**

2 Pay with check made payable to **California Native Grasslands Assoc.**

or **3** Pay via credit card (please check type): ❍ Visa ❍ MasterCard ❍ American Express

Card number _____ Exp. Date:_____

Name on card:_____

and mail to: **CNGA, P.O. Box 72405 Davis, CA 95617**

For more information please contact Liz at 530-902-6009 or admin@cnga.org

Participant's name (print or type, please) _____

Participant's organization or agency _____

Mailing address: *Street* _____ *City* _____ *State* _____ *Zip* _____

Preferred phone _____ Preferred email _____

Successful Recovery of a Native Thistle Population Following Jubatagrass Control

by Don Thomas, San Francisco Public Utilities Commission[1]

Introduction

One of the distinguishing features of the Peninsula watershed, managed by the San Francisco Public Utilities Commission (SFPUC), is the presence of a north-south rift valley holding the Crystal Springs Reservoir. Another is the expanse of serpentine grassland in the watershed. These two features are related since the movement of the San Andreas fault formed the valley and brought metamorphic serpentine rock to the surface.

Serpentine soil is ultramafic (high in magnesium and iron) and also high in heavy metals like nickel and chromium, while being deficient in several essential nutrients such as nitrogen and calcium. Though this makes it inhospitable for many plants, some native plants have adapted to these soil conditions and are even restricted to serpentine soils. Because of this specialization, many of these native plants are rare with limited distributions.

This watershed contains a number of special-status serpentine endemics including three federally endangered species: the San Mateo woolly sunflower *(Eriophyllum latilobum*), white-rayed pentachaeta (*Pentachaeta bellidiflora*) and fountain thistle (*Cirsium fontinale* var. *fontinale*). The federally threatened western dwarf flax (*Hesperolinon congestum*) also occurs, as does the Crystal Springs lessingia (*Lessingia arachnoidea*), a species of special concern.

This study describes the successful recovery of a population of fountain thistle, a rare endemic native thistle adapted to unique habitats including serpentine seeps, wetlands, and seasonally wet riparian grasslands. Its most common associate in the Peninsula watershed is California hairgrass (*Deschampsia cespitosa*). Fountain thistle only occurs on the San Francisco Peninsula, and most of the populations are within this one watershed.

One of the fountain thistle populations was largely displaced by the invasion of jubatagrass (*Cortaderia jubata*) which occupied seep habitats, confining the fountain thistle to a narrow riparian strip bordered by woodland (Fig. 1). Invasion by jubatagrass has been identified as one of the principal threats to fountain thistle in the U.S. Fish and Wildlife Service (USFWS) Recovery Plan for Serpentine Soil Species of the San Francisco Bay Area (USFWS 1998).

In 1997, the SFPUC began removing jubatagrass to restore fountain thistle habitat, with additional projects in 2006, 2007, and 2008. Jubatagrass was cut at the base, and then treated with 50% glyphosate herbicide. The result has been the elimination of most of the jubatagrass and the re-opening of the habitat for fountain thistle (Fig. 1).

In 2007, the SFPUC initiated a project to measure and map the fountain thistle population to track the recolonization of habitat cleared of jubatagrass. This monitoring program sought to measure the rate of expansion of the fountain thistle population and to assess the progress of recovery through passive recruitment of seedlings.

Methods

A permanent transect was established in 2007 through the fountain thistle population. This transect was also used by the Knight Lab of Washington University for their research on the population biology of fountain thistle (Powell and Knight 2009, Powell et al. 2011). Survey methods included measuring the distance to the advancing edge of the population at intervals along the transect. The distance to the population margin was determined by extending perpendicular transects every 5 ft along the main transect and measuring the distance to the fountain thistle plant farthest from the perpendicular transect. This mapping procedure was repeated in 2008–2011 to measure the expansion of the population through natural recruitment along its outer edge.

By 2010, the fountain thistle population had begun to expand beyond the bounds of the first transect, and a second transect was established through the outer edge of the population and through the remaining unoccupied seep habitat. The same procedures were used, with transverse transects located at 5-ft intervals along the main transect extending to the north and south of the central transect. To track population expansion, the survey was repeated annually from 2011–2015.

Results and Discussion

This study monitored the passive restoration of a fountain thistle population through natural recruitment over the course of eight years, following removal of jubatagrass. The overall result has been the recovery of the population across its previous extent (Fig. 1).

The initial rate of fountain thistle expansion was relatively slow, averaging 3.3 ft/yr. Average expansion across the first four years was 1.7 ft in 2008, -0.6 ft in 2009 (a contraction in size), 6.3 ft in 2010, and 5.8 ft in 2011.

The slow initial rate of recolonization by fountain thistle was expected, based upon the special adaptations the species possesses for the serpentine seep habitat that limit the dispersal of propagules into the less favorable surrounding dry habitat. Fountain thistle produces a small number of achenes (one-seeded fruits) with dehiscent pappi that fall apart upon maturity, resulting in seeds that are dispersed close to the parent plants (Powell 2007). Powell (2007)

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[1]Don Thomas is an Integrated Pest Management Specialist for the San Francisco Public Utilities Commission.

Figure 1. Fountain thistle site in 1997 before clearing of jubatagrass (left); in 2011 after jubatagrass control (center); in 2015 with extensive cover of thistle rosettes and *Lilium paradalinum* in foreground (right). *Photos: Guido Ciardi and Don Thomas*

Successful Recovery of a Native Thistle Population *continued*

found that fountain thistle produces an average of 356 achenes per plant and has an obligate outcrossing breeding system, requiring pollen from another plant in order to set seed.

Fountain thistle also has relatively large achenes for a thistle species with an average weight of 8 mg. The same characteristic of large fruits dispersed close to parent plants has been found for fountain thistle's conspecific relatives, the Mount Hamilton thistle (*C. fontinale* var. *campylon*) (Hillman 2007) and the Chorro Creek bog thistle (*C. fontinale* var. *obispoense*) (Chipping 1994). Hillman (2007) hypothesized that the nodding flowerheads are an adaptation to produce a small seed shadow.

In contrast, the non-native congeneric bull thistle (*C. vulgare*), an aggressive colonizer of disturbed habitats, has a large number of lighter achenes (2–4 mg; Halevy 1989) which disperse farther from parent plants. Powell (2007) found that bull thistle produces as many as 16,969 achenes per plant with an autogamous (able to set seeds through self-pollination) breeding system.

This difference in attributes and life history reflects the contrasting adaptive strategies of the two species to their different types of habitat. Bull thistle, a species of unstable, disturbed habitats, invests a smaller amount of resources in each of a large number of widely dispersed offspring, while fountain thistle, a species of stable wetland habitats, invests more resources in each of a smaller number of closely dispersed offspring.

By 2011, the rate of expansion had become much more rapid, averaging a total distance (northward plus southward) of 12.3 ft/yr between 2010 and 2013. Population expansion north and south of the transect was tracked separately and averaged 5.2 and 7.1 ft/yr, respectively. The greater rate of expansion southward corresponds to habitat availability, as the smaller habitat north of the transect was mostly recolonized by 2013.

This more rapid later expansion rate is difficult to explain, based upon what is known about the life history of fountain thistle. This result suggests that either there is recruitment from a dormant seedbank or that an animal seed dispersal vector is transporting seeds greater distances from the mother plant. Fountain thistle seeds have been reported to lack dormancy. Powell (2007) did not find any seed dormancy for fountain thistle in her greenhouse tests.

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Successful Recovery of a Native Thistle Population *continued*

Hillman (2007) also found a lack of seed dormancy for Mt. Hamilton thistle, obtaining 91% germination in the first year. Therefore a seed dispersal vector seems to be implicated.

It is known that thistle seeds are dispersed by ants (myrmecochory) (Pemberton and Irving 1990). They possess elaiosomes (food reward structures for ants that transport the seeds) and elaiosomes are present on fountain thistle achenes. However, at this site native ants capable of carrying the seeds have been replaced by Argentine ants (*Linepithema humile*), which are too small to move the seeds. Other candidates for seed vectors include woodrats, which have nests in the vicinity, and goldfinches, which were observed visiting the fountain thistles in June 2015. Goldfinches are known to disperse seeds of Hill's thistle (*C. hillii*), another rare thistle (Molan-Flores 2000).

By 2014, the expansion rate of the SFPUC population both north and south of the transect had slowed, as fountain thistle had reclaimed most of the available habitat indicating a successful recovery of the SFPUC population (Fig. 2). In addition to fountain thistle, the seep habitat has also been recolonized by other native plants, including seep monkeyflower (*Mimulus guttatus*), marsh baccharis (*Baccharis douglasii*), verbena (*Verbena lasiostachys*), iris-leaved rush (*Juncus xiphioides*) and leopard lily (*Lilium pardalinum*).

However, re-invasion by non-native plants remains a problem. Rabbit's-foot grass (*Polypogon monspeliensis*), bull thistle (*C. vulgare*), sow thistle (*Sonchus oleraceus*), and willowleaf lettuce (*Lactuca saligna*) require ongoing control. Tall fescue (*Festuca arundinacea*), a new opportunistic invader, has now replaced jubatagrass as the greatest competitive threat to fountain thistle at this site.

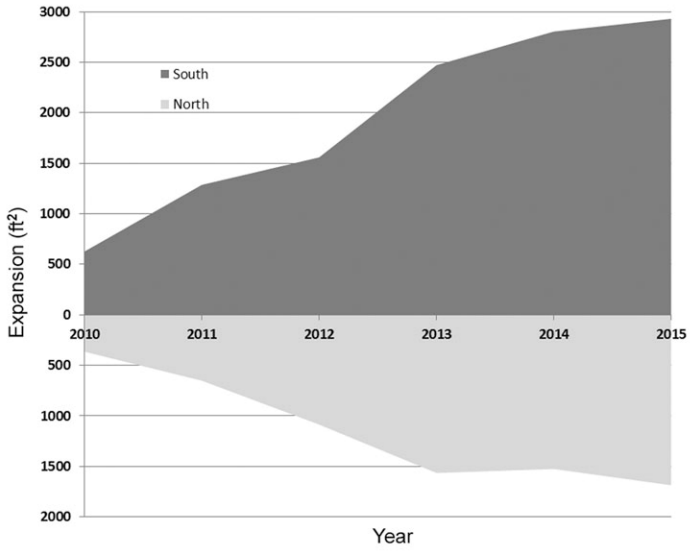

Figure 2. Cumulative increase in area (ft²) of fountain thistle population north and south of the central transect from 2010–2015.

This project demonstrates that successful recovery of special-status plants can be achieved where suitable habitat exists through passive recruitment coupled with long-term invasive plant management. In addition to this project, another seep population of fountain thistle on a nearby property has also recovered following control of jubatagrass by the California Department of Transportation and ongoing management of invasive plants by volunteers of the California Native Plant Society. This population, which had been reduced to fewer than 100 plants, has now increased to several thousand plants (Thomas 2015).

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Identifying and Appreciating Native and Naturalized Grasses of California

Class: **Saturday, May 14, 2016, 9am–4pm**

College of Marin, Kentfield Campus Rm SMN 112

Optional Field Day: May 15, 9am–4pm, Mt. Tamalpais

Day 1, College of Marin in the Classroom:

Grasses are fun and easy to identify! Our goal is to learn the basic skills of identifying grasses and provide an overview of the native grass distribution in California. We will learn about California's grassland ecology, compare native and non-native grasses and become skilled at recognizing the basic groups and common species by working with plant samples in the classroom. We will review both the Hitchcock's tribe method of identifying grasses as well as the artificial key methodology focusing on the important distinguishing traits. A class syllabus and basic keys will be provided, and dissecting scopes available for use.

Morning refreshments provided.
Optional lunch available for additional $12 charge.

$160/CNGA member | $180/Non-member | $95/Student

Optional Day 2, Mt. Tamalpais Field Day:

A full-day field tour of grasslands on Mt. Tamalpais: see dozens of grass species in the field, and learn some of the grassland types in the area. To be eligible to attend the Field Day, registrants must also attend the May 14 Classroom day. Space for this trip is limited, sign up early to be assured a spot!

Field tour agenda will be sent out after registration is completed.
No food is provided for this trip, so please bring water, snacks and lunch.

$60/CNGA member | $80/Non-member | $45/Student

Registration Form:

Grass ID Classroom Day May 14 ❍ $160/CNGA member ❍ $180/non-member | ❍ $95/student | ❍ $12/lunch

Optional Field Day May 15 ❍ $60/CNGA member ❍ $80/non-member | ❍ $45/student

1 Register online with PayPal at **www.cnga.org**

2 Pay with check made payable to **California Native Grasslands Assoc.**

or **3** Pay via credit card (please check type): ❍ Visa ❍ MasterCard ❍ American Express

Card number _____ Exp. Date:_____

Name on card:_____

and mail to: **CNGA, P.O. Box 72405 Davis, CA 95617**

For more information please contact Liz at 530-902-6009 or admin@cnga.org

Participant's name (print or type, please) _____

Participant's organization or agency _____

Mailing address: *Street* _____ *City* _____ *State* _____ *Zip* _____

Preferred phone _____ Preferred email _____

An Integrated Approach to Barbed Goatgrass Control in the East Bay Regional Park District

by Pamela Beitz, East Bay Regional Park District[1]

Figure 1. Mature barbed goatgrass among other annual grasses at the Galvin Land Bank property, and a view of the unique seed heads (inset). *Photos: Pamela Beitz*

Introduction

Barbed goatgrass (*Aegilops triuncialis*), on vacation from the Eurasian continent in the early 1900s, found California's climate amenable and decided to put down roots. Barbed goatgrass was first documented in 1914 in El Dorado and Sacramento counties (Peters et al. 1996). The species matures relatively late in the growing season and is easily spotted with its green seed heads and red awn tips in the dry annual grasslands (Fig. 1). Barbed goatgrass has only just recently begun to rapidly colonize northern California, monopolizing the valuable real estate of the grassy East Bay hills (Davy et al. 2008).

This remarkably tenacious annual grass transforms plant communities through a variety of strategies, including early germination, aggressive root development, formation of thatch that does not readily degrade, and the "sneaky sister seed." Each spikelet contains two seeds, one of which germinates and suppresses the other until the following season. This guarantees a second generation, requiring at least two solid treatment seasons to reduce a population. One of three goatgrass species (jointed, barbed and ovate) in the Bay Area, barbed goatgrass is unpalatable to livestock late in the season and can quickly out-compete other desirable grasses and forbs by up to 50–75% (Davy et al. 2008). This bad actor frequently occurs with medusahead (*Elymus caput-medusae*), another troublesome invasive annual grass, and has the ability to colonize and dominate botanically important areas with serpentine, siliceous shale, and heavy clay soils where native plant species typically find refuge.

Barbed goatgrass is known to infest 110 acres in four parks in eastern Contra Costa and Alameda counties and is anticipated to be elsewhere. Considerable effort has been put into mapping by interns over the last two years. The species is commonly found along fire roads and all populations are located in grazing units. Because barbed goatgrass threatens to reduce forage, native species diversity, and ecosystem functions in grasslands, the Integrated Pest Management department of the East Bay Regional Park District decided to make control a top priority and completed its first treatment season in 2015. Treatment efforts focused on two parks, Morgan Territory Regional Preserve and the Galvin Land Bank in eastern Contra Costa County. Our primary goal was to develop an integrated and flexible approach that could be rapidly deployed by park staff to treat satellite populations, spreading edges (such as along roads and trails), and areas with special-status native plant species.

Methods

We combined two readily available control methods: timed mowing with a line trimmer and follow-up herbicide application. Both are available to park staff, contractors, and to a lesser extent, volunteers. Mowing reduced herbicide use and mitigated the collateral take of native forbs and grasses. Additionally, a line trimmer can be easily stowed and transported in a park truck, allowing for a rapid response when a new population is spotted. Line trimmers are also more easily employed in topographically challenging areas, as well as under tree canopies. This was particularly important as we observed barbed goatgrass extending into oak woodlands and occurring well under the drip line of oak trees.

The target timing for mowing was just as goatgrass seed heads emerged to flower in mid–late May. Crews were asked to line trim as low as possible without scalping the ground and to go over their work to cut pop-ups or misses. Crew were initially instructed to selectivly trim where the dense patches were present. However, closer inspection revealed that between dense patches were many individual plants, often delayed in development, so selective trimming was abandoned for a more complete trimming throughout (Fig. 2).

In two large flat fields, a turf mower was also used on its lowest setting and cross-mowed in order to get the closest cut possible. Cross-mowing allowed for the maximum amount of mulching of cut material. Crews were instructed to stop work at any time that animals were observed in the treatment area and to leave large downed wood in place in order to avoid disturbing wildlife. Abundant native tarweeds were too numerous to avoid but were observed to resprout and flower after mowing.

Follow-up spot treatment of resprouts with herbicide (2% glyphosate) occurred at most sites 21–35 days after mowing. The ideal re-treatment time was 21 days based on recommendations by

continued next page

[1]Pamela Beitz is a Resource Analyst in the Integrated Pest Management Department of the East Bay Regional Park District.

An Integrated Approach to Barbed Goatgrass Control *continued*

managers with experience treating goatgrass, but retreatment was often delayed due to scheduling difficulties. Phenology at the time of re-treatment ranged from flowering to early seed elongation. Widespread native tarweeds were easily avoided during spot treatment, while resprouts were pulled by hand at several remaining sites that were small enough or that had sensitive resources. Clethodim (selective grammicide) was initially considered instead of glyphosate, but was not used because some lands were grazed. Clethodim does not affect forbs and has been used for goatgrass control, but is not registered for use on grazed lands without halting grazing for 1–2 years.

Before and after treatment, rapid monitoring was attempted using two different methods to compare efficacy and efficiency. Before each treatment we used either a point-intercept method, sampling at 0.5 meters intervals along a 50-meter transect, or a 1-m^2 quadrat, divided into 100 sections to determine percent cover of goatgrass (Fig. 2). Identical sampling occurred after treatments were completed. A similar approach will be used for the 2016 growing season. Our hope is that the data, while not necessarily statistically robust, will support qualitative observations and future management decisions.

Results

Approximately 1.4 ac of the 7.7-ac Galvin Land Bank property were treated at a cost of $668/ac (36 person-hours). This property was not grazed during the growing season of this treatment cycle and there was substantial biomass production that may have impacted initial treatment results. Based on quadrat sampling, the initial mowing treatment resulted in a 22% reduction of goatgrass in dense areas and 33% reduction in less dense areas. We retreated the remaining goatgrass with glyphosate on an unusually hot day. After herbicide treatment, some goatgrass individuals were effectively killed while others resprouted, potentially due to poor herbicide uptake. After herbicide application, a 72% reduction was

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Figure 2. Sampling quadrat in a goatgrass patch (foreground), and crews using line trimmers to mow goatgrass. *Photo: Pamela Beitz*

CNGA to Chair Upland Restoration Session at SERCAL Conference

by Andrew Rayburn, Grasslands *Editor*

Creativity in Collaboration — the 23rd Annual Conference of the California Society for Ecological Restoration (SERCAL) will be held May 11–12 at the North Tahoe Event Center in Kings Beach, California. All-day, post-conference fieldtrips on May 13 will further demonstrate the conference theme of collaboration, showcasing local restoration projects in the Tahoe area.

SERCAL is a non-profit organization dedicated to facilitating the recovery of damaged ecosystems by advancing and promoting the field of ecological restoration. The mission of SERCAL is complementary to the mission of CNGA, one of several reasons why both organizations offer joint memberships. For the past several years, CNGA board members have supported the annual SERCAL conference by organizing and chairing sessions on the restoration and management of grasslands, rangelands, and other upland communities.

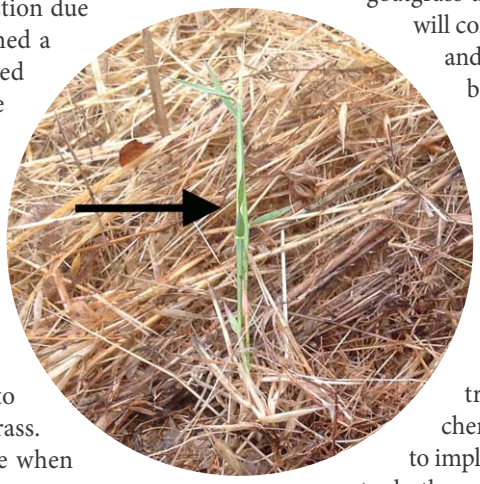
The conference will feature a diverse mix of attendees and presenters, a poster session and student poster contest, a plenary session, mini-fieldtrips, and the following technical sessions: Creative Collaboration for Multiple Benefits, Fire and Post-fire, Riparian and Wetland Systems, Montane Meadows, Mono Lake and Desert Ecosystems, Creativity in Upland Restoration, and a special session on an emerging issue — preventing the spread of plant pathogens. CNGA board members will chair the upland session, which will include an engaging mix of speakers from the public and private sector covering topics such as plant propagation challenges, soil regeneration, dune stabilization, wildlife response to restoration, seedbank analysis, and drone-based invasive species mapping.

Please join us at the 2016 SERCAL Conference. For more information and to register, visit the SERCAL website: **www.sercal.org/sercal-2016/**.

An Integrated Approach to Barbed Goatgrass Control *continued*

achieved in dense areas and and 63% in the less dense areas. One particular individual showed remarkable resistance to treatment, resprouting after both mowing and herbicide application (Fig. 3). It is possible the second seed was released from suppression, although this was not confirmed.

Approximately 13.8 ac of the 85.4-ac Morgan Territory property were treated at a cost of $516/ac (276 person-hours). The property is rotationally grazed year-round, although cattle had been rotated out at the time of treatment. Goatgrass was reduced by 74% and 66% in two different plots after initial line-trimming treatment. Remaining resprouts were then treated with glyphosate. We were unable to measure the additional reduction due to herbicide application; however, we assumed a reduction of at least 74% although some seed heads developed and we expected that some seeds would reach viability. We hand pulled, bagged, and disposed of goatgrass regrowth in three sensitive areas in lieu of herbicide application: around a vernal pool, in a small prairie with abundant native perennial grasses, and along a riparian corridor.



Observations and Lessons Learned

- Proper timing of treatment is essential to achieve the greatest reduction of goatgrass. Seed head sampling helped to determine when most plants were at or near the flowering stage.
- Ideal timing for follow-up treatment after mowing is approximately 21 days. Prior to this, the plants may not be far enough along for treatments to be effective. Later than this, plants are more likely to produce some viable seed. Environmental conditions will greatly affect the retreatment window. Whatever the constraints, plan for at least one follow-up treatment to reduce seed production for at least two or more years.
- Barbed goatgrass is robust in its ability to regrow after mowing and herbicide application, though poor uptake of herbicide (due to heat, dust, and/or litter obscuring growing grass) may account for our results at the Galvin Land Bank property.
- Thick thatch suppresses desirable species and favors goatgrass. Any practice that reduces thatch will add to the competitiveness of desired species (Fig. 3).
- Grazing may weaken goatgrass and facilitate more effective control as seen in grazed plots at the Morgan Territory property compared to ungrazed plots at the Galvin Land Bank property.
- Special-status native plant species that co-mingle with goatgrass make treatment difficult and expensive. Selective mechanical treatment (e.g., hand pulling and line trimming) are one option in grazed lands. Spot spraying any resprouts with a non-selective, grazing-compatible herbicide is more efficient and less costly, provided applicators are educated and careful to avoid non-target species.

Conclusion and Future Directions

We will continue to treat goatgrass as a priority target, focusing on satellite populations, road and trail edges, and threats to special-status plant species. Utilizing an integrated approach, we will continue the combination of mechanical and chemical treatments. Where topography permits, mowing by a turf mower at its lowest setting will be a more efficient means of mechanically reducing goatgrass than line trimming. Otherwise, line trimming will continue on variable terrain, on slopes, in swales, and adjacent to drainages. This season, crews will be directed to cut as low as possible, without regard to scalping.

Given the extent of goatgrass populations, chemical treatment will be necessary to reduce patches and to curb spread. All mechanical efforts must include follow-up herbicide treatment as close to 21 days as possible. Glyphosate is the only current option in these grazing units. In some new treatment areas, initial treatment may be chemical if feasible. Where possible we would like to implement strategies that incorporate more cultural tools, though planning has yet to begin. These may include prescribed burns and high-intensity grazing. As always, follow-up treatment with herbicide will be required. In addition, an important goal will be to standardize protocols and locations for monitoring plots to make our sampling more efficient and effective.

Finally, collaboration is the key to maximizing our workforce. We hope to support park staff in their timed mowing and chemical applications wherever feasible. We will also continue to train park staff to develop volunteer programs to create a stewardship workforce to control harmful invasives. Additionally, we hope to increase our partnerships with volunteer and school groups for follow-up hand pulling of goatgrass resprouts in these precious parklands.

References

Davy, J.S., J.M. Ditomaso, and E.A. Laca. 2008. "Barb Goatgrass." Publication 8315. Davis: University of California Davis Division of Agriculture and Natural Resources.

Peters, A., D.E. Johnson, and M.R. George. 1996. "Barb goatgrass: a threat to California rangelands." *Rangelands* 18(1):8–10.

Figure 3 (inset). Barbed goatgrass regrowth (here 27 days after line trimming) was usually in areas of thick litter. *Photo: Pamela Beitz.*

Identifying and Appreciating Native and Naturalized Grasses of California

A One-Day Workshop with Classroom and Field Components

Saturday, May 21, 2016, 9am–5pm $160/CNGA member | $180/Non-member | $95/Student

Bodega Marine Reserve and Laboratory, 2099 Westshore Road, Bodega Bay

Workshop highlights include…

- Morning classroom with plant samples, guided keying, and 10x hand lenses
- Afternoon outdoors at the Reserve: Coastal prairie, uplifted marine terrace and coastal bluff communities during wildflower season!
- Species of interest on the reserve: *Bromus maritimus* is common, rare grass *Agrostis blasdalei*, and *Elymus pacificus*!
- Course workbook, morning refreshments and lunch provided

Grasses are fun and challenging to identify! Our goal is to learn the basic skills of identifying grasses by using a dichotomous key and observing them in the field. We will learn about California's grassland ecology and become skilled at recognizing the basic groups and common species by working with plant samples in the classroom. We will use the artificial key methodology focusing on the important distinguishing traits of a variety of grass species as presented in *The Jepson Manual*, second edition. A class syllabus and basic keys from the Jepson Manual website will be provided. We will not be using dissecting microscopes in class, but 10x hand lenses will be available. An afternoon field tour on the Bodega Marine Reserve will round out this full day of learning. Morning coffee and snacks along with a bag lunch are included.

Instructor: Michelle Cooper

Registration Form: Bodega Marine Reserve Grass ID | May 21, 2016

Registration Fee (check one): ❍ $160/CNGA member | ❍ $180/non-member | ❍ $95/student

1 Register online with PayPal at **www.cnga.org**

2 Pay with check made payable to **California Native Grasslands Assoc.**

or **3** Pay via credit card (please check type): ❍ Visa ❍ MasterCard ❍ American Express

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For more information please contact Liz at 530-902-6009 or admin@cnga.org

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A Special *Thank You* to our Bunchgrass Circle Members! Your support for CNGA is much appreciated.

As a nonprofit organization, CNGA depends on the generous support of our Corporate and Associate members. Ads throughout the issue showcase levels of Corporate membership; Associate members ($125) are listed below. Visit www.cnga.org for more information on joining at the Corporate or Associate level.

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It's that time of year again!

Help us get a headstart on 2016: Renew your membership early!

2015 was an exciting year for CNGA: We received a significant grant, added new staff, and expanded our workshop offerings. Thank you for being there for us! **Your continued support will allow us to move forward with all of our exciting plans for celebrating our 25th anniversary and making 2016 our biggest workshop year yet!**

Use this form to renew, or go to www.cnga.org and renew online.

- - - - Detach and mail this form with check made out to CNGA. Send to CNGA, P.O. Box 72405, Davis, CA 95617 - - - -

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- ❒ **SUSTAINING:** $60/year
- ❒ **JOINT CNGA+SERCAL*:** $80/year (save $10)
- ❒ **STUDENT:** $30/year *Please send photocopy of current ID.*
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All employees of a corporate member receive member pricing when registering for CNGA events. All membership benefits are good for 2016. All copies of *Grasslands* will be sent to the main contact at the organization.

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❍	*Poa secunda*	$250	Below *Stipa* listings	SMALL	B&W version of online ad	2
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*CNGA and the California Society for Ecological Restoration offer this joint membership as a benefit to our members. Learn more about SERCAL at sercal.org.

California Native Grasslands Association

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Some Great Spring Events are Coming Your Way!

Inside: CNGA Field Day, 3 Grass ID Workshops, and CNGA Upland Session at SERCAL 2016 Conference

Front cover: California poppies bask in the coastal sun at Pacific Valley. *Photo: Mark Ray*

Back cover: A pollen specialist bee (*Andrena blennospermatis)* on a yellow carpet (*Blennoperma nanum*) flower at Jepson Prairie. *Photo: Douglas Wirtz*