# NORTHERN CALIFORNIA PLANT LIFE: CELEBRATING WHAT WE HAVE WITH AN EYE TO THE FUTURE

THE SECOND ANNUAL SYMPOSIUM
PRESENTED BY

## NORTHERN CALIFORNIA BOTANISTS

California State University, Chico
14-16 January 2008

# Northern California Plant Life:
# Celebrating What We Have With an Eye to the Future

## SYMPOSIUM SPONSORS

- **Friends of the Biological Sciences Herbarium, CSU Chico**
- **College of Natural Sciences, CSU Chico**
- **Mount Lassen Chapter, California Native Plant Society**
- **California Invasive Plant Council (Cal-IPC)**
- **California Native Grasslands Association**
- **Plumas National Forest**
- **U.S. Fish and Wildlife Service, Region 8**
- **Bureau of Land Management**
- **Sierra Nevada Brewing Company**
- **Sierra Pacific Industries**
- **River Partners**
- **The Nature Conservancy**
- **North State Resources, Inc.**
- **Chestnut Cellar (Danyal Kasapligil, Dellavalle Laboratory, Inc.)**

**THANK YOU TO OUR SYMPOSIUM SPONSORS!!**

Cover photo courtesy of Lawrence P. Janeway. View of Mount Shasta from the south, looking across upper Panther Meadow, a site sacred to many old and new earth-based spiritual paths. 29 October 2006.

# WELCOME!

## Northern California Botanists

welcomes you
to our second annual symposium!

MISSION STATEMENT: Northern California Botanists is an organization with the purpose of increasing communication about botanical issues in Northern California among agency, consulting, academic, and other botanists. Our primary objectives are to establish a communication forum via occasional meetings, an internet list-serv, a scholarship fund for students working on botanical problems in Northern California, a job forum, and an annual symposium that focuses on the botany of Northern California.

OFFICERS

- President: Linnea Hanson, Plumas National Forest
- Vice President: Colby Boggs, North State Resources, Inc.
- Treasurer: Gail Kuenster, Calif. Dept. of Water Resources
- Secretary: Jenny Marr, Calif. Dept. of Fish and Game

BOARD OF DIRECTORS

- Barbara Castro, Calif. Dept. of Water Resources
- Robin Fallscheer, Calif. Dept. of Fish and Game
- Christine Hantelman, consulting botanist
- Lawrence Janeway, California State University, Chico
- Kristina Schierenbeck, California State University, Chico
- Rob Schlising, California State University, Chico (retired)
- Joe Silveira, U.S. Fish and Wildlife Service
- Karen Wiese, Tahoe National Forest
- Forest Gauna, Modoc National Forest

SYMPOSIUM PLANNING COMMITTEE

- The Officers and Board of Directors
- Samantha Hillaire, Garcia and Associates
- Mike Williams, Butte College

**PROGRAM OF PRESENTATIONS BY INVITED SPEAKERS**
Bell Memorial Union Auditorium

**Monday 14 January 2008**

**7:30 – 8:30 a.m. Check-in for registered participants, late registration, and poster set-up**

## Welcome

**8:30 – 8:40 a.m.**

1. **Linnea Hanson**, President, Northern California Botanists
   *Welcome to Our Second Northern California Botanists Symposium*

## Session 1: Rare Plant Monitoring and Management

**8:40 – 10:00 a.m.**

**Ann Howald, Session Chair**, Garcia and Associates

2. **Jeffrey White**
   *The Biology and Conservation of Locally Rare Plants*
3. **Erin Martin**
   *Habitat Models for Sensitive Lichen Species in the Western Cascades of Oregon*
4. **John Willoughby**
   *Rare Plant Monitoring for Adaptive Management*
5. **Rod MacDonald**
   *Adventures in Establishing a Native Plant Population (Butte County Meadowfoam,* Limnanthes floccosa *ssp.* californica*) in the Vernal Pool Ecosystem: the Pitfalls and Pleasures*

**10:00 – 10:20 a.m. Break**

## Session 2: Ethnobotany and Vegetation Management

**10:20 – 12:00 noon**

**Gail Kuenster, Session Chair**, California Department of Water Resources

6. **Michelle Stevens**
   *Al Ahwar Peace Park: Conservation and Peace-Building in the Mesopotamian Marshes of Southern Iraq and Iran*
7. **Renee Shahrokh**
   *The Traditional Gathering and Processing of Redmaid Seeds (*Calandrinia ciliata*)*
8. **Don Hankins**
   *Restoring the Patch Mosaic: Indigenous Fire Use as a Management and Conservation Tool*
9. **Susan Campbell**
   *Traditional Uses of Native Plants*
10. **Dennis Martinez**
    *Restoration Forestry from a Native American Perspective: Reversing Loss of Forest Understory Cultural Species/Non-Timber Products and their Larger Plant Communities*

**12:00 – 1:30 p.m. Lunch**

## Session 3: How to Be a Botanist (Panel Discussion)

**1:30 – 3:20 p.m.**

**Kristina Schierenbeck, Moderator**, California State University, Chico

11. **R. Moe**
    *The Consortium of California Herbaria: a Community Approach to Maintaining Specimen Information*
12. **Michael Mesler**
    *How to Be a Botanist in Northwestern California*
13. **David Magney**
    *Botanical Certification: Do We Need to Improve the Profession Through Certification?*
14. **James Bartolome**
    *Rangeland Manager Certification Program*
15. **Robert Carey**
    *The Wildlife Society's Certification Program for Professional Wildlife Biologists*
16. **Eric Huff**
    *The Professional Forester's Law: Purpose, Utility, and Lessons for other Professions*

**3:20 – 3:40 p.m.** **Break**

## Session 4: Ecological Studies, with an Eye to the Future

**3:40 – 5:00 p.m.**

**Karen Wiese, Session Chair**, Tahoe National Forest, USDA Forest Service

17. **Jim Bishop**
    *Alpine Summits – an International Climate Change Study in Northern California*
18. **Chris Ivey**
    *Consequences of Climate Change for Phenology of two Northern California Wildflowers*
19. **Carl Skinner**
    *Climate Change and Fire Regimes: What Might We Expect?*
20. **Tom Rickman**
    *Aspen Management on the Eagle Lake Ranger District: a Case for Community*

**5:30 – 7:00 p.m.** **Reception** – Upstairs in the Bell Memorial Union

**7:00 p.m.** **Dinner** – Bell Memorial Union Auditorium

## Keynote Speaker

**8:00 p.m.**

**Constance Millar**, USDA Forest Service, Pacific Southwest Research Station
*What to Do about Climate Change? Conservation, Blink!, and the Art of Beginner's Mind*

**Tuesday 15 January 2008**

**8:00 – 8:20 a.m.** **Coffee and late registration**

## Introduction

**8:20 – 8:30 a.m.**
**Linnea Hanson**

## Session 5: Going Underground

**8:30 – 9:50 a.m.**
**Rob Preston, Session Chair**, Jones and Stokes Associates

21. **Alice Ratcliff**
    *Nitrogen Budget Considerations for Ponderosa Pine Stand Management in Central Oregon: Are Thinning and Burning Detrimental to Site Quality?*
22. **Robert Schlising**
    *Belowground Behavior in a Geophytic Lily (*Triteleia*)*
23. **Teresa Sholars**
    *Understanding Below Ground Complexity*
24. **Margot Griswold**
    *From Seeds to Rhizomes: Growing Native Wetland Plants for Dust Control on Owens Lake*

**9:50 – 10:10 a.m.** **Break**

## Session 6: Wetland Restoration and Mitigation

**10:10 – 11:30 a.m.**
**Colby Boggs, Session Chair**, North State Resources

25. **Jeffrey Hart**
    *Restoration Approaches for a Sustainable Delta*
26. **Mike Finan**
    *Clean Water Act Section 404 Mitigation*
27. **John Carlon**
    *A Case Study: the Bear River Levee Setback Project – Flood Conveyance, Mitigation, and Restoration*
28. **Andrew Jensen**
    *State Wetland Regulations and Oversight of Compensatory Wetland Mitigation Projects*

**11:30 – 1:00 p.m.** **Lunch**

## Session 7: Vegetation Mapping and Conservation

**1:00 – 2:20 p.m.**

**Todd Keeler-Wolf, Session Chair**, California Department of Fish and Game

29. **Colleen Hatfield**
    *Mapping Vegetation in Complex Terrain – Big Chico Creek Ecological Reserve as a Case Study*
30. **Arthur Dawson**
    *Oaks Through Time: Reconstructing Historical Change in Oak Landscapes*
31. **Robert Holland**
    *Great Valley Vernal Pool Distribution, Rephotorevised 2007*
32. **Jaymee Marty**
    *Habitat Conservation in the Great Central Valley: How Do We Decide Where to Work?*

**2:20 – 2:40 p.m.** **Break**

## Session 8: Northern California Botanical and Ecological Discoveries

**2:40 – 4:40 p.m.**

**Julie Nelson, Session Chair**, Shasta-Trinity National Forest, USDA Forest Service

33. **Carri Pirosko**
    *A Few More Noxious Weeds to Add to Your Watch List!*
34. **Alison Colwell**
    *New Plant Discoveries at Yosemite National Park*
35. **Roy Buck**
    *Stalking the Wild Streptanthus: a New Species from Northern California*
36. **Ayzik Solomeshch**
    *Diversity of North California Vernal Pools: Eco-floristic Approach*
37. **Len Lindstrand**
    *Notes on the Discovery of Squashberry (*Viburnum edule*) in Siskiyou County, a New Shrub Species for California*
38. **Kris Hulvey**
    *Do Abundance Declines of Native Species Affect Invasion Vulnerability of California Grasslands?*

## Closing Remarks

**4:40 – 4:50 p.m.**

**Linnea Hanson**

## POST-SYMPOSIUM WORKSHOPS

Sponsored by The California Native Plant Society and Northern California Botanists
Holt Hall

**Wednesday 16 January 2008**
8:30 a.m. – 4:30 p.m.

### Post Conference Workshop 1: Rare Plants of Northern California Vernal Pools

Instructors: **Carol Witham**[1] and **Jennifer Buck**[2]
[1]1141 37th Street, Sacramento, CA 95816
[2]California Native Plant Society, 2707 K Street, Suite 1, Sacramento, CA 95816

This one day laboratory course will focus on identification of vernal pool rare plants of the Sacramento Valley. Participants will learn characters used to distinguish the rare species beyond those used in the typical dichotomous plant key. Specific microhabitat for the species will also be discussed. Participants will receive numerous handouts to aid their future rare plant survey work. California vernal pools have been called a spatially-stable, pedo-climax community dominated by dwarfish annual plant species. There are about 200 plants known to occur in vernal pools of which half are endemic to this ecosystem. Most of the plants are small. There is a dizzying array of cryptic species in several of the endemic genera such as *Lasthenia*, *Plagiobothrys*, and *Orcuttia*. These genera also contain rare, threatened and endangered species.

### Post Conference Workshop 2: Conducting Rare Plant Assessments

Instructor: **John Dittes**
Dittes & Guardino Consulting, P. O. Box 6, Los Molinos, CA 96055

This is a short course on rare plant survey protocols with an emphasis on pre-field information review, field survey methods, mapping techniques, and reporting standards. This course is intended for environmental consultants, agency staff, and students of natural sciences who would like to improve their working skills in the applied field of rare plant conservation. A variety of California Bio-Regions, plant communities and plant species will be touched upon during discussion; information learned is applicable to botanical assessments conducted anywhere in California.

### Post Conference Workshop 3: Traditional Landcare Practices of Indian Peoples of The Pacific Slope and Their Relevance to Restoration Today

Instructors: **Don Hankins**[1] and **Dennis Martinez**[2]
[1]Department of Geography and Planning, California State University, Chico, CA 95929
[2]Co-chair Indigenous Peoples' Restoration Network (IPRN), Co-director Takelma Intertribal Project (TIP), PO Box 495, Douglas City, CA 96024

This workshop will present an overview of the traditional landcare practices (TLPs) of Indian peoples of the Pacific Slope. We will argue that the rich cultures of the Pacific Slope worked very hard at plant, animal, and fish "management" including regular prescription fire, cleaning of salmon spawning beds, outplanting culturally favored plant species, transplanting of salmon, selective animal and plant harvesting, and pruning and other horticultural practices in a land tenure system which required families and clans that used cultural resources to take "turf" responsibility for TLPs necessary for their maintenance over hundreds of generations.

## INDEX OF AUTHORS

(Talk abstract pages in **bold**; poster abstract pages in *italics*)

## ABSTRACTS OF TALKS

(Abstracts in chronological order; index to authors on page 6)

1. **HANSON, L.**
Feather River Ranger District, Plumas National Forest, 875 Mitchell Avenue, Oroville, CA 95965

### Welcome to Our Second Northern California Botanists Symposium

I'd like to welcome you all to our second symposium. We hope you will enjoy the symposium that we have put together for you this year. We again hope to provide botanists with a forum to hear talks on a variety of subjects and have time to socialize with each other. We have encouraged students to attend so please meet each other. Northern California Botanists is an organization of individuals devoted to the study, preservation, and conservation of native plants and plant communities of Northern California. The purpose is to share information; agency botanists to share project ideas with academic and consulting botanists; graduate students to get project ideas from agency botanists and to meet professional botanists in Northern California. Have a great symposium.

2. **WHITE, J.W.**
Department of Biological Sciences, Humboldt State University, Arcata, CA 95521

### The Biology and Conservation of Locally Rare Plants

All species are rare somewhere. Some are rare in a few places and exist nowhere else – the globally rare species. Others are rare in parts of their range while more common elsewhere. Rarity of the latter kind, referred to as local rarity, typically occurs at the edges of a species' natural range. Locally rare plant populations, also known as peripheral populations, tend to be ecological and genetically distinct and thus are of conservation significance. Furthermore, they contribute significantly to local and regional plant diversity, including plant community diversity. Given the magnitude of global environmental change, both the evolutionary potential and the heightened extinction risk of locally rare taxa warrants much greater attention. Fortunately, a number of recent efforts are in progress to achieve this goal. These include: 1) flora checklist development with explicit identification of locally rare taxa, 2) proposals for assessing the conservation significance of locally rare taxa including spatially explicit criteria for categorizing and ranking their status, and 3) education and outreach aimed to increase awareness and understanding about locally rare plants including the need for monitoring and research of these sensitive and unique plants.

3. **MARTIN, E.P.*[1] and MCCUNE, B.[2]**
[1]Department of Science, Language Arts, and Mathematics, Shasta College, 11555 Old Oregon Trail, P.O. Box 496006, Redding, CA 96049-6006
[2]Department of Botany and Plant Pathology, Oregon State University, 2082 Cordley Hall, Corvallis, OR 97331

### Habitat Models for Sensitive Lichen Species in the Western Cascades of Oregon

We used nonparametric multiplicative regression (NPMR), to develop habitat models for sensitive and ecologically significant lichen species in the western Cascades. Traditional modeling techniques assume that a species has a particular response shape along an environmental gradient. These techniques are often inappropriate for developing habitat models, because in reality, species exhibit a wide range of complex response shapes. NPMR does not assume a particular species response shape along an environmental gradient, and therefore provides a flexible approach to estimating the occurrence of species across the landscape. In addition, NPMR has a multiplicative basis and considers interactions among variables automatically. Our habitat models are based on environmental data describing topographic position, climate and stand structure for 543 plots on the western slopes of the Cascades Mountains in Oregon. Lichen communities were sampled in these plots following standard Forest Health Monitoring guidelines. We present habitat models for *Alectoria sarmentosa* and *Lobaria oregana,* two lichen species that play important ecological roles in western forests, and for several former survey-and-manage species including: *Nephroma occultum, Pseudocyphellaria rainierensis,* and *Usnea longissima*. These models can fo-

cus continuing survey efforts to areas where rare lichen species are most likely to occur. In addition, we have combined our habitat models with a landscape simulation model (Tool for Exploratory Landscape Scenario Analyses, TELSA) to describe the effects of different land management scenarios on lichen species in the Blue River Watershed, OR.

**4. WILLOUGHBY, J.**
Bureau of Land Management, California State Office (Retired); Current address 2236 Mulberry Lane, Placerville, CA 95667

### Rare Plant Monitoring for Adaptive Management

Monitoring is most effective when used as part of the adaptive management cycle, where monitoring results are used to make informed management decisions. Such monitoring requires the development of specific management objectives. Two basic types of management objectives are recognized: (1) target/threshold management objectives specify a desired condition or state; (2) change/trend management objectives specify a change relative to the existing situation. Ecological models and other tools can be used to develop good management objectives. The management action that will be taken in the event the management objective is not met should be specified in advance of the monitoring, with the agreement of the decision-maker and – if possible – all stakeholders. Monitoring that involves sampling requires a sampling objective as a companion to the management objective. The sampling objective accompanying a target/threshold management objective specifies the confidence level and target precision. The sampling objective accompanying a change/trend management objective specifies the statistical power, acceptable false-change (Type I) error rate, and the minimum level of detectable change. Target/threshold management objectives that involve sampling are analyzed by comparing sample means (or totals or proportions) and their confidence intervals to the specified target or threshold value. Change/trend management objectives that involve sampling are analyzed by statistical tests comparing sample means or proportions.

**5. KELLEY, D.B., MACDONALD, R.L.,*[1] TALLEY, S.N., and BARBOUR, M.G.**
[1]Kelley and Associates Environmental Science, Inc., Davis, CA

### Adventures in Establishing a Native Plant Population (Butte County Meadowfoam, *Limnanthes floccosa* ssp. *californica*) in the Vernal Pool Ecosystem: the Pitfalls and Pleasures

Our talk will focus on technical, botanical analysis of collection, planting stewardship, fecundity, and comparisons between years and sites. We want to address directly the difficulties of establishing a viable population of an annual plant species. What do we know and when can we know if we would succeed?

**6. STEVENS, M.L.**
California State University Sacramento, Environmental Studies Department, Amador Hall 555B, 6000 J Street, Sacramento, CA 95819

### Al Ahwar Peace Park: Conservation and Peace-Building in the Mesopotamian Marshes of Southern Iraq and Iran

Designation of the Hawizeh-Azim marshes as an internationally recognized conservation area or transboundary peace park is important for the restoration and sustainable management of this cultural and ecological treasure. It will support protection of regional biodiversity, maintain traditional cultural integrity, support regional economic growth, and promote peace and cooperation among countries in the watershed. There are several possible international instruments to support conservation and co-operative adaptive management of the Hawizeh-Azim marshes straddling the Iran-Iraq border. In 2006, the Iraq Council endorsed participation in the Ramsar Convention on Wetlands with the designation of the Hawizeh marshes as the first Ramsar wetland of international importance. Other approaches to peace park establishment include the following: creation of a Shared Peace Park or Transboundary Biosphere Reserve, designation as Ramsar Sites (Wetlands of International Significance), and designation as a World Heritage Site. Iran and Iraq are most likely to be successful in obtaining funds and resources if they jointly nominate the marsh area under one of the international instruments mentioned above. Given the current political situa-

tion in the two countries, it is more likely that separate designation of conservation status for the Al Azim and Al Hawizeh marshes is a timelier first step to the environmental peacemaking process. Peace park or conservation status would have the added benefit of providing a buffer between two countries that have been in conflict for centuries; cooperation and mutually beneficial goals are crucial for regional security in an area with limited sweet water and the world's largest oil reserves.

**7. SHAHROKH, R.**
American River College, 4700 College Oak Drive, Sacramento, Calif. 95841

**The Traditional Gathering and Processing of Redmaid Seeds (*Calandrinia ciliata*)**

**8. HANKINS, D.L.**
Department of Geography and Planning, California State University, Chico, CA 95929

**Restoring the Patch Mosaic: Indigenous Fire Use as a Management and Conservation Tool**
For millennia the Native people of California used fire as a tool for management of plant and wildlife populations, ecosystems and the conservation of resources at a landscape scale. Since the arrival of non-native cultures the use of traditional fire practices have been virtually non-existent. Though the practices of traditional burning are not currently in general practice, the knowledge does exist within some communities. In light of the contemporary dilemma of wildfire threats and the implications of climate change Native communities may provide a key resource to mitigate such threats. This presentation will summarize previous research of the presenter on restoring traditional fire use to select ecosystems, and discuss the concept of using traditional burn techniques to manage and conserve resources within California.

**9. CAMPBELL, S.D.**
Four Winds of Indian Education, 2986 Sandi Drive, Chico, CA 95973

**Traditional Uses of Native Plants**
I am of Mountain Maidu and Hamawii Pit River decent and I am a basket weaver from northern California. I was taught to weave through a California Arts Council grant in 1992. My master weaver was Denise Davis, who was taught by Lily Baker. I have been a member of C.I.B.A. since 1996 and have attended all but a few of their annual gatherings. I am also a member of a native tending and gathering gardening group in my local area. My family and I participate in our tribal Bear dance ceremonies every spring. In the past I have had the honor of making traditional acorn soup for this ceremony. I am committed to perpetuating and preserving the traditions that connect life with art, the weaver with the willow, and the bear grass with the roots that create the baskets.

**10. MARTINEZ, D.**
Co-chair Indigenous Peoples' Restoration Network (IPRN), Co-director Takelma Intertribal Project (TIP), P.O. Box 495, Douglas City, CA 96024

**Restoration Forestry from a Native American Perspective: Reversing Loss of Forest Understory Cultural Species/Non-Timber Products and Their Larger Plant Communities**
Conventional forest economies focus their extractive activities on production of wood fiber with relatively little attention paid to understory non-timber products. Environmental preservationists have also placed a higher value on saving the same economically important large conifer tree species. Little attention has been given to restoring forest understory plant species and communities as well as non-conifer tree species. We are in the process of losing a huge number of understory and hardwood plants due to shading and lack of frequent low severity fires. Shade tolerant conifer species now occur at a rate ten to twenty times or greater than historical stocking numbers, causing a significant loss of integrity and function while contributing to a rapid increase in the potential for stand-replacing wildfires. This unprecedented level of degradation is causing not only loss of biodiversity and stability, but also is contributing to loss of Native American cultural plants and opportunities for economic diversification of formerly timber dependent rural communities. I argue that saving only culturally or economically important species, while necessary, is not sufficient to restore forest structure, composition, and function that is within the histori-

cal range of variability. I propose a holistic approach to restoration forestry including variable density management and pre-contact Native American fire regimes which helped – with lightening fire – to create an open but diverse forest structure that favors fire-dependent and sun-adapted herbaceous vegetation and flowering tree species. I will show that this kind of historical reference model is viable even in the face of climate change.

**11. MOE. R.,*[1] MARKOS, S.,[1] and VANDERPLANK, S.[2]**
[1]University and Jepson Herbaria, 1001 VLSB #2465, Berkeley, CA 94720
[2]Rancho Santa Ana Botanic Garden, 1500 North College Avenue, Claremont, CA 91711

**The Consortium of California Herbaria: a Community Approach to Maintaining Specimen Information**

The Consortium of California Herbaria (CCH) is a useful resource for accessing specimen records of California plants. Nearly 900,000 records from 15 institutions can be searched by taxon name, county, place name, collector, collection date, collection number, and geographic coordinate. Displays include detailed database records and in some cases, links to an image of the specimen, links to web-based maps with various layers, and links to field-book entries. We will demonstrate some of the search and display capabilities of the CCH and discuss how users of the data can contribute to its accuracy. A discussion of the second edition of The Jepson Manual will show how TJM2 authors are using CCH records to developed revised taxonomic treatments and update distribution information.

**12. MESLER, M.*[1] and KALT, J.[2]**
[1]Biological Sciences, Humboldt State University, Arcata, CA 95521
[2]California Indian Basketweavers Association, Northwestern Field Office, Willow Creek, CA 95573

**How to Be a Botanist in Northwestern California**

Botany is a thriving enterprise in our area. Apart from the eight Botany faculty at HSU and one at College of the Redwoods, we have identified almost 40 professional botanists in Humboldt County, more than half of whom are employed on a permanent, full-time basis. Most work for government agencies, with the rest either employed by well-established local and regional consulting firms or supported by short-term government contracts. Job responsibilities vary, but the majority of our local botanists work on protecting rare species, tracking weedy invasives, and habitat restoration. Humboldt County may harbor one the highest per capita concentrations of botanists in the state, a testimony both to the high demand created by the need to manage the many rare and endemic plants occupying extensive public and private lands and to local academic programs that supply a large number of botany graduates. Our interviews reveal that being a successful non-academic botanist requires more than "simply" knowing how to identify plants. Other important skills include habitat evaluation in all its dimensions, wetland delineation, demographic analysis, GIS, knowledge of relevant statutes and regulations, and political savvy and sensitivity.

**13. MAGNEY, D.L.**
David Magney Environmental Consulting, P.O. Box 609, Grass Valley, CA 95945

**Botanical Certification: Do We Need to Improve the Profession Through Certification?**

Most environmental professions require a license or certification, or certification is available through one or more professional organizations. That is not the case for the professional botanist. The work of the consulting botanist can have a significant influence on land use decisions that can result in the destruction of botanical resources in California. Without certification, anyone can call themselves a botanist, and many do, with little or not formal training or education. The quality of work by professional botanist ranges from excellent to incompetent to even fraudulent. A program to certify professional botanists would provide the professional many benefits, the public would have one measure of competence, and the profession would almost certainly improve over time. The California Native Plant Society is considering a certification program for the professional botanist. This potential program will be described.

**14. BARTOLOME, J.**
Department of Environmental Science, Policy, and Management, 137 Mulford Hall, University of California, Berkeley, CA 94720-3114

### Rangeland Manager Certification Program

**15. CAREY, R.L.**
W.M. Beaty and Associates, Inc., 845 Butte Street, Redding, CA 96001

### The Wildlife Society's Certification Program for Professional Wildlife Biologists

The Wildlife Society (TWS) is an organization of wildlife professionals. Their motto is "Excellence in Wildlife Stewardship through Science and Education." The Wildlife Society has an established program whereby wildlife biologists may be recognized as Certified Wildlife Biologists (CWBs) or Associate Wildlife Biologists (AWBs) based upon their academic training and professional work experience.

**16. HUFF, E.K.**
Professional Foresters Registration Program, State Board of Forestry and Fire Protection, P.O. Box 944246, Sacramento, CA 94244-2460

### The Professional Foresters Law: Purpose, Utility, and Lessons for Other Professions

The Professional Foresters Law of 1972 was enacted, like many other consumer protection laws of the time, to recognize a greater public interest in the management and treatment of California's forest resources. It is intended to regulate individuals who practice the profession of forestry such that environmental protection is assured concurrent with an increasing yield of natural resource benefits. California's Forest Practice Act of 1973 directs the express involvement of professional foresters in commercial timber management and this has been both a blessing and a curse to the modern-day forestry practitioner. The utility of the foresters license is well established within the confines of the state's certified regulatory program for timber harvesting. However, beyond the bounds of commercial timber management, the license appears to have little social value. To date, 2,853 individuals have become licensed through the state's program and roughly 1,250 of those persons had to pass a lengthy and comprehensive written examination with a historical average pass rate of 37%. In light of the strong link to commercial timber management and the apparent limited utility of the license beyond that link, it seems likely that the future ranks of professional foresters will remain forever dependent upon the number of individuals interested in some aspect of commercial timber management.

**17. BISHOP, C. and BISHOP, J.***
California Native Plant Society and Plumas National Forest, 875 Mitchell Avenue, Oroville, CA 95965

### Alpine Summits – an International Climate Change Study in Northern California

Alpine plants live above the elevation where trees can survive, in an environment where maintaining a metabolically viable temperature is the central challenge. The average temperature during the growing season is a limiting factor, and snow cover plays a large role in protection from winter cold. With a warming climate the growing-season temperature is expected to increase, snow cover may change, with consequent effects on alpine plants. In general, the species richness, cover, and topographic distribution of plants at a given elevation would be expected to become more like those typical of lower elevations. The **GL**obal **O**bservation **R**esearch **I**nitiative in **A**lpine Environments (GLORIA) is a systematic program to detect and characterize changes in alpine vegetation. It began in Austria, prompted by evidence of change and the lack of a systematic, global monitoring process to measure it. Over the last century, treelines in many European mountains have been observed to rise many 10s of meters, and species richness has increased on many summits. The alpine zone is very sensitive to climate change, spans all latitudes from tropical to arctic, samples the major elements of the global circulation, and alpine summits often have little direct human impact…it is a very appropriate barometer of global climate change. A GLORIA site has been established in the Carson Range near Lake Tahoe. Freel Peak and two nearby summits at slightly lower elevations were surveyed in 2006. The GLORIA protocol uses a summit-centered pat-

tern that covers the uppermost 5 vertical meters and the next 5 vertical meters. Those 5-meter elevational zones are divided into a nested series of survey plots that range in scale from compass-quadrants to meter-scale quadrats. Cover estimates are made for all plant species and for categories of non-plant surface. Photodocumentation is done for all survey plots. A temperature logger is placed on each of the N, E, S, & W aspects at 10cm depth. The data is archived at the international GLORIA center in Austria. The site will be resurveyed every 5 years to assess any changes. The alpine plants will certainly show effects of global climate change. And they are at risk as unique and beautifully adapted organisms, as their habitat is lifted above the tops of the summits.

**18. IVEY, C.T.*[1] and CARR, D.E.[2]**
[1]Department of Biological Sciences, California State University, Chico, CA 95929-0515
[2]Blandy Experimental Farm, University of Virginia, Boyce, VA 22620

### Consequences of Climate Change for Phenology of two Northern California Wildflowers

Although considerable progress has been achieved in predicting climate change, much less is understood about the potential evolutionary response of organisms to altered climate. Most Northern California plants are well adapted to seasonal drought, but drought frequency and severity are predicted to increase in the coming decades in our region. The fragmented and patchy landscape limits opportunities for migration, which highlights the importance of adaptive evolutionary change. I conducted greenhouse experiments to examine how the timing of reproduction responded to experimental manipulation of water availability in two closely related species of herbaceous monkeyflowers (genus *Mimulus*), one of which is considered more adapted to drought. Both species flowered earlier in drier soil, and earlier flowering was advantageous for both species in both environments, in terms of flower production. I also estimated the magnitude of genetic variation for flowering time in *M. guttatus*, using a paternal half-sib breeding design. I found substantial narrow-sense heritability (about 50%) for flowering time under either wet or dry conditions. In sum, these results suggest that flowering time in these species retains the ability to evolve adaptively in response to drought conditions.

**19. SKINNER, C.N.**
USDA Forest Service, Pacific Southwest Research Station, 3644 Avtech Parkway, Redding, CA 96002

### Climate Change and Fire Regimes: What Might We Expect?

California's Mediterranean Climate makes for annually dry summers regardless of the amount of winter precipitation. A warming climate will likely alter fire regimes in ways that will make it more difficult to manage forests influenced by many decades of changes. Climate change influences fire regimes in complex ways due to differences in responses to variation in temperature and precipitation. Both tree-ring records and modeling indicate the probability of fires is driven by temperature whereas, the extent and intensity of fires is driven mostly by precipitation. Warmer temperatures lead to an earlier onset and later end for the drying period, thus increasing the length of the fire season. Precipitation influences the growth of vegetation (fuel). The more/less precipitation in the wet season the more/less fuel will be produced and available in the dry season. Under a warming climate, the general outlook is to expect a greater number of fires with more escaping initial-attack due to the longer fire seasons. The past century of altering stand structures and accumulating live and dead fuels increases the probability that many fires will be of higher intensity than would have been otherwise been likely. During periods of rapid climate change, fire can serve as a catalyst for significant change in vegetation. Severe fires can alter conditions sufficiently that post-fire successional pathways lead to new and novel vegetation communities.

**20. RICKMAN, T.* and JONES, B.**
USFS, Lassen National Forest, Eagle Lake Ranger District, 477-050 Eagle Lake Road, Susanville, CA 96130

### Aspen Management on the Eagle Lake Ranger District: a Case for Community

Single species management is often emphasized in current management direction within Region 5 of the Forest Service. However, emphasis on single species may not provide for ecosystem resiliency and integ-

rity as often recommended in ecosystem-based approaches to forest management. Aspen ecosystems have been considered keystone communities of conifer-dominated western landscapes due to high levels of biodiversity and ecological services. In order to restore these important communities, the Eagle Lake Ranger District (ELRD) of the Lassen National Forest initiated an active aspen management and restoration program. This comprehensive program was initiated in 1999 and has included, 1) a District-wide mapping and inventory effort of aspen stands, 2) restoration treatments including conifer removal and fencing, 3) effectiveness monitoring of restoration projects, 4) a genetics assessment, and, 5) a District-wide documentation of historical aspen carvings. To date, over 700 aspen stands totaling over 3,700 acres have been inventoried, and restoration treatments have been applied on approximately 91 stands totaling 470 acres. We present information regarding the current condition of aspen communities on the ELRD as well as monitoring data from restoration treatments. We recommend that aspen restoration efforts focus on aspen communities, including the associated plant species within aspen stands, not just restoration of aspen as a single species.

**21. RATCLIFF, A.W.* and BUSSE, M.**
US Forest Service, Pacific Southwest Research Station, 3644 Avtech Parkway, Redding, CA 96002

**Nitrogen Budget Considerations for Ponderosa Pine Stand Management in Central Oregon: Are Thinning and Burning Detrimental to Site Quality?**

Dense stands of 2nd growth ponderosa pine on central Oregon's pumice plateau are considered at risk of catastrophic fire and insect infestation. A long term study to determine ecological effects of thinning and prescribed burning of these stands was established on the Deschutes National Forest in 1989. The resilience of the relatively young and infertile soils (coarse textured pumice and ash) to disturbance was investigated. Correlations between vegetation and soil responses to thinning and repeated prescribed fire on 3 sites are presented. Thinning and fire had little affect on mineral soil quality (total or available N, C, pH, extractable P, cation exchange capacity, C utilization, PLFAs) during the initial 15 years after treatment. However thinning removed up to 10% total ecosystem N and prescribed burning removed an additional 25% (523-549 kg $ha^{-1}$ loss from the forest floor). Estimated time required to replace N losses via symbiotic N fixation was 48 years by *Ceanothus velutinus* and 262 years by *Purshia tridentata*. We conclude that (1) detrimental losses of ecosystem N resulted due to common forest practices, particularly prescribed burning, (2) N losses can be reduced considerably during burning by limiting duff consumption, and (3) replenishment of ecosystem N by N-fixing shrubs is an important yet time-consuming process.

**22. SCHLISING, R.*[1] and KANNELY, A.[2]**
[1]Department of Biological Sciences, California State University, Chico, CA 95929
[2]Yuba College, 2088 N. Beale Road, Marysville, CA 95901

**Belowground Behavior in a Geophytic Lily (*Triteleia*)**

Geophytes – plants dying back to a bulb or corm during the "harsh season" – are abundant but little-studied in California. The small-cormed *Triteleia ixioides* subsp. *anilina* (Themidaceae) was studied in coniferous forest of Butte County. Data on belowground behavior were collected over a 12-month period from a population at 1510 m, starting in the hot/dry Mediterranean summer when aboveground parts were dead. To determine when and how plants replenish perennial corms, dry weight ($X \pm SE$) was determined for 30 plants in July ($0.17 \pm 0.01$ g). Four close individuals were staked near each plant to provide corms for later months. Starting in November, small new stems and roots were gently shaved off corms before drying. By February corms had well-developed shoots and circles of roots, and weighed significantly less than in July. Snow prevented sampling in March and April, but by earliest May corms had single leaves aboveground, weighed significantly less than in February and had a new (rootless) corm developing on top of the old corm. By early June, just before plants began to flower, the new corm weighed much more

than the old one bearing the roots and flowering stem (0.14 ± 0.01 vs. 0.01 ± 0.001g; $p < 0.0001$). Thus, corm replacement, not replenishment, occurs, the individual plants having "non-aging bodies." To determine when and how seeds germinate, local seeds were planted in the field in September and recovered at intervals during winter and spring. As in some other geophytes, a fleshy root appears lateral to the primary root, produces a channel in the soil, and then contracts, carrying the embryo deeper into the soil. Both belowground behaviors during winter illustrate adaptation to Mediterranean conditions, and both probably occur widely at varying elevations in California geophytes.

**23. SHOLARS, T.**
College of the Redwoods, 1211 Del Mar Drive, Fort Bragg, CA 95437

### Understanding Below Ground Complexity

The ecosystem below ground is analogous to the ocean surface; everyone sees the surface but few understand the complexity below ground. Understanding below ground complexity is necessary for: evaluating niches of plants (specifically rare plants); restoration potential of individual sites and understanding the potential for invasive species. Many factors influence the complexity of the underground ecosystem. Biotic factors like the presence or absence of a symbiont will influence the viability of a species. Examples of these symbiotic relationships include mycorrhizae and nitrogen fixation. In a larger context, presence and absence of some species creates habitat. For instance large hole making mammals like voles, moles and gophers create habitat for other important underground species like salamanders and bumblebees. The presence of these species in turn impact slug density and pollination potentials. Important abiotic factors such as soil texture and structure; slope; moisture and soil atmosphere composition (specifically $O_2$ and $C0_2$ content) influence the site quality that allows underground vertebrates and invertebrates to establish there.

**24. GRISWOLD, M.* and RIEDLE-LERHKE, M.**
EARTHWORKS Restoration, Inc., 2116 Arlington Avenue, Suite 301, Los Angeles, CA 90018

### From Seeds to Rhizomes: Growing Native Wetland Plants for Dust Control on Owens Lake

In 1997, the Los Angeles Department of Water and Power (LADWP) entered into an agreement with Great Basin Unified Air Pollution Control District (GBUAPCD) committing DWP to control dust emissions from the surface of Owens Dry Lake, the leading source of dust ($PM_{10}$) emissions in the United States. Mitigation of this major $PM_{10}$ source specified three acceptable dust control measures, one of which was irrigated, local saltgrass (*Distichlis spicata*). Major impediments to establishing vegetation on Owens Lake include soils with surface horizons dominated by soluble salt and alkaline to depth, ranging from sandy to heavy clay prone to dispersion and sealing, as well as saline, anoxic shallow groundwater, seasonally or perennially near the soil surface. There was no established method for large-scale propagation of local saltgrass to meet a schedule requiring 2400 acres of dust control by December 2006. The entire project depended on and was effected by the rhizome of saltgrass, from seed collection and seed farm production to water use and spread of vegetative cover for dust control. Driven by the project schedule, the distance between planted saltgrass rows had to be determined from literature review and limited lakebed research. A distance of 5-feet between beds was determined to allow rhizomes to spread through most of the soils to establish vegetation within the time allowed. Based the heterogeneous soils within the site, some areas had to be under-irrigated to limit irrigation in other areas where soil conditions caused rhizomes to rot. Saltgrass water requirements were evaluated in irrigation reduction trials conducted on site from 2004 through 2007. Results show irrigation during only one month in spring or summer allows saltgrass rhizomes to remain viable and recover above ground vegetation when adequate water is returned after three years. Therefore, temporary, extreme water stress is tolerated by established plants, and is a tool now used to maintain plant stand and cover in the long term for dust control on the lakebed.

**25. HART, J.A.**
Hart Restoration, Inc., P.O. Box 439, Walnut Grove, CA 95690

### Restoration Approaches for a Sustainable Delta

The California Delta's marsh is a relatively young landscape, having been formed since the end of the last Ice Age about 8,000 years ago. Transformation or "reclamation" of this approximately 750,000-acre tidal, freshwater marsh began in the 1850's, soon after the first phase of the gold rush. Since then much of this landscape has been farmed and otherwise intensively managed. Now, some 150 years after reclamation, the Delta landscape has subsided, with "islands" often lying 15-20 ft. below sea level, these being protected by fragile, highly "engineered" levees. About 2/3 of California's water supply is dependent upon the maintenance of this anthropogenic landscape. Building a more sustainable Delta landscape can take place through a variety of vegetative restoration approaches. These include: 1) strengthening levees by means of biotechnical methods; 2) reversing subsidence through re-establishment of tules and other wetland plants; and, 3) agricultural practices that adopt a no-net carbon loss approach. Current levee vegetation maintenance "standards" that leave slopes bare often reduce levee stability; new standards are now being explored that incorporate adequate vegetation for levee protection and habitat improvement. Several "green" levee restoration approaches include biotechnical brushbox that strengthen levees organically and various uses of combinations of rock, soil and vegetative plantings. Obstacles to tule marsh restoration and conversion to carbon sequestration include concerns for methane generation, mercury sequestration are addressed through various management techniques and cultural practices.

**26. FINAN, M.**
US Army Corp of Engineers, Sacramento District Regulatory Branch, 1325 J Street, Room 1480, Sacramento, California 95814-2922

### Clean Water Act Section 404 Mitigation

General overview of Corps jurisdiction, permitting and mitigation policy and practice with emphasis on status and trends in wetland and aquatic resource mitigation within the Sacramento District. Regulatory Guidance Letter 02-02 and the currently proposed Corps and EPA Mitigation Rule address when on-site and in-kind compensatory mitigation versus use of off-site, mitigation bank and/or fee in lieu are appropriate. The Corps' Sacramento District, in accordance with the National Wetlands Action Mitigation Plan and existing regulations and guidance, has developed Habitat Mitigation and Monitoring Guidelines, a draft standardized Bank Enabling Instrument template and standardized conditions and templates for mitigation planning and implementation. Methods to increase success and long term viability of mitigation for losses of waters permitted by the Corps under Section 404 of the Clean Water Act are included. Some mitigation efforts have worked well while others have not. Examples and recommendations for current and future permit-related mitigation efforts are covered.

**27. CARLON, J.,* SWAGERTY, H., GRIGGS, T., and PACINI, N.**
River Partners, 580 Vallombrosa Avenue, Chico, CA 95926

### A Case Study: the Bear River Levee Setback Project – Flood Conveyance, Mitigation, and Restoration

In 2006, the Three Rivers Levee Improvement Authority (TRLIA) completed construction of 3.5 miles of set-back levees at the confluence of the Bear and Feather rivers. The Bear River Setback Levee Project, increases floodway capacity and provides significant opportunities for ecological restoration. The 395 acres in the levee setback area and 300 acres in the existing floodway were actively restored to enhance ecological values. River Partners designed and implemented this project to meet multiple objectives, maintain floodwater conveyance capacity; enhance and restore fish, wildlife, and riparian habitat; provide mitigation for terrestrial resource impacts of the TRLIA flood control projects; protect known archaeological sites and minimize long-term operation and maintenance costs. I will discuss how the specific arrangement of plant communities has met all of these objectives and provides a model for future levee setback planning.

**28. JENSEN, A.**

Central Valley Regional Water Quality Control Board, 415 Knollcrest Drive, Suite 100, Redding, CA 96002

### State Wetland Regulations and Oversight of Compensatory Wetland Mitigation Projects

The State of California's wetland regulations are administered in-part by the State Water Resource Control Board and/or Regional Water Quality Control Boards, through the Clean Water Act Section 401 Water Quality Certification Program and the California Water Code – Porter-Cologne. State wetland mitigation requirements, and wetland mitigation compliance associated with Clean Water Act Section 401 Water Quality Certifications and Porter-Cologne actions are effective but have room for improvement. In 2006 Ambrose et al. prepared the Report – "Evaluation of Compensatory Mitigation Projects Permitted Under Clean Water Act Section 401 by the California State Water Quality Control Board, 1991-2002" which outlined areas of concern and provided recommendations for improvements. The State of California's No-Net-Loss of Wetlands Policy must be met, and in order to ensure that it is being met, regulatory agencies must direct and support staff to continue to improve mitigation requirements and compliance monitoring.

**29. DEVOST, E.,[1] HATFIELD, C.,*[2] and FAIRBANKS, D.[1]**

[1]Department of Geography, California State University, Chico, CA 95929
[2]Department of Biological Sciences, California State University, Chico, CA 95929

### Mapping Vegetation in Complex Terrain – Big Chico Creek Ecological Reserve as a Case Study

Vegetation dynamics are an important underpinning of ecological processes. Dominant vegetation type is a fundamental aspect of the environment creating habitat for plants and animals and it has a crucial influence on disturbance regimes, runoff, albedo, evapotranspiration and ultimately atmospheric composition and global climate. A critical step in assessments of vegetation dynamics encompasses detailed vegetation survey and mapping. Vegetation mapping is particularly challenging in complex terrain where vegetation patterns also reflect the underlying complexity. The area that encompasses Big Chico Creek Ecological Reserve (BCCER), Upper Bidwell Park, and Bidwell Ranch east of Chico in Butte County, CA is a case in point and yet are uniquely positioned in space and property status to contribute to our understanding of long-term ecological processes. We developed a vegetation classification map for the Reserve and Park with vegetation classified at the alliance level according to the national vegetation classification system (Natureserve) and Manual of California Vegetation. Primary interpretive tools included a combination of color photography, field work, DTM and DSM products from side-scanning radar and unofficial BCCER maps. A total of approximately polygons 872 have been classified. The final product will be a alliance vegetation map of a 4507 hectare study area that encompasses Upper Bidwell Park, Bidwell Ranch, Big Chico Creek Reserve and several properties north of the Reserve that are within the first catchment facet of Big Chico Creek as defined by the CalWater watershed database. This data base provides an essential resource that can inform research, education and management of the area.

**30. DAWSON, A.**

Sonoma Ecology Center, 20 Spain Street, Sonoma, CA 95476

### Oaks Through Time: Reconstructing Historical Change in Oak Landscapes

The San Francisco Bay Area was home to some of the most celebrated valley oak lands in California, their grandeur much chronicled by early visitors and residents. Despite extensive loss, substantial interest remains in their preservation and restoration, necessitating an understanding of historical distribution and subsequent change. Assembling and interpreting historical and current oak data for Bay Area landscapes, such as Sonoma Valley in this study, requires the incorporation of several techniques. While historical data involves many uncertainties, careful, site-specific integration of early written accounts, 19$^{th}$ century maps and surveys, historical photographs, and modern field data, make it possible to develop a likely scenario of historical oak distribution in Sonoma Valley. This and similar studies in the Napa and Santa

Clara Valleys are contributing to a detailed picture of the changes undergone by oak savannah and woodland over the last two centuries. Preliminary results indicate a highly patchy distribution within areas considered to have had relatively continuous cover. Valley oak distribution appears to have been largely determined by microtopography, soils, and groundwater. Ring counts from recently cut trees indicated age/size relationships, and suggested that disturbance event(s) may have begun even before the beginning of European-style settlement. Fieldwork to identify heritage trees has found many more trees surviving within these modified landscapes than expected. This study has been used to assess baseline erosion rates, determine site suitability for an oak woodland mitigation project, and to assist other efforts to maintain these trees as significant components of regional landscapes into the future.

**31. HOLLAND, R.F.**
Geobotanical Phenomenology, 3371 Ayres Holmes Road, Auburn, CA 95602

### Great Valley Vernal Pool Distribution, Rephotorevised 2007

In 1996 I presented results of mapping vernal pool habitats in about 18 million acres of the Great Valley and north bay counties up to about the conifer belt. This mapping circumscribed 1,781 polygons that covered 1,027,067 acres based on 1:10,400 scale air photos taken between 1978 and 1995. In 2000 I updated this mapping by comparison to a 1:130,000 scale U2 flight that covered nearly the same area, documenting the demise of 62,681 acres of habitat that was present in the original mapping. In 2007 I reevaluated each of the 1,781 original polygons by reference to 2005 National Agricultural Imaging Program (NAIP) photomosaics. I updated each polygon's geometry to reflect changes in land use since the original mapping, and scored each polygon for its new land use. Fragmentation increased the number of surviving polygons to 2,512. 145,001 acres of habitat as mapped in 1996 had been converted to other uses by the time the NAIP imagery was obtained. Residential and commercial developments accounted for about 49,700 acres (~1/3 of the loss), the balance was due to agricultural developments, especially tree crops, vines, and irrigated pasture or alfalfa. Regulatory focus on residential and commercial development thus ignores the much larger source of habitat loss.

**32. MARTY, J.*[1] and CAMERON, D.[2]**
[1]The Nature Conservancy, 2015 J Street, Suite 103, Sacramento, CA 95814
[2]The Nature Conservancy, 201 Mission Street, 4th Floor, Sacramento, CA 94105

### Habitat Conservation in the Great Central Valley: How Do We Decide Where to Work?

The Central Valley of California contains some of the most diverse habitat in North America and harbors over 800 special status species and species of special concern. Conversion of the remaining habitat to more intensive agricultural uses and residential and commercial development continues to occur at an alarming rate. Limited resources are available to protect the habitat that remains in this region so it is critical to narrow the universe of priority sites for conservation. We used a systematic methodology developed by The Nature Conservancy to identify priority sites for the conservation of biological diversity within the Central Valley of California. The goal of this process was to identify areas that have high biodiversity value while focusing in on those areas that require conservation action in the next 10 years. We assembled the most current and complete spatial data for species and vegetation systems representative of the ecosystems found in the Valley. The basic steps in this planning process included; identifying conservation targets, data collection on target distribution, defining conservation suitability factors, setting conservation goals for target protection, and identifying protected lands currently managed for biodiversity values. We used site selection software (MARXAN) to find an arrangement of planning units to meet our goals in areas with the highest conservation suitability. The model identified 5,740,895 acres of habitat as critical to meeting our conservation goals for the Central Valley. Only 29 percent of this area is currently protected: 22 percent in fee ownership and 7 percent in conservation easement. Nearly 700,000 acres of habitat in these sites will be lost to development if not protected in the next 20 years.

**33. PIROSKO, C.**
California Department of Food and Agriculture, Integrated Pest Control Branch, Noxious Weed Program, 37490 Toronto Avenue, Burney, CA 96013

### A Few More Noxious Weeds to Add to Your Watch List!

Three A-rated noxious weeds have recently been added to the California Department of Food and Agriculture's Noxious Weed List. A-rated weeds are those prioritized by the Department for statewide eradication. Slender False-brome, *Brachypodium sylvaticum*, is a non-native bunch grass invading habitats in western Oregon and more recently in California. The only known infestations are in the Santa Cruz Mountains, in low elevation forested lands. This invasive grass can be identified by its: hairy leaf margin, hollow stems, soft spreading hairs at nodes, seasonally persistent bright green color, flower spikes that noticeably droop, and formation of large clumps. Japanese Dodder, *Cuscuta japonica*, is an invasive parasitic vine with a broad host plant range, from annual herbaceous plants to trees and shrubs. This invasive was likely introduced into California via Asian immigrants as an herbal remedy. Japanese dodder can be distinguished from other dodders due to a vibrant yellow-gold color, comparably thicker stems, scale of an infestation (web covering entire host), and that it is found in more residential areas. Meadow knapweed, *Centaurea pratensis,* was originally introduced as an ornamental and prospective forage crop in Southern Oregon. There are less than ten known sites in the California. Meadow knapweed primarily reproduces by seed and to a lesser extent by root and crown fragments. This knapweed typically invades first along roadsides and in forest openings and needs some moisture for establishment. Meadow knapweed is a cross between brown and black knapweeds and can be distinguished by rather large and showy purple flowers.

**34. COLWELL, A.E.L.,*[1] GROSSENBACHER, D.,[2] and MOORE, P.E.[1]**
[1]USGS Yosemite Field Station, 5083 Foresta Road, El Portal, CA 95318
[2]Population Biology Graduate Group, One Shields Avenue, University of California, Davis, CA 95616

### New Plant Discoveries at Yosemite National Park

Although Yosemite National Park has been explored by many of California's most noted botanists, the flora of large areas of the park remains incompletely documented. In order to most efficiently find the species not yet documented, we focused recent survey efforts on sites containing rare and unusual habitats. The central Sierra Nevada, where Yosemite is located, is well-known for its granitic landscape. However, there are also remnants of uplifted metamorphic rock from ancient sea-beds and scattered mineral springs influenced by the metamorphic rock chemistry. These sites have unusual soil characteristics such as high pH, salt or calcium content and in these sites we found species from coastal and inland saline or alkaline areas (e.g. *Triglochin palustris, Ruppia maritima, Scirpus pungens*), and species disjunct from similar sites to the north and east (e.g. *Erigeron tener, Botrychium ascendens, Botrychium yaaxudakeit*). In addition, locations that remained ice-free during the recent (Tioga) glaciation harbor regional endemic species. Such areas are extensive in the western half of Yosemite and our surveys on both metamorphic and granitic substrates yielded additional populations of rare species known to occur in the park (e.g. *Clarkia australis, Eriophyllum congdonii*) as well as a new species (*Platanthera yosemitensis*).

**35. BUCK, R.* and CLIFTON, G.**
EcoSystems West Consulting Group, 819½ Pacific Avenue, Santa Cruz, CA 95060

### Stalking the Wild Streptanthus: a New Species from Northern California

Rare plant surveys conducted in eastern Shasta County in 1987 and 1988 for a proposed transmission line resulted in the discovery of several populations of a *Streptanthus* (Brassicaceae) species previously recognized by Glenn Clifton, from a population in Butte County, as a possible undescribed taxon. A herbarium survey determined that this taxon had been collected a number of times previously in Shasta, Butte, and Tehama counties, beginning in 1898, and misidentified as a form of *Streptanthus cordatus*. Comparative field and herbarium studies indicated that this taxon, while a member of informal group Cordati along with *S. cordatus*, is most closely related to *Streptanthus campestris* and *Streptanthus bernardinus*, species endemic to the Transverse and Peninsular Ranges of southern California and northern Baja Cali-

fornia. The northern California taxon is very similar to *S. campestris*, but differs consistently in several morphological characters. These three taxa present a biogeographically interesting disjunction: the three taxa occur in similar montane coniferous forest habitats, but the northern California taxon is separated from its southern relatives by approximately 600 km. This new northern California taxon was published in Madroño 54(1) in 2007as *Streptanthus longisiliqus*.

**36. SOLOMESHCH, A.,*[1] BARBOUR, M.,[1] BUCK, J.,[2] HOLLAND, R.,[1] MACDONALD, R.,[1] and WITHAM, C.[1]**

[1]Department of Plant Sciences, University of California, One Shields Avenue, Davis, CA 95616
[2]California Native Plant Society, 2707 K Street, Suite 1, Sacramento, CA 95816

**Diversity of North California Vernal Pools: Eco-floristic Approach**

Californian vernal pool vegetation is unique by the presence of many endemic genera and species. Their habitat is endangered throughout California, only 5-20% of vernal pools remain in existence due to the spread of agriculture and urbanization. Although their threatened nature has attracted legislative and academic interest, the diversity of vernal pool communities has not been well described. During 2001-2005 we sampled more than 2000 plots in 700 pools throughout California. Using multivariate classification and ordination techniques, we defined, named, and ecologically described a new vegetation class (Downingio-Lasthenietea), three new orders, 9 alliances, and more than 30 new associations. The class includes all types of hardpan, claypan, volcanic, terrace, freshwater, and saline pools in California, Oregon, Washington, and Baja California. Classification summarizes existing knowledge about vernal pool biodiversity, geographic distribution, hydrology, and habitat characteristics (e.g. geology, landform, soils). Despite this ecological variety of pools, most of them share a dozen common species, such as *Lasthenia californica, Navarretia leucocephala, Plagiobothrys stipitatus, Downingia bicornuta, Eryngium vaseyi, Pilularia americana*, and *Gratiola ebracteata*. The greatest number of communities and the highest biodiversity are in the order Downingio bicornutae-Lasthenietalia fremontii of shallow fresh-water pools, in part because the physiological stresses of inundation are not strong. Lower community and species diversity characterize deep, long-inundated pools in the order Lathenietalia glaberrimae. Saline pools are in the order Frankenio-Lasthenietalia fremontii. Typical pools consist of several geographically independent associations, most of which are narrowly distributed.

**37. LINDSTRAND, L., III**

North State Resources, Inc., Redding, CA 96002

**Notes on the Discovery of Squashberry (*Viburnum edule*) in Siskiyou County, a New Shrub Species for California**

Squashberry (*Viburnum edule*) is a boreal North American shrub species generally known to occur in moist forests and swamps. In the Pacific Northwest, the species occurs from Alaska and British Columbia into Washington, northern Idaho and north-central Oregon. Squashberry was found during field studies at a site near McCloud, Siskiyou County, CA in summer 2007. The site is characterized as a montane meadow with riparian habitat along a spring-fed stream adjacent to mixed conifer forest. This discovery represents the first recorded occurrence of the species in California and a southern extension of the northwestern portion of its known geographic range.

**38. HULVEY, K.* and ZAVALETA, E.**

Department of Environmental Studies, University of California, 1156 High Street, Santa Cruz, CA 95060

**Do Abundance Declines of Native Species Affect Invasion Vulnerability of California Grasslands?**

Yellow starthistle negatively impacts California grasslands through losses of forage quality, native species, and landscape aesthetics. We conducted two experiments, one in pots at Stanford's Jasper Ridge Biological Preserve, and a second in the grasslands of McLaughlin Reserve near Lower Lake, focusing on the competitive interactions between starthistle, *Centaurea solstitialis*, and the native tarweed, *Hemizonia*

*congesta*. We investigated whether tarweed abundance declines affected grassland vulnerability to starthistle invasion. This is important because changes in species abundance are more common than extinctions, and ecosystem functions such as invasion resistance may be mediated by such changes. In the first experiment, we created grassland microcosms with varying tarweed abundance levels. We invaded half the microcosms with starthistle and gauged invasion resistance by measuring final starthistle biomass and flower number. To investigate possible mechanisms driving the relationship between tarweed abundance and invasion, we measured soil moisture, nutrient availability, and available light. In the second experiment, we invaded grassland plots containing a natural range of tarweed abundance levels with starthistle. We gauged invasion resistance by measuring final starthistle abundance, biomass, and flower number, and investigated mechanism by measuring soil moisture and available light. In pots, we found tarweed affected invasion resistance, with increasing tarweed abundance resulting in less starthistle biomass and flower production. Soil moisture was the only measured factor that explained this relationship; pots with greater tarweed abundances used more water. In the field, it was uncertain if tarweed abundance affected invasion because few starthistle plants survived in any plot, possibly due to low rainfall during the 2007-08 growing season.

## ABSTRACTS FOR POSTERS

(Abstracts in alphabetical order by primary author name; index on page 6)

**BERLUND, T., GALEY, B., and SHEPARD, E.**
Garcia and Associates, 435 Lincoln Way, Auburn, CA 95603

### 2007 Comprehensive Weed Survey Methods for Pacific Gas and Electric Company's Mokelumne River Project

Baseline surveys and mapping of noxious weed infestations were conducted within the Upper Mokelumne Watershed in 2002 to document the population composition and extent of noxious weed species to comply with a Federal Energy Regulatory Commission's (FERC) license condition for Pacific Gas and Electric Company's (PG&E's) continued operation of the Mokelumne River hydroelectric project. Following completion of the baseline comprehensive weed survey conducted in 2002, PG&E, in consultation with the Eldorado National Forest (ENF) developed a list of nine target weed species to be managed. A subsequent 2007 comprehensive survey by Garcia and Associates (GANDA) documents the population size and distribution of these target weed species and includes treatment prescriptions for the continued control of the target weeds. The 2007 survey effort used global positioning system (GPS) and geographic information system (GIS) map layers prepared for ArcPad 7.0.1 software on handheld dataloggers. These layers included local roads data and geo-rectified aerial imagery to navigate the survey area. Attribute data was collected using a grid layer composed of square 2.5-acre management cells that included fields for recording species composition, population size, and percent cover for each target weed species in each management cell in the grid layer. An initial management prescription to control the target weeds was developed based on the target weed species found within the survey area.

**CHRISTOFFERSON, C.**
USDA Forest Service, Plumas National Forest, Feather River Ranger District, Oroville, CA 95965

### Burning Bear-Grass for California Indian Basketweavers

Bear-grass (*Xerophyllum tenax*) has been used for thousands of years and continues to be used by California Indian basketweavers. The plant is an essential element in traditional Maidu basketry art and culture. Bear grass must be burned in order to produce flexible, strong leaves. Bear grass that has not been burned is not useable for basket weaving. A century of fire suppression has reduced the amount of bear grass suitable for basketry. Fire suppression has also resulted in an accumulation of flammable material which exacerbates the process of applying prescribed fire to meet resource objectives. The Feather River Ranger District in cooperation with local basket weavers, and the California Indian Basket Weavers Association have worked together to reintroduce fire to promote bear grass. Two prescribed fires have been applied with drastically different results. The first fire was conducted in the fall of 2005 and resulted in high bear grass mortality. The second was conducted in the spring of 2007. Permanent monitoring transects were established prior to the second burn and post treatment survival and plant cover will be collected in the spring of 2008. We are using an adaptive management approach to gauge success and modify actions when necessary.

**DIGGORY, Z.E.,[1] STELLA, J.C.,[2] ORR, B.K.,[1] and REIL, M.D.[1]**
[1]Stillwater Sciences, Berkeley, CA
[2]SUNY College of Environmental Science and Forestry, Syracuse, NY

### Growth and Survival of Riparian Trees Three Years after Revegetation of Graded Floodplain Dredger Tailings at the Merced River Ranch

The floodplain habitat of the Merced River Ranch (MRR) has been severely degraded by historical dredger mining. Floodplain restoration is being planned at the site and extensive revegetation will be necessary to recreate a riparian corridor that provides multiple ecosystem benefits. A multi-factorial experiment was conducted from 2004-2006 to reduce uncertainty in how site conditions will affect revegetation performance and to improve the effectiveness of future revegetation efforts. The MRR revegetation

experiment tested the effects of depth to groundwater, irrigation duration (irrigated for 1, 2 or 3 years), and weed control treatments on the survival and growth of Fremont cottonwood, box elder, Oregon ash, and valley oak. Final survival of plants irrigated for all three years ranged from 42-87% by species. Final survival of plants irrigated for only one or two years ranged from 31-74% and 41-74%, respectively. Mortality was influenced most strongly by initial planting size in the first year, by irrigation duration in the second year, and by depth to groundwater in the third year. The temporal change in the primary drivers of mortality is likely the result of the interaction of the treatment regimes with the plants' growth patterns and changing vulnerability over time. Growth patterns did not vary systematically by treatment factors, although some factors were important for individual species. We used these results in conjunction with logistic regression models of survival to develop recommendations for minimum sizes of container stock and cuttings, irrigation duration, restored floodplain elevations, and weed control measures.

**EGAN, S.M., COLLINS, T.L., and SYKES, D.M.**
ECORP Consulting, Inc., 2525 Warren Drive, Rocklin, CA 95677

### Yankee Slough Preserve: Vernal Pool Construction in the Sacramento Valley, California

The Yankee Slough Preserve is a 436-acre mitigation site located in western Placer County. Construction of over 43± acres of vernal pool habitat occurred at the Yankee Slough Preserve as an off-site mitigation requirement for impacts incurred at a nearby development project. The Yankee Slough property was deemed to be a suitable mitigation site because 1) it historically contained vernal pools that had been degraded by past farming activities, 2) appropriate soil types were present and intact, 3) federally-listed threatened vernal pool fairy shrimp (*Branchinecta lynchi*) were present on-site, and 4) the property is situated adjacent to existing and proposed conservation areas. During the wetland design process, soil characteristics, depth to water restriction layer, pre-farming/historic wetland location, and current topography were evaluated. Wetland seed and invertebrate cyst-bearing topsoil was collected from vernal pools planned for impact at the nearby development site and transferred to the preserve site. A one to two-inch deep layer of this soil was spread out in the bottom of constructed vernal pools, which were designed to become seasonally inundated by annual rainfall, allowing vernal pool plant seeds and invertebrate cysts to grow and become established. The constructed vernal pools will be monitored for 10 years. The results of the first and second year of monitoring indicate that most of the constructed pools are exhibiting appropriate vernal pool hydrology and have characteristic vegetation, with *B. lynchi* found within 39 of the newly constructed pools. Following 10 years of monitoring, if deemed successful according to agency-approved criteria, a less-intensive monitoring program will commence and be conducted in perpetuity.

**FISCHER, R.D.**
2312 Floral Avenue, Chico, CA 95929

### Ahjumawi Lava Springs State Park – a Northern California Boat-in-Only Park

The theme of my poster has two goals. In part one I simply wish to share the aesthetics of Ahjumawi's land, water, flora and wilderness-like qualities. Part two deals with the known but weakly documented botanical transition between portions of Northern California's two geographical provinces; California Floristic Province and Great Basin Province. Specifically, the information relates mainly to three of their adjoining regions; Cascade Ranges, Sierra Nevada, and Modoc Plateau. After canoeing and exploring Ahjumawi for years my interest in wildflowers and photography led me to begin compiling its botanical and general park data into photo illustrated reports. Upon reviewing my first year's collection data (2004) I began to see a pattern. Many of my species were not listed by the Jepson Manual (1996) for the Great Basin or for its Modoc Plateau region. I found that my data was more in line with Vern Oswald's "Selected Plants of Northern California and Adjacent Nevada" (2002). In addition, most of the Modoc Plateau endemics encountered were very weakly represented in both populations and total number of species observed. My hope is to both continue my Ahjumawi wanderings and increase my understanding of its flora. Yet I trust "there remaineth an effectual struggle to be made" Mosiah 7:18.

**GRABIEL, M.**
University of California, Santa Cruz, CA

### Grazing Reduction by *Tegula funebralis* in the Presence of a Keystone Predator, *Pisaster ochraceus*: Evidence for Trait-Mediated Indirect Interactions

Classical trophic cascade models focus on predation as the source of indirect effects (density-mediated indirect interactions, DMII) in a three-level food chain. Yet a growing body of work indicates that trait-mediated indirect interactions (TMII) complement density-mediated indirect interactions by altering the behavior and habit of prey species. We tested the strength of trait-mediated indirect interactions in rocky intertidal communities by examining interactions among a keystone predator, *Pisaster ochraceus*, an herbivore, *Tegula funebralis*, and the algal community in and around mid-high intertidal pools at Horseshoe Cove, Bodega Bay, CA. Laboratory experiments demonstrated a reduction in grazing by *Tegula* when caged *Pisaster* were added. Initial field experiments with diatom-covered plates to estimate grazing also saw a reduction in herbivory when *Pisaster* was added. This trend disappeared when repeated at a later date. When *Pisaster* was added *Tegula* density remained similar to the control treatment throughout the field experiment. Algal percent cover and composition in and around pools did not change significantly from each other over the 7-week period. Trait-mediated indirect interactions appear to have an important temporal relevance and the importance of density-mediated indirect interactions and trait-mediated indirect interactions on the algal community need to be explored.

**HARTWELL, G.W.**
Paradise, CA 95969

### Atypical Apparitions: Images of Uncommon Beauty

Across a spectrum of color, texture, form and function, photographer George Hartwell presents an acute perspective of just a few of the rare, uncommon and recently described plant species integrated into the kaleidoscope of biological diversity in Butte, Glenn, and Plumas counties. These snapshots of life-on-the-edge for some of the species portrayed provide a macro-focused image of the fact that rare natural beauty may fade from nature's palette into obscurity absent protection and careful management.

**HAYDEN. M.K.,[1] KEITH, A.J.,[1] SWANEY, W.M.,[1] JAQUETTE, C.D.,[1] REIL, M.D.,[1] STELLA, J.C.,[2] and ORR, B.K.[1]**
[1]Stillwater Sciences, 2855 Telegraph Avenue, Suite 400, Berkeley, CA 94705
[2]Forest and Natural Resource Management, SUNY College of Environmental Science and Forestry, One Forestry Drive, Syracuse, NY 13210

### Former Agricultural Fields Restored to Riparian Floodplains along the Lower Tuolumne River, CA: Inundation Patterns, Fish Use, and Revegetation Results

Agricultural encroachment and flow regulation have impaired natural floodplain functions of many Central Valley rivers, resulting in significant loss of native riparian forest and impacts to native fish and wildlife. In 2004, restoration of 238 acres of former agricultural fields along the lower Tuolumne River was initiated by notching surrounding berms to restore hydrologic connectivity, and planting 60 acres with native riparian trees and shrubs. Post-implementation monitoring began in 2005 to evaluate floodplain hydrology and sedimentation, fish use, survival and growth of planted vegetation, and natural recruitment of native woody vegetation. Floodplain inundation began at flows of 4,000 cfs (a 2-year recurrence interval event), and suitable depth for fish was achieved at approximately 6,000 cfs. Juvenile Chinook salmon were observed only in floodplain areas with measurable water velocity. Prolonged inundation events in 2005 and 2006 resulted in mortality of 64-100% of planted California blackberry, California rose, and box elder on a lower elevation field, while all other planted species had $\geq$ 70% survival. Fremont cottonwood and willow seed rain occurred within unmaintained experimental areas, but seedling recruitment was limited to one experimental area in 2006. Seedlings survived through the summer growing season despite heavy cover of non-native herbaceous vegetation. Results imply that restoration of floodplain hydrogeomorphic function at this site is modest under regulated flow conditions without lowering floodplain

surfaces, although it does provide periodic benefits to aquatic ecosystems during wet years and will continue to improve riparian conditions for terrestrial species as planted and naturally recruited vegetation matures.

**HEE, S.**
USDA Forest Service, Shasta-Trinity National Forest, Weaverville Ranger District, Weaverville, CA 96093

### Botany Program of Shasta-Trinity National Forest

Located in northern California, the 2.1 million acre Shasta-Trinity National Forest encompasses 3,280 square miles ranging in elevation from 1,000 to 14,162 feet. Situated within parts of Shasta, Trinity, Modoc, Siskiyou, Tehama, and Humboldt counties, the Forest boasts such botanical phenomena as Scott Mountain and Mount Eddy; the Castle Crags, Trinity Alps, Chanchellula, Yolla Bolly-Middle Eel, and Mount Shasta Wilderness Areas; the Rattlesnake Creek Terrane; South Fork Mountain; the headwaters of the Trinity River and New River; and Mount Shasta. Spanning five major geographic and botanic subregions: the Klamath Ranges, High North Coast Ranges, the High Cascade Range and Foothills, and the Modoc Plateau; Shasta-Trinity National Forest contains roughly 1,800 vascular plant species, including 52 species managed within the Sensitive Plant Program. The Botany Program of the Forest includes rare vascular plant, bryophyte, lichen, and fungi conservation; native plant materials collection, propagation, and restoration; weed management; public education and collaboration and other aspects.

**HEISE, K.,[1] HULSE-STEPHENS, G.,[2] and TOREN, D.[3]**
[1]Consulting, 453 Mendocino Dr., Ukiah, CA 95482
[2]Consulting, 915 East Hill Rd., Willits, CA 95490
[3]Consulting, 50 Gardenside #2, San Francisco, CA 94131

### Considering Bryophytes in Botanical Surveys

Over 750 bryophyte species are known to occur in California: 602 mosses, 142 liverworts, and 7 hornworts. They are distributed across the state but reach their highest diversity in the northwest, a wetter region of varied topography, geology and vegetation. Although bryophytes are included in the 6th edition of the *CNPS Inventory of rare and endangered plants of California* and the CNDDB they are seldom considered in botanical surveys. During independent surveys in 2007, bryophytes along with vascular plants were documented at 3 sites in Mendocino County ranging from coastal redwood/Douglas-fir to interior Oak woodland/riparian forest. The bryophytes added significantly to local plant diversity across all sites and proved useful in recognizing a wide variety of microhabitats and substrate preferences. Recently published checklists as well as descriptions of new species of California bryophytes along with various identification workshops now make these small, largely ignored plants within reach for the curious botanist.

**HOPKINSON, P., STEVENSON, M., HAMMOND, M., GENNET, S., RAO, D., and BARTOLOME, J.W.**
ESPM-Ecosystem Sciences, University of California, Berkeley, CA 94720-3114

### Annual Ryegrass (*Lolium multiflorum*, Poaceae), a New Regional Grassland Dominant

The non-native grass *Lolium multiflorum* has long been characterized as a minor player in the Valley Grassland. In wetter areas of California's annual grasslands however, there is increasing evidence to suggest that *Lolium* has become a regional dominant. *Lolium* often forms dense stands that crowd out native plants, the loss of which affect other natives. A study in six grasslands in Alameda and Contra Costa counties found that between 2002 and 2007, from a pool of approximately 100 species, *Lolium* was the overall dominant species every year. In the wet years 2005 and 2006, *Lolium* made up 23% and 32%, respectively, of the absolute cover. Even in the drought year 2007, *Lolium* was dominant at 19% cover. *Lolium* appears to have been on the increase for at least a decade. In a single watershed in Contra Costa, a study from 1993 to 2001 showed that *Lolium* rose steadily from under 10% cover in 1993 to dominance at 45-55% cover during 1997 to 2001. These high levels of *Lolium* in the last two decades contrast with

low levels found in a study from the early 1970s at another Contra Costa site. From 1969 to 1973, *Lolium* only rose above 8% cover once, when it reached 16% and was never the dominant species. Elsewhere in the San Francisco Bay Area and further south along the coast, similar trends have been observed. *Lolium* dominance may be driven by nitrogen deposition from cars, and negative ecological impacts of this new dominant may be significant.

**KEEVER, M.[1], HUME, N,[1] JURJAVCIC, N.,[1] LEVERICH, G.,[1] CROSBIE, L.,[2] DIETL, M.[3]**
[1]Stillwater Sciences, 2855 Telegraph Avenue, Suite 400, Berkeley, CA 94705
[2]Sacramento Area Flood Control Agency, 1007 7th Street, 7th Floor, Sacramento, CA 95814
[3]US Army Corps of Engineers, Sacramento District, 1325 J Street, Sacramento, CA 95814

### Revegetation at Sacramento River and American River Bank Protection Projects: Are Mitigation Revegetation Designs Self-Sustaining?

The US Army Corps of Engineers and local partners such as the Sacramento Area Flood Control Agency have recently repaired a number of erosion sites along the nearly 1,000 miles of existing levees and flood control facilities that protect cities, rural communities and agricultural lands in the Sacramento Valley and Sacramento-San Joaquin River Delta. In addition to ensuring the reliability and integrity of the levees and flood control system, recent bank protection efforts have included a number of environmental enhancements such as benches for wetland and riparian species and anchored woody materials to provide riparian and aquatic habitat. Revegetation designs attempt to establish a self-sustaining, mixed-canopy forest and riparian scrub habitat that provides both terrestrial and aquatic habitat values without compromising bank protection features. Monitoring of projects constructed between the late 1990s and 2006 compares revegetation success and site evolution at older, more established sites with more recent sites and whether the designs are self-sustaining or require longer-term management strategies.

**KLEINER, E.S.**
Comstock Seed Company, 917 Hwy 88, Gardnerville, NV 89460

### A Survey of Reclamation and Restoration Projects in the Sierra Nevada Mountains

This poster displays several high elevation projects from the Sierra Nevada Mountains. The challenges that these projects share include short growing seasons, poor soils, lack of appropriate seed, and logistical problems related to terrain, remoteness, and weather. The projects include road cuts, riparian corridors, mines, and a comparison of two ski resorts. For each project, I have described the installation procedures and supplied monitoring data when available. The accompanying photos have followed these projects over time. The information gained from these projects not only adds to our data bank for future project design and implementation, but also adds to our intuitive sense of how to work with the nuances of nature.

**MALLEK, C.R.**
Department of Plant Sciences, University of California, Davis, CA 95616

### Describing Vegetation, Fire Regime, and Canopy Seed Storage in a California Cypress, *Callitropsis macnabiana*

California contains a greater diversity of coniferous trees than any other comparably sized region in the world, particularly within the genus *Callitropsis* (cypress, formerly *Cupressus*). At the regional scale, California cypress exhibit a very limited distribution, yet, where they occur, cypress typically dominate the vegetation. As a result, cypress species characterize a set of distinct community types that are both unique to and rare within the state. However, despite their substantial contribution to both the floristic and vegetational uniqueness and diversity of California, maintenance of these species and the communities they dominate suffers from a limited understanding of community attributes, ecological processes, and life history traits. At the species level, a conspicuous example of this deficiency is the serotinous, serpentinophilic, northern California endemic, *Callitropsis macnabiana* (A. Murray bis) D.P. Little (MacNab cypress). This ongoing project addresses the following questions: 1) To what extent does MacNab cypress

vegetation vary in terms of floristic composition and vegetation structure; and how does this relate to in the abiotic environment? 2) What are the fire regimes of MacNab cypress communities as inferred from population age structure, adjacent vegetation type, fire behavior modeling, and post-fire seed bank recovery? 3) Does significant variation in degree of canopy seed storage (serotiny) exist among populations of MacNab cypress? If so, with what environmental factors is this variation correlated? Some early data pertinent to these questions will be provided.

**MALPAS, J.**
The Calflora Database, Berkeley, CA 94709

### What Grows Here? Conveying the Local Diversity of Plant Life

Calflora has been collecting plant occurrence data from diverse sources for 10 years. Based on this data, the Calflora website suggests a statewide distribution for various wildland species, both native and exotic. However, this use of the data does not convey any sense of the diversity of plant life in various areas. In 2007, Calflora began a new service called *What Grows Here?*, which uses the same data to suggest what plants have been observed growing wild near any particular location in the state. The service works best in an area where there is a high density of observation data available (e.g. many location checklists for small areas). To come up with a reasonably complete list of species that may grow near a point of interest, the user can choose any of several geographical abstractions around the point, including watershed, park or reserve, zip code, and quad. (These abstractions are most helpful in areas where observation point data is scarce.) Potential uses of the service include the following: 1. a homeowner can find suggestions for locally appropriate landscape plants; 2. a hiker can take a plant list along on a trip to an open space area; 3. a community group can look for rare or significant plants in the area of a proposed development; and 4. a restorationist can find a list of plants suitable for a project site. *What Grows Here?* also highlights areas of the state where wild plants have not been adequately studied.

**MARTIN, C.,[1] GRIGGS, T.,[1] and SILVEIRA, J.[2]**
[1]River Partners, 580 Vallombrosa Avenue, Chico, CA 95926
[2]US Fish and Wildlife Service, Sacramento National Wildlife Refuge Complex, Willows, CA 95988

### Observations and Future Research on Great Valley Riparian and Floodplain Meadow Habitat.

The Great Valley riparian and floodplain meadow habitat is a rare plant community that occurs on floodplains in the Great Valley of California. This community occurs in sinks and channels often associated with a high water table and soils with textures ranging from clay to silt loam. It is composed of perennial herbaceous plant species, some of which are rarely observed and do not often occur in other habitat types. This plant community was first discovered in 2002 at the San Joaquin River National Wildlife Refuge and is currently documented to exist in three locations in the Great Valley. Riparian meadow habitat supports numerous rare California native plant species as well as unusual native insects. Although riparian restoration is becoming a common practice, riparian meadow habitat is not incorporated. River Partners will be conducting an experiment on three of its restoration sites to study the propagation needs of selected species in this plant community for future restoration work. This will include planting methods, weed control needs and irrigation needs. This experiment will be part of a long-term joint research project between River Partners and the US Fish and Wildlife Service, Sacramento River National Wildlife Refuge that will be conducted in order to produce a restoration and management plan for Great Valley riparian meadow habitat.

**MCCLAIN, C.**
Department of Biological Sciences, California State University, Chico, CA 95929

### Assessing Recovery of Understory Plants at Riparian Restoration Sites along the Sacramento River

Riparian forest restoration along the Sacramento River began the late 1980s. Initial restoration efforts in 1989-2000 were directed towards planting trees and shrubs with the assumption native understory vegetation would colonize the sites naturally. Holl and Crone (2004 – J. Applied Ecology 41:922-933) surveyed the understory composition in these initial restoration sites in 2001 and found they were dominated by non-native species. Recent restoration efforts (1999-present) incorporate native understory species in plantings to create an initial floristic composition of a diverse suite of species at the onset of restoration. We conducted a study of how initial planting approach and time since restoration affect the successional trajectory of riparian plant communities. During May-June 2007 we resurveyed the 15 sites of Holl and Crone (2004) and surveyed an additional 20 newer restoration sites, in most of which native herbs and vines were planted. Our preliminary analyses suggest: 1) Relative native understory cover at sites planted with only woody species has not changed over the past 6 years; 2) Sites planted with a more diverse suite of native species are not always more successful in increasing cover and richness of native understory species; 3) Mean exotic species cover is inversely proportional to mean overstory cover; however there is no significant relationship between overstory cover and native understory cover. Future restoration efforts may benefit from planting shade-tolerant native understory species after canopy cover has more fully developed to avoid competition with sun-loving exotic species.

**MERRIAM, K.,[1] RENTZ, E.,[2] and PRITCHARD, K.[2]**
[1]Plumas National Forest, Quincy, CA 95971
[2]Klamath National Forest, Happy Camp, CA 96039

## Restoring Fire to Baker Cypress Populations in Northern California

Many fire-adapted plant communities cannot survive extended periods of fire suppression. Baker cypress (*Cupressus bakeri*), a rare serotinous conifer known from only a handful of locations in northern California, is thought to depend on fire for seed dispersal, and to require post-fire conditions such as bare mineral soil and direct sunlight to germinate. Fire has been excluded from many sites supporting *C. bakeri* for decades and most populations show no evidence of regeneration. In 2006 we began a study to examine how prescribed burning and thinning treatments affect cypress regeneration and to identify factors that influence cypress recruitment. In the first year of this project we collected pre-treatment data at seven *C. bakeri* occurrences across northern California. We found large variation in the status of these populations. Some sites were characterized by decadent, even-aged stands, while other sites appear to support healthy, multi-aged populations. We observed few seedlings at sites that had not experienced recent fires suggesting that fire is critical for recruitment. We also found fewer cones in densely populated stands and preliminary measures of seedling viability were low. Next year we will collect post-treatment data at sites where prescribed burning and thinning treatments are being implemented and at two sites where wildfires occurred since the project began. The information we collect will not only fill gaps in our understanding of *C. bakeri*, but will also help us to develop recommendations for restoring fire to cypress and other fire dependent communities across northern California.

**MILLER, T. and POSEY, R.**
USDA Forest Service, Shasta-Trinity National Forest, Shasta-McCloud Management Unit, Mt. Shasta, CA 96067

## Promoting Community Partnerships Through a Restoration Greenhouse Program

The Forest Service Greenhouse in Mt. Shasta was built in 1993 with money from the McConnell Foundation to grow plants for high alpine meadow restoration on Mt. Shasta. With the help of all of our partners and volunteers, the greenhouse has grown plants for many restoration projects both large and small. We also provide educational opportunities for local schools and other groups such as garden clubs on the importance of using native plants in restoration and landscaping projects. We provide information on how to use native plants in gardens to attract butterflies, pollinators, birds and other wildlife. We also provide information on Native American uses of native plants. Our greenhouse is open to the public. In the near future, we hope to have an interpretive garden using local native plants at our greenhouse location.

**MUCHOWSKI, M. and VLAMIS, B.**
Butte Environmental Council, 116 West Second Street, #3, Chico, CA 95928

## Critical Habitat for *Limnanthes floccosa* ssp. *californica*

Butte Environmental Council (BEC) is a local public benefit corporation with 850 members. Despite its size, BEC has had a tremendous influence protecting vernal pool species in California. The ability to do that necessitated moving outside Butte County to start partnerships with other groups, attorneys, and agencies. Butte County meadowfoam, *Limnanthes floccosa* ssp. *californica*, was listed as an endangered species by the California Department of Fish and Game in 1982 and by the US Fish and Wildlife Service (Service) in 1992. It is also listed by the California Native Plant Society on List 1B (rare and endangered throughout its range). BCM is found in four general areas of concentration along a narrow band of the eastern foothills from central Butte County to north of Chico, California. BEC sued for critical habitat designation of 4 crustaceans in April 2000. When the Service missed its first court ordered deadline, BEC negotiated an extension and agreement that added 11 plants to the critical habitat designation including Butte County meadowfoam. Political manipulation by a Bush administration appointee eliminated six entire counties, including Butte, from the 2003 final critical habitat rule. BEC, the California Native Plant Society, and Defenders of Wildlife joined together to challenge the designation. A second final Rule was published in 2005. The *Recovery Plan for Vernal Pool Ecosystems of Southern California* was also created from the settlement brokered by BEC in 2002.

| County | 2002 Proposed Acreage | 2003 Rule Acreage | 2005 Rule Acreage |
|---|---|---|---|
| Butte | 58,849 | 0 | 24,247 |
| Madera | 95,802 | 0 | 48,359 |
| Merced | 194,335 | 0 | 147,638 |
| Sacramento | 68,820 | 0 | 37,098 |
| Solano | 67,961 | 0 | 13,415 |

**PRESTON, R.E.**
Jones & Stokes, 2600 V Street, Sacramento, CA 95818

## Post-Jepson Manual Additions to the California Flora

The Jepson Manual, published in 1993, contained 5,862 species and 1,169 infraspecific taxa. Over the last 15 years, the dedicated efforts of many academic and non-academic botanists have added to that total through the description of new species and infraspecific taxa and by the discovery of range extensions for both native and non-native species. I have been tracking these new additions to the California Flora since the early 1990's by systematically surveying the taxonomic literature. At least 61 new species and 49 new subspecies and varieties have been described after the first edition of The Jepson Manual was published. New taxa have been discovered in almost every region in the state, although most have been discovered in Northwestern California, the Sierra Nevada, and Southwestern California. Three families contribute the greatest number of new taxa: Asteraceae, Polygonaceae, and Brassicaceae. Range extensions to California have been reported for 19 native taxa, and more than 125 additional nonnative taxa have been documented in California. Information on many of these taxa can be found at the Jepson Online Interchange (http://ucjeps.berkeley.edu/interchange.html), an ongoing component of the Jepson Flora Project. Many, but not all of these additions, will be included in The Jepson Manual Second Edition.

**ROBISON, R.**
California Botany and California Invasive Plant Council, 1925 Meer Way, Sacramento, CA 95822

## Assessing Research Priorities for Invasive Plants in California

California has over a thousand introduced plant species, many of which are invasive in wildlands. In 2006, the California Invasive Plant Council rated the most invasive plants in the "California Invasive Plant Inventory." During the research compilation process for the list it became evident that information was lacking on many species. However, the limited availability of funding for management and control programs makes it important to know where research should be focused. The Research Needs Assess-

ment project was formed in 2005 at UC Davis. The project will summarize existing research pertaining to invasive plants in California through literature review and interviews with researchers, and identify high-priority areas for future research. It will address 12 topics including biology, effects of human alterations (i.e. climate change, nitrogen deposition), weeds of horticultural origin, and policy. Through this effort, we seek to further energize the academic and land management communities by: (1) facilitating connections between disciplines by increasing awareness of the range of ongoing research on invasive plants; (2) creating a forum for assessing high-priority research needs; and (3) guiding future research (especially graduate student projects) toward these high-priority needs. Our poster summarizes the research areas where we would like to see efforts continue and provides sample projects for each area. A directory of invasive plant researchers is also available.

**SIERRA PACIFIC INDUSTRIES BOTANY PROGRAM**
Sierra Pacific Industries, Research Department, Anderson, CA 96007

## 2007 Botanical Survey Results from Sierra Pacific Industries Timber Harvest Plans

Sierra Pacific Industries (SPI) is California's largest private landowner, managing over 1.7 million acres of forestlands. In an effort to protect botanical resources on SPI timberlands a scientifically based Botany Policy was developed to guide how sensitive plants are addressed in timber harvest plans (THP's). Dr. Cajun James, Research and Monitoring Manager at SPI formulated this policy in consultation with Dr. Dean Taylor, an independent consulting Botanist and Research Associate at the Jepson and University Herbaria, Berkeley, CA. The Botany Policy calls for botanical field surveys in suitable habitat for any THP with the potential to contain sensitive plant species. When a rare plant is found, it is documented by standard professional practice and sent to the Department of Fish and Game (DFG) to be added to the California Natural Diversity Database (CNDDB). All surveys and findings are submitted with the THP to the California Department of Forestry and Fire Protection. Botanists, seasonal crewmembers, and foresters conducted rare plant surveys on sixty-seven THP's throughout California in 2007. Rare plant species were found on forty-six of the sixty-seven THP's surveyed. In 2007, 189 rare plant occurrences were identified and since 2002, nearly 1000 sensitive plant occurrences have been reported. Each new sensitive plant finding increases our knowledge of the species life cycle, habitat, and geographic range resulting in SPI practicing better forest management.

**TAYLOR, D**
Jepson Herbarium, University of California, Berkeley CA, 94720

## Elevation Pattern of Vascular Plant Richness, Central Sierra Nevada, California

Elevation pattern of central Sierra Nevada vascular plant richness is defined: observed upper and lower elevation limits for 2,526 taxa based on 67,000 plant records (specimens and plots) were analyzed using interpolation. The cSN richness pattern exhibits a broad central domain maximum of ca. 1000 taxa between 1200 and 2100 meters, but no single peak. At elevations below 1200 m, richness increases with elevation at ca. 44 taxa 100 $m^{-2}$. Above elevations of 2100 m, richness plummets precipitously at a rate of ca. 55 taxa 100 $m^{-2}$ such that only two dozen vascular plants are recorded above 3600 m. Non-native plant richness exhibits differing pattern: a single peak at 1100 m. Elevation richness profiles for families, genera, endemic or CNPS taxa differ from the overall pattern. Richness is positively correlated with area [log basis, digital terrain model] ($R^2 = 0.88$) for elevations below 2200 m, but negatively correlated above that elevation ($R^2 = 0.46$); very strongly correlated with estimated precipitation ($R^2 = 0.96$); and moderately correlated with estimated mean temperature ($R^2 = 0.17$). A Mid-Domain Effect model based on cSNH range-sizes is highly correlated with observed richness. A temperature adjustment model of projected vascular plant elevation limits under low and high range climate change scenarios suggests only moderate decrease of richness for the low range temperature increase (1.3°C) projection, but for the high range (Had CM3 model, 5.8°C) on the order of one-third of the entire flora is potentially impacted, with virtually complete elimination of the Sierran alpine flora.

**TAYLOR, D**
Jepson Herbarium, University of California, Berkeley, CA 94720

## Documentation of the Vascular Flora of Yosemite National Park

The National Park Service Natural Resource Challenge sets a goal of documentation of minimally 90% of all taxa occurring in parks. Has this goal been met for Yosemite? Moreover, what measures can test the 'maturity' of a local flora? A regional database of 44,505 specimens (18,907 from the Park) is available, and is used to illuminate the status of knowledge of the Yosemite flora. YNP has a recent flora which records 1,437 plants. Collection database records for an additional 235 plants not treated in the recent flora are known. Floristic analysis of the flora of the entire central Sierra Nevada region, where 2,526 plant taxa are presently documented, suggests and additional 400-500 taxa could reasonably be expected to occur in the Park, suggesting that the flora is presently documented ~75% level. The maximum proportion of taxa detected by the single most prolific YNP botanist [Sharsmith, 2,207 specimens over 62 years] was 51% [a sidebar discussing effectiveness of floristic surveys based on this detection rate is provided]. The collective effort of ≥20 independent contributors was necessary to supply >90% of the documented Park records [comparison of some maturity test statistics are made with the floristic database of the White Mountain flora and the sedge flora of California]. The frequency distribution of specimens per taxon for California [500 taxon random sample of the *Consortium* database] exhibits a 'normal' distribution: the same statistic for the Park specimen database is left-skewed, indicating 'immaturity.' The density of specimen records from the Park is comparable to that of the state as a whole.

**TOUT, J. and WHITE, J.**
Department of Biological Sciences, Humboldt State University, Arcata, CA 95521

## Sampling Rare Plants Efficiently: an Evaluation of Adaptive Cluster Sampling

Using a population of Western Lily (*Lilium occidentale*) as a case study, we evaluate the efficiency of adaptive cluster sampling (ACS) with respect to simple random sampling (SRS) for estimating population totals. With a completely mapped plant population and GIS technology, we simulate a series of grid-based sampling regions with cell sizes ranging from 1 $m^2$ to 225 $m^2$. At each scale we calculate the relative efficiency of ACS and SRS designs at a range of initial sampling efforts beginning at 5% of the total sample area. Unlike previous studies of ACS that were based on sample based estimates, our approach allows us to calculate the true variances of two ACS abundance estimators in order to compare them to the much more common SRS abundance estimator. We find that the ACS design can offer much more efficient estimates of population totals when sample units are approximately 50 $m^2$ in size and when initial samples comprise 10% or more of the total sample area. Adaptive cluster sampling is a design allowing samplers to observe a disproportionately large fraction of a population with respect to the sample effort while still providing unbiased estimates of population totals. Our findings imply that by properly implementing ACS, surveys and monitoring of rare plants can be achieved at lower costs and with less effort.

# ADDENDUM

## PROGRAM CHANGES

### Tuesday 15 January 2008
### Session 6: Wetland Restoration and Mitigation

**CANCELLED:**

**25. Jeffrey Hart**
*Restoration Approaches for a Sustainable Delta*

**ADDED:**

**25A. Lisa Schile**
*Elevation, Inundation, and Vegetation Patterns in Natural and Restored Tidal Wetlands*

## ADDITIONAL ABSTRACTS OF TALKS

**7. SHAHROKH, R.**
American River College, Biology Department, 4700 College Oak Drive, Sacramento, CA 95841

### The Traditional Gathering and Processing of Red Maid seeds, *Calandrinia ciliata*, an Important Native Food

A large variety of seed plants have been used by California Tribes in great abundance as staple foods. Today it is difficult to find some of these plants in large enough quantities to process for traditional use. One plant in particular, *Calandrinia ciliata*, was reportedly used in great quantities by the Numlaki, the Sierra Mewuk and the Luiseno. Pounds of this particular seed were gathered and processed. Today, however, this plant is found sporadically and the seeds are so tiny that it is hard to imagine how it could have been possibly used as a staple. Since it is not being processed today in large amounts, little is known about the specifics of the gathering and cooking process of this plant. The author has discovered a large field of this plant in the Central Valley from which she was able to gather and process several pounds of seed traditionally. This presentation will show one traditional method of gathering, drying, pounding and cooking of this plant with hot rocks in a basket. There is some question, also, as to whether some Tribes gathered seeds from this plant using seed beaters and burden baskets. Using these baskets, the author will show the success of the technique in question. In highlighting this plant my hope is to spread the word about the importance of protecting plants significant to Native culture. At Native gatherings today, a number of traditional foods are served such as venison and "seaweed." My hope is that *Calandrinia ciliata* will someday be found being cooked and served at traditional gatherings as well.

**25A. SCHILE, L.,*[1] CARSON, T.,[2] CALLAWAY, J.,[3] PARKER, V.T.,[4] VASEY, M.,[4] and SIEGEL, S.[2]**
[1]University of California, Berkeley, 137 Mulford Hall #3114, Berkeley, CA 94720-3114
[2]Wetlands and Water Resources, 818 Fifth Avenue, Suite 208, San Rafael, CA 94901
[3]University of San Francisco, 2130 Fulton Street, San Francisco, CA 94117
[4]San Francisco State University, 1600 Holloway Avenue, San Francisco, CA 94132

### Elevation, inundation, and vegetation patterns in natural and restored tidal wetlands

Tidal wetland restoration efforts have focused on establishing appropriate elevations for plant colonization, with the assumption that elevation determines inundation rates and other critical factors for plant establishment and growth. While elevation is the key factor driving inundation rates, within-site variation due to impoundments, pannes and other features also affect local flooding and draining. Substantial research has evaluated elevational distributions of tidal wetland plants in San Francisco Bay wetlands; however, little work has directly linked elevation to patterns of inundation across a tidal wetland. We evaluated plant distributions across five tidal wetlands in the northern San Francisco Bay Estuary. Plant and elevation surveys were conducted at 200-500 points around three to four water level stations per site. Inundation data were collected for approximately one year. Data were combined in 5-cm intervals according to tidal elevations, and mean and maximum depth and duration of inundation were calculated for each interval. Patterns of vegetation zonation were apparent from our data, with species showing peaks in distributions across the tidal wetlands. For

example, *Sarcocornia pacifica* had the most widespread elevational distribution, with a number of species occurring at slightly lower elevations, including *Spartina foliosa*, *Typha angustifolia, Bolboschoenus maritimus*, and *Schoenoplectus acutus*. There was substantial overlap and spatial variability in distributions relative to both elevation and inundation patterns for some dominant species. We found little evidence for critical thresholds for plant distributions across all wetlands, although, there is evidence that plants respond to minor changes in elevation and inundation.

## ADDITIONAL ABSTRACTS FOR POSTERS

**CRAIN, B. and WHITE, J.**
Department of Biological Sciences, Humboldt State University, Arcata, CA 95521

### Classification and Distribution of Locally Rare Plant Taxa in Napa County

The ecological and evolutionary significance of locally rare plant taxa has been well discussed in the literature. Yet these taxa have not been well integrated into conservation planning largely due to a lack of distribution data and a system for summarizing their status. To address this concern, we have developed a set of criteria called L-ranks for categorizing locally rare taxa that largely conform to the G- and S-ranks developed by the Natural Heritage Network (NatureServe). Furthermore, we incorporate aspects of the Red List Criteria developed by the International Union for the Conservation of Nature. In this study, we test the utility of these criteria using the flora of Napa County. We conducted GIS analyses of distributions using 1 km x 1 km grids. Our preliminary analyses indicate that among the 1418 native plant taxa in the county, 56 are considered locally rare based on our criteria. Furthermore, over 4% of the area of Napa County contains 20 or more locally rare plant taxa. These hotspots of locally rare plants correspond to some extent with global rare plant hotspots.

**ECKERT, J.,[1] WILLIAMS, J.,[2] LUNDBERG, J.,[3] and FISCHER, A.[1]**
[1]University of California, Department of Plant Sciences, Davis, CA 95616
[2]California State University, Chico, CA 95929
[3]Lundberg Family Farms, 5370 Church Street, Richvale, CA 95974

### Traits for field identification of *Monochoria vaginalis* and biotypes of *Heteranthera limosa* at different growth stages.

It has recently been noted that there is a widespread misconception/misidentification of one of the predominant weeds in California rice. Ducksalad (*Heteranthera limosa*) has been a common weed in California rice for many decades. The 1976 Rice Field Day booklet notes ducksalad first recorded in Glenn County in 1948. It also notes a marked spread of the weed during the early 1970s. From anecdotal evidence this ducksalad was the white flowered form. A blue flowered form was collected in 1983 by then Butte County farm advisor Carl Wick. It was found on the Rice Experiment Station around 1989 (Bill Brandon, personal communication). The blue flowered form appears to be more aggressive than the white flowered form. These two color forms are currently listed as the same species; however, samples are being submitted to the herbarium for a definitive identification. The blue flowered form of ducksalad has been called Monochoria (*Monochoria vaginalis*) by growers across the Sacramento Valley.

**WILSON, B.L. and OTTING, N.**
*Carex* Working Group, 2710 Emerald Street, Eugene, OR 97403

### New Resources for Sedge Identification

*Carex* is one of the most diverse genera on the west coast, with 140+ taxa in California and 160+ in Oregon and Washington. Species can be difficult to identify. Some sedges are important as community dominants, often used in habitat restoration. They are valued for soil erosion control, as wildlife habitat, and for basketry. Some taxa are very rare. New taxa are being found in the west, and the taxonomy of others is being revised. Recent resources for *Carex* identification include the Flora of North America treatment for the continent, available in book form and on the internet, and a new web-based interactive key. In May 2008, a Field Guide to Sedges of the Pacific Northwest will be published by Oregon State University Press. This Guide was written by the *Carex* Working Group. It has identification keys, two-page species accounts, 650+ photographs, distribution maps, and information on aspects of *Carex* ecology, morphology, and ethnobotany.

# Evaluation of Northern California Botanists Symposium

This is our second symposium and we would like to get your feedback. Please fill out the following evaluation and turn it in as you leave the symposium. Thank you!

**General Conference: Please circle the number that most fits your thoughts. Space is provided below each topic for comments**.

| | Poor | Fair | Acceptable | Good | Excellent | |
|---|---|---|---|---|---|---|
| Time of year: | 1 | 2 | 3 | 4 | 5 | |
| Comments: _____ | | | | | | |
| Chico State campus conference facility – Bell Memorial Union: | 1 | 2 | 3 | 4 | 5 | |
| Comments: _____ | | | | | | |
| Reception: | 1 | 2 | 3 | 4 | 5 | N/A |
| Comments: _____ | | | | | | |
| Banquet and food: | 1 | 2 | 3 | 4 | 5 | N/A |
| Comments: _____ | | | | | | |
| Web site and registration: | 1 | 2 | 3 | 4 | 5 | |
| Comments: _____ | | | | | | |

**Symposium Topics: Please circle the number that most fits your thoughts. Space is provided to highlight the talks that you liked the best or the least in that topic.**

| | Not useful | Fair | OK | Good | Excellent |
|---|---|---|---|---|---|
| 1. Rare Plant Monitoring and Management: | 1 | 2 | 3 | 4 | 5 |
| Comments: _____ | | | | | |
| 2. Ethnobotany and Vegetation Management: | 1 | 2 | 3 | 4 | 5 |
| Comments: _____ | | | | | |
| 3. How to be a Botanist: | 1 | 2 | 3 | 4 | 5 |
| Comments: _____ | | | | | |

4. Ecological Studies, with an Eye to the Future:
1 2 3 4 5
Comments: _____
_____

Keynote Speaker: 1 2 3 4 5
Comments: _____
_____

5. Going Underground: 1 2 3 4 5
Comments: _____
_____

6. Wetland Restoration and Mitigation:
1 2 3 4 5
Comments: _____
_____

7. Vegetation Mapping and Conservation:
1 2 3 4 5
Comments: _____
_____

8. Northern California Botanical and Ecological Discoveries:
1 2 3 4 5
Comments: _____
_____

Poster Session: 1 2 3 4 5
Comments: _____
_____

**Other comments**: Please include ideas for future topics that we should consider for the next symposium:

_____
_____
_____
_____

**Suggestions**: Please suggest persons or organizations that should be considered for the next symposium. Please include suggestions on how to increase involvement from outlying parts of California and adjacent states?

_____
_____
_____
_____

**Thank you for attending the Northern California Botanists Symposium**