C. N. G. A. DEVELOP • PROMOTE • RESTORE

GRASSLANDS

The Newsletter of the California Native Grass Association October 1992

GRASSLAND RESTORATION IN CALIFORNIA

by David Amme

The Restoration Process

There are four main tools available for grassland restoration and management: 1) Rest, 2) Fire, 3) Grazing, and 4) Technology (Savory 1988). These tools are not necessarily exclusive of each other and when used together or in tandem can be effective in accomplishing restoration goals.

Rest

The concept of rest as defined here is no application of fire, grazing, or technology. There is both periodic rest and permanent rest. There is misconception held by public and many land managers that once livestock are removed from a grassland habitat , plant succession proceeds to the native climax vegetation that existed before disturbance. This is not the case, and in studies thoughout California rested or ungrazed vegetation grasslands remains dominated by weedy species such as ripgut brome (*Bromus diandrus*),wild oats (*Avena spp.*), and foxtail (*Hordeum spp.*) (Biswell 1956, White 1966, Bartolome and Gemmill 1981, Saenz and Sawyer 1986, Foin and Hecktner 1986). Plant succession is largly controlled by the litter buildup of annual grasses and competion from the fast- growing annuals (Sinclair and Sampson 1931, Heady 1956, Menke 1989). Plant diversity in ungrazed grassland is actually depressed by the weedy grasses (Heady 1977). There is much evidence, both circumstantial and direct, that indicates grassland rest is detrimental to native annual wildflower displays (Edwards 1992).

Fire

There are many factors that must be taken into consideration when developing a grassland restoration strategy utilizing fire. Most of the grassland plants' above ground portions die back at least once a year. Grassland plants gennerally grow rapidly and decompose slowly because of their chemical and physical composition (Mutch 1970, Philpot 1970). Grassland fuels ignite easily and burn readily. Consequently fire is a major decomposition agent and a key nutrient recycler in grasslands (Vogl 1974). Fire increases soil pH and temperatures, creates favorable conditions for the growth of soil fungi, algae, and nitrogen production (Wicklow 1973, Vogl 1979), and suppresses soil pathogens (Parmeter 1977). Generally, perrennial grasses produce more flowers and seed for a few years following fire (Vogl 1979). Fire also substantially reduces annual grass production and density while greatly increasing the herbacious forb component (Hervey 1949, Daubenmire 1968). Periodic fires in grassland generally promote perennial grasses and forb production at the expense of woody species (Daubenmire 1968, Vogl 1977).

Indian burning of the grasslands came late in the evolution of California's Mediterranean grassland (Edwards 1992). However, periodic fires set by lightning have historically occured in the California grasslands and are the primary souce of natural ignition (Komarek 1968, Heady 1972). Until very recently, very little scientific work concerning the effect of fire on the establishment and management of native perennial grasses has been conducted in California's Foothill Grassland (Heady 1972). It has been generally accepted that the California Mediterranean grassland is well adapted to periodic fires (Biswell 1956, Barry 1972). Prescribed fire studies have been recently intiated at Jepson prairie in Solano County (Menke and Langstroth 1978) and in the grasslands of the northcoast and sierra foothills (Bartolome 1968). Prescribed burning in late spring has resulted in the reduction of exotic annual plant seed production and the increase of perennial grass seedling establishment (McClaran 1981, Bartolome pers comm. 1968). On an inner coast range site in San Joaquin County (Site 300, Lawence Livermore National Laboratory), yearly prescribed fires in May over a period of 26 years resulted in a dramatic increase of the native bunchgrass *Poa scabrella* (Taylor and Davilla 1968). This grassland area with over 158 plant taxa was characterised by Taylor and Davilla to be one of the three largest native grasslands in California. At the Jepson prairie, summer burning stimulates perennial bunchgrass fragmentation into two or more vigorous "daughter plants" (Menke 1992). At the U.C. Sierra Field Station, late fall burning after the annual grasses have germinated resulted in a dramatic increase of seedling recruitment of Purple Needlegrass (Hatch et al 1990). Today periodic burning prescribed fire is the prefered tool for grassland restoration utilized by the California Department of Parks and Recreation and The Nature Conservancy (Amme and Prischel 1990). Menke (1992) cautions against frequent prescribed burning because of the volitization of nitrogen and sulfer. Any management tool that exposes the ground to wind and water erosion should be used judiciously and with clear vegetation objectives (Savory 1988).

Fires at too infrequent of an interval, especially on productive soils where the above ground biomass (yield) is great, can lead to native perennial grass mortality (Menke, 1992) and in some cases valley oak (O. lobata) mortality (Griffin pers. comm.)

Grazing

Grazing as well as periodic fire is a natural and necessary process in the grassland landscape (Edwards, 1992). Grazing has similar effects as fire: litter removal, nutrient recycling, basal tiller stimulation, and seedbank reduction of competitive annual plants (Menke, 1992). Today in California there is a tendency to graze close in the California "annual-type" grassland in order to encourage more nutritious herbs and grasses (*Erodium, Trifolium, Medicago, Bromus mollis*, etc.) Because of this, grazing burden on the California Foothill Grassland is substatially higher than would be recommended for perennial bunchgrass management through out the rest of western North America (Menke, 1992). In short, Foothill Grassland habitat is historically and currently being managed as an "annual-type." Generally the grassland is grazed continuously throughout the year or primary growing season with little regard to species composition or diversity. The primary factor that is used to govern grazing intensity on the annual-type grassland is maintaining residual dry matter (RDM) levels at the end of the summer for erosion control purposes (Clawson et al., 1988). Continuous grazing lead to heavy overgrazing of preferred areas, the deterioration of the riparian zone and wetlands, the increase of unpalatable weeds, thistles, and exoti annuals, and the gradual erosion of the top soil resource.

A more holistic approach to grazing, utilizing techniques for the enhancement of native perennial grasses and sustained resource management

(plant, wildlife, soil, water), is a relatively new concept in California grassland management. Recently, new grazing management systems have been introduced that mimic grazing processes under the heading of Holistic Resource Management (HRM) (Savory, 1988). The key feature of these grazing techniques is not so much the intensity of plant defoliation, but the time allowed for plant recovery between defoliation events (Voisin, 1959). Actual livestock numbers can be high, but the amount of time that the livestock spends on a particular area is limited. This time will vary according to type and number of livestock, terrain, pasture size, rainfall, air and soil temperatures, and plant growth rates.
Technological advances in electric fence design has made HRM programs possible. Information and techniques derived from the HRM schemes are applicable to native Foothill Grassland habitat restoration (Menke,1992).

Technology

There are several tools available in the technology category including mowing, herbicide application, and seeding and planting of native perennial grasses. Mowing management involves considerations similar to both periodic burning and livestock grazing. Mowing must be employed with specific vegetation goals and with consideration for the season, height, and frequency of mowing as well as cutting removal. An important study by Love (1944) tested the effect of managemnent (both grazing and mowing) on the establishment of perennial grasses. Love found that early spring mowing with removal of cut material prevents additions of annual grass seeds to the soil seed bank, reduces competition for light and moisture, stimulates perennial grass tillering, and promotes perennial grass seedling establishment. Similar results were found on mulch manipulation trials at the U.C. Hopland Field Station, Mendocino County (Heady, 1956; Heady et al., 1991). Reducing or eliminating the annual plant litter layer inhibits the establishment of weedy annual range grasses (Evans and Young, 1970). Early spring mowing is an accepted worthwhile practice in the establishment and management of native perennial grasses in the face of stiff annual grass competition (Bartolome, pers. comm., Menke pers. comm.).

Selective and non-selective herbicides are available for initial weed control and seedling establishment of native perennial grasses and herbaceous species (Anderson, 1992). Herbicides do not distinguish between beneficial native plants and competitive noxious weeds. Therfore herbicide treatments are most applicable on greatly disturbed sites where the native flora is absent, otherwise there is a possibility that important native plants (both annual and perennial) will be destroyed. Disturbed sites and areas cleared of trees and shrubs should be seeded with a mix of fast-growing native perennial grasses to mitigate erosion, provide competition against weed establishment, and encourage the natural establishment of other native grasses, forbs, and woody plants. The primary native perennial grasses that can be utilized in this general purpose, erosion control setting are California brome, blue wildrye, and meadow barley. Seeding techniques available include broadcast seeding, hydroseeding, drilling, and spreading native perennial grass straw (Kephart and Amme, 1992). The preferred method of seeding in areas where machinery access is difficult or impossible is broadcast seeding coupled with light raking to bury or cover the seed.

Plug planting of selected, long-lived perennial grasses (purple needlegrass, California Fescue, tufted hairgrass, etc.) is another important restoration technique for areas that are compacted, shady or vernally wet (Amme, 1985).
Recently on Mount Tamalpias, a plug planting of Idahoe fescue was successfully used to restore the old eroded Laurel Dell trail from Rock Springs. The plugs used in this project are 3 cm. square at the top and taper down to a 1.5 cm. point. The plug plants are grown in a rigid 200 cell tray (Plastimer container) and cost between 4 to 6 cents each depending on the quantity grown. Plugs should be grown in the late summer so they are ready to plant as early as possible in the fall when the soil has been moistened with the first rains. Depending upon drought, rain occurances, and temperatures, plug planting of slow growing grasses (Stipa and Festuca Spp.) can be delayed until the end of January. If rainfall is low or absent, occassional deep watering is necessary.

The California Conservation Corp. (CCC) grows and plants native perennial grass plugs. The CCC plant plugs are commonly grown in "stubbie" containers that are 4cm round at the top and taper to a blunt point, 14cm, deep.

Monitoring

A proper restoration project requires a means of evaluating success. monitoring grassland restoration is neccesary for determining treatment success and adjusting treatments. Success may be measured by native plant diversity, weed reduction, site equilibrium, and vegetation stability. A restoration program requires permanent transects and plots, control sites, treatment areas on different soils and exposures, replicated treatments, and a fast and efficient means of recording plant composition, cover, frequency, and other biotic factors.

Three types of permanent plots are needed to monitor grassland restoration treatments: 1) Large permanent 30x30 meter plots to monitor the effects of management on trees and shrubs and to evaluate their regeneration; 2) Five to fifteen permanent 1x1 meter quadrants on a 10 to 30 meter transect to monitor the effects of management on scrub habitat and weedy shrub infestations; and 3) Ten permanent 20x50 cm quadrats on a ten meter transect to monitor the effects of grassland management on habitat. The number of transects and plots depends on the size and area to be treated and the number of different vegetation/habitat types in the treatment area. The number of tree and shrub plots should contain at least 20 trees and 150 shrubs. At least ten grassland transects are required to adequately monitor a grassland area up to an acre in size. Instead of randomly placing these permanent plots and transects, they should be placed (stratified) on specific sites representational of habitat being evaluated. Control plots should be paired, that is, choosen to be similar as possible to treatment plots in history, aspect, exposure, cover, and species composition. The plots and transects should be monitored in the peak flowering period, (May) as well as summer, (August). Areas where yield (primary production) information is to be gathered should not be gathered in plots/transects but rather from similar representive locations near the plot/transect. Plot transect information must be recorded before and after treatments and each year after treatment for at least four years or until the next treatment occurs.

Each plot should have a master description/history data sheet that includes the following information:

- Exact location
- Description of site
- Physical parameters (slope, aspect, soil series)
- Soil description (% sand, silt, clay, organic matter)
- Vetebrate signs (deer, gophers, ground squirrels, mice, ect.)
- Management history including grazing, cultivation, mowing, and horticultural and exotic introductions.

All plots should be grid mapped on data sheets. Information to be gathered at each plot in each quadrat include:

- Species composition
- Tree and shrub stem locations, numbers, diameters, and canopy (cover)
- Perennial grass numbers, basal diameter, and cover class
- Annual grass and forb densities and cover (by class/catagory)
- Annual grass and forb densities and cover (by class/catagory)
- Yield samples (primary production) of the grassland areas from all plots/transects

Literature citations available to Grassland readers upon request.

Presidents Message

Restoration Recommendations

The last message included a discussion of the appropriate use of perennial grass ecotypes. This focused on restoration projects; the selection of adapted ecotypes; and the responsibility of users and sellers of seed to, respectively, define the conditions under which a product will be used and reconize the limits of a product's range of adaptation.

Another issue is misidentification of introductions as native. Zoro fescue, a commercially available variety of annual foxtail fescue (*vulpia myuros var. hirsuta*, formerly identified as *Festuca megalura*), occasionally has been called a native. This is an error. In the new edition of Jepson's Manual of the Flowering Plants of California (available April ? 1993), foxtail fescue is formally reconized as a naturalized introduction. All seed suppliers need to acknowledge the alien nature of Zoro in representing this product.

There is concern about the inclusion of annual grasses in mixes with perennial grasses. Seedlings of annual grasses grow more rapidly than those of perennial grasses and they are more competitive; years of research have established the need to minimize competition from annuals in seeding perennials. Where erosion control is an objective, the more rapid protection annual grasses can provide is an advantage, but their inclusion in significant amounts in mixes with perennial grasses will severely limit establishment of the latter.

Annual General Membership Meeting

By now, you have received registration information on the November 13 Annual Meeting. This will be one of the most important of CNGA's 1992 meetings The event will provide information critical for the development of CNGA policy and definition of direction. I encourage early registration (before Oct 31) to avoid the late registration surcharge.

1993 Board of Directors

In this issue you will find a request for nomination of canidates to serve on next year's board. Please consider this carefully and submit your choices following the instructions in the request.

CNGA cannot function or exist without an active membership. Participation in its governance is the strongest statement you can make in support of our objectives. So, please consider members-at-large and officers when submitting nominations for the 1993 Board of Directors. Election by ballot will follow the November Meeting.

Bylaws amendments

Included in this issue of grasslands are suggested changes to the Bylaws of the Association. These have been discussed by the Board and are concidered necessary to provide a smooth transition between administrations. In addition, they will provide "institutional memory", an important consideration in an organization with activities that extend over time. Request for approval of the Amendments will be included on the ballot with canidates for the 1993 Board.

Education

In the last issue, I included an optimistic announcement of the anticipated completion (by 1993) of a draft of Preliminary Guidelines for the Establishment and Management of Native Grasses. This will not occur. The necessary commitments of time and money are not available. Donations of both time and money are necessary to bring this project to fruition.

BYLAWS AMENDMENTS

Changes are needed in the Bylaws. Suggested changes, proposed below and indicated by *italics*, will permit a more efficient transition when new officers and other Board members are elected each year. These changes will provide "institutional memory", so important in an organization with a program that develops over time and with activities that bridge administrations. Note: Deletions occur in brackets.

Discussion of the proposed changes will be included in the November General Membership Meeting.

BY-LAWS CALIFORNIA NATIVE GRASS ASSOCIATION PROPOSED AMENDMENTS

Section 6. Amendments of Bylaws

These bylaws may be amended by a (90 percent) *two thirds* majority vote of *those casting ballots*, providing the amendments were presented for discussion at a previous meeting....

ARTICLE III. MEMBERSHIP AND VOTING

Section 4. Meetings

The President of the Association, or (Vice President) *President elect* in the absence of the President, shall preside at the meetings of the general membership....

Section 6. Powers and Duties

(b) The general membership shall annually elect a (President, Vice President), *President elect*, Secretary, Treasurer and (7) 3 other (Association) *members-at-large*, who shall be members of the Board of Directors.

ARTICLE IV. BOARD OF DIRECTORS

Section 1. Membership *and Election*

(a) The Board shall consist of 11 directors including the President (Vice President), *President-Elect, Immediate Past President*, Secretary, Treasure and 6 elected *members-at-large*. In as much as possible, the Board shall represent a cross section of the diverse affiliations of the Association membership and regions of California. The President, or in the President's absence, the (Vice President) *President-elect* shall preside at meetings of the Board. All Board, (committee and Workshop) members shall be current members of the association.

(b) The tenure of the 6 elected members-at-large of the Board shall be 2 years and their terms shall be staggered so that 3 members are elected each year. After an absence of one year, elected members-at-large of the Board may be reelected. As appropriate, proceedures for nomination and election shall follow those defined in article V., Section 3.

Section 3. Powers and Duties

The Board of Directors shall have the following powers and duties:

(f) The Board may fill any and all vacancies (in the office of President, Vice President, Secretary, Treasurer or representative

Directors) *on the Board* for the remainder of the unexpired terms; but the general membership may, by election, select (a) successors to fill such vacancies for which the Board has not appointed (the) successors.

Section 5. Executive Committee

There shall be an Executive Committee of the Board consisting of the President, (Vice President) *President-Elect, Immediate Past President*, Secretary, Treasurer and one (appointed Director) *member-at-large who shall be appointed by the Board and serve for no more than one year....*

ARTICLE V. OFFICERS

Section 1. Officers

The officers of the Association shall be the President, (Vice President), *President-elect*, Secretary and Treasurer. *Following the annual meeting of the general membership*, the officers shall be elected by the general membership (by mail ballot following the annual meeting) *in accordance with Section 3. of this article.*

Election shall be from among nominations *of members in good standing* submitted as provided in Section 2 of this Article. (Only CNGA members may serve as officers of the association.)

With the exception of the President, the officers of the Association shall serve a term of one year and may succeed themselves. *In the absence of a President-elect, the President may serve one or more additional terms.* The officers shall serve without compensation but shall be entitled to reimbursement for expences as provided for members of the Board of Directors.

Section 5. (Vice President) *President Elect*

President-Elect shall exercise all the functions of the President in the absence or disability of the President *and shall succeed to the office of President on expiration of the incubent's term.*

ARTICLE VI. COMMITTEES AND WORKGROUPS

Section 1. Standing Committees and Workgroups

California Native Grass Association
General Membership Meeting
Holiday Inn-Northeast, Sacramento
November 13, 1992

Vendors Program

The California Native Grass Association will provide its members the opportunity to display and advertise their products at the 1992 Membership Meeting. By including this forum, we believe that the annual meeting will have greater value for our participants. We hope you will join us and share your interests in California native grasses.

When: November 13, 1992
Set up 8:00 a.m.-9:00am
Break down 4:00 p.m.-5:00pm
(coffee and danish supplied)

Where: Holiday Inn-Northeast
5321 Date Ave.
Sacramento, CA 95814-2597
Telephone: (916) 338 5800
(see map enclosed)

Who: Any member who would like to promote or advertize a business or display an educational poster.

For commercial displays, contact:
Dave Gilpin Pacific Coast Seed
7074-D Commerce Circle Pleasanton, CA 94588
Telephone: (510) 463-1188 FAX:(510) 463-1941

For educational posters, contact:
Ted Adams Agronomy Department
University California Davis, CA. 95616
Telephone: (916) 752-3457 FAX: (916) 752-4361

Facilities:
The Mariposa Room (28' x 60') will be available for displays. With 2 exceptions, the basic display element is a 2' x 6' table. Locations and codes are identified on the enclosed scale diagram. The exceptions, Tables P1 and P2, will be 2' x 8'.

Codes and charges for display tables are as follows:

P1-P4 Reserved for posters, NO CHARGE (Elements can be leaned against the wall.)

D1-D10 Standard 2'x6' table. Elements for display may be leaned against the wall but not attached. Walls are movable and accordion pleated.

$75 before Oct. 30
$85 after Oct. 30

DD1-DD4 Double L Tables for anyone needing more surface area.
$100 before Oct. 30
$120 after Oct. 30

Early reservations are encouraged. This helps the Planning Committee, insures those who plan ahead a wider choice of locations and avoids late registration fees received after Oct. 30. There will be no vender registration at the door.

The Association encourages both the display and distribution of living plant material and related items. These may be sold at the end of the meeting. As a courtesy to the speakers and members, please do not remove items from display until the meeting adjourns.

All materials must be kept on tables on or near display area and must meet with committee approval to assure no damage to the premises will occur as a result of display.

On the form below, identify your choice of display space (show 1st, 2nd, and 3rd choices. To reserve your commercial display area, send your check and display area choice to: Dave Gilpin. To request educational display area, contact, Ted Adams.

Please reserve the display space(s) indicated at the CNGA 1992 General Membership meeting. I understand that space will be reserved on a first-come, first-serve basis; and my first choice may not be available. Resistration to attend the meeting is included in the display fee.

Educational Posters (no charge)
P1 P2 P3 P4

Commercial Displays ($75 ea. before Oct 30th; $85 ea. after Oct. 30)
D1 D2 D3 D4 D5
D6 D7 D8 D9 D10

Commercial Displays ($100 ea. before Oct. 30,$120 ea. after Oct. 30)
DD1 DD2 DD3 DD4

Name
(please print) _____

Title _____

Date _____

Address _____

_____

Amount enclosed _____

Telephone _____

FAX _____

This abstract is presented for your review by Kevin Jensen, who will speak at our November meeting in Sacramento.

Authors:
Kevin B. Jensen, Kay H. Asay, and Tom Jones
Recognition of Genetic Variability in Land Restoration. A Case Study

Summary:
The presentation will discuss the geographic distribution, genomic structures and the genomic relationships among closely related taxa of native Pseudoregneria spicata (Bluebunch wheatgrass), an artificially created hybrid between Elytrigia repens (Quakgrass) and P. spicata (Bluebunch). In addition the presentation will explore different mating systems and their potential impact on genetic diversity at the species and population levels. We will discuss the potential of the above species to participate in hybridization events and their potential for genetic introgression between closley related taxa. In conclusion, breeding histories, management options, and sites of adaptation will be discussed.

Agreement Between SCS And CNGA Implemented

SCS has entered into a unique agreement with the CNGA. The agreement is unusal in that there are few nongovernmental organizations that have memorandums of agreement with SCS to cooperate on plant materials and ecosystem restoration.

The agreement provides for CNGA expertise and assistance for SCS plant materials work including grants, literature reviews, seed collections, and planting evaluations. SCS will be working with CNGA to establish grass gardens and various trial plantings.

Request For Nominations: Board of Directors

Nominations are requested for:

President
President-elect
Secretary
Treasurer
Members-at-large

Please note that President-elect is a director addition this year. The office is not included in the by-laws, which can be changed only by vote of the membership. A recommendation to include this office and other recommended changes affecting the structure of the board will be presented in the October issue of Grasslands and discussed at the November General Membership Meeting.

With changes in the current by-laws, ballots in 1993 and subsequent years will not include the office of president. The current President-elect will succeed to the presidency with election of a new president-elect, and the President will become the Imediate Past President and a member of the Board. The recommended changes will create a smoother transition and provide "institutional memory".

This year"s ballot will include the offices of both President and President-elect. This will be neccessary to provide the successional structure if changes are approved.

Any CNGA member is eligible to run for office or for the position on the Board as a Member-at-large. Members are encouraged to nominate themselves or other members. Please be sure if you nominate another person, they agree to the nomination.

A short biography should accompany all nominations, something that can be included on the ballot describing canidate qualifications.

Include each nominee's name, title (if any), affiliation, adress and telephone number and mail to:

CNGA (nominations)
P.O. Box 566
Dixon, CA 95620

Join the Native Grass Association

Date _____

Name _____
(Print)

Title _____

Organization _____

Address _____

City/State/Zip _____

Phone/FAX _____

Membership Status

Regular	$35.00/yr.
Student	$20.00/yr.
Life	$350.00/yr.
Corporate	$500.00/yr.
Associate	$100.00/yr.

To support CNGA in its efforts to Develop, Promote, and Restore,
I am enclosing a donation of $_____
Donations are tax deductible to the extent allowed under federal and state law.

Detach and mail to:
California Native Grass Association
P.O. Box 566
Dixon, Ca 95620

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P.O. Box 566
Dixon 95620