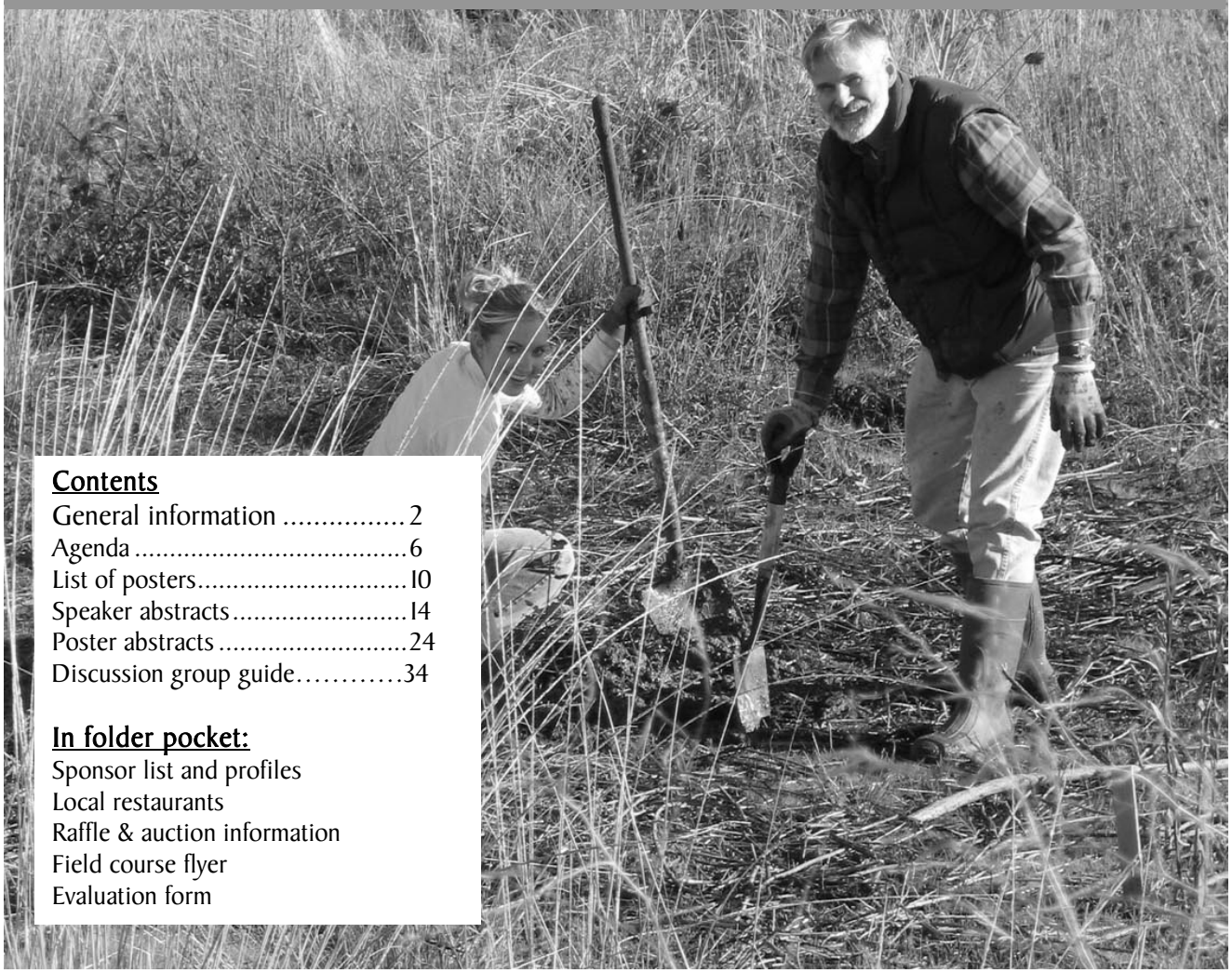
California Invasive Plant Council

2008 Symposium

The Future of Invasive Plant Management

California State University, Chico - October 2-4, 2008



Contents

In folder pocket:

Sponsor list and profiles
Local restaurants
Raffle & auction information
Field course flyer
Evaluation form

Oroville High School students, Photo: Jim Dempsey, California State Parks

Welcome to the 17th Annual Cal-IPC Symposium!

For some of you, this will be your first introduction to Cal-IPC. For others, you may have attended more Symposia than you can count. All Symposium attendees receive a 2009 membership, joining 1000 fellow members in California and beyond! Membership includes our quarterly newsletter; updates on field courses, advocacy events, and next year's Symposium; and the right to vote for the Board of Directors.

Session Locations: Most paper sessions will take place in the auditorium of Bell Memorial Union. Posters will also be located here. Some sessions and discussion groups will be held in 100 Colusa Hall. Please see the campus map on page 5.

Keynote Speaker: Please join us in welcoming Dr. Emilyn Sheffield of the Recreation and Parks Management Department of CSU Chico, who will speak on "The evolving people and landscapes of California."

Discussion Groups: This year, we are separating groups into two sessions to allow attendees the option of attending two topics. These groups will run concurrent with paper sessions. Please see the Discussion Group listings on the last page of the program (behind the abstracts) for each group's description and room location.

Sponsors: Our sponsors help offset the cost of the Symposium while providing information and services to Cal-IPC members. Sponsor exhibits are located on the edges of the main auditorium. Please take time to visit with their representatives at breaks or lunch.

Thursday Evening: Join your fellow weed workers for the annual Social Hour and Raffle at the Warrens Reception Center, followed by the Awards Banquet and Auction in the Bell MU Auditorium. The raffle features useful, decorative, and sometimes wacky items, while the auction will highlight a few special contributions. See the flyer in the folder pocket for a partial list of item and the campus map in this program for the location of Warrens Reception Center.

Friday Student Lunch: The Cal-IPC Student Chapter invites all students to join them at Madison Bear Garden, adjacent to the campus at the corner of Salem and 2nd Streets, to discuss ideas for student involvement in Cal-IPC. (Students will need to pay for their own lunches.)

Saturday Field Trips: All trip participants should meet in front of Bell MU at 8am Saturday morning. Transportation is provided for all trips; lunch is provided for all trips except Local Restoration Projects. **Please bring water and sun protection.** This is especially important for participants in the Sutter Buttes and Lassen trips as we expect hot weather.

Photo Exhibit: Once again, Cal-IPC members contributed their best shots to the Photo Exhibit. Be sure to vote for your favorite on Thursday; the winner will be announced at the banquet.

Sales: Need reference books on invasive plants? A t-shirt and hat to look stylish in the field? A totebag to carry your gear (or groceries)? Please visit our sales table in the main auditorium. We accept cash, checks, and credit cards. All proceeds benefit Cal-IPC programs.

Parents Room: We realize that some Symposium attendees have small children with them. The Green Room (off the main auditorium, to the right as you face the stage) is available to nursing mothers or other parents who need a space to sit with their little ones. Please note that we are not providing childcare. If your child becomes fussy or noisy, please respect your fellow attendees and the speakers and leave the session.

Continuing Education Credits: Continuing Education hours are available from the California Department of Pesticide Regulation, including two hours of Laws and Regulations credit on Friday. See the Continuing Education table near Registration for attendance sheets and scantron forms. Keep the codes and hours listed below for your records.

Codes and hours:

Field Course	5.0 hrs. Other	Code A-I23I-08
Thursday	Credits vary depending on whether you attend Laws and Regulations. **To receive credit for Laws and Regs, you must sign the separate attendance sheet and turn in a separate scantron for that session.** If not attending the Laws and Regulations, you may receive hrs Other credit.	
	4.5 hrs. Other + 2.0 hrs. Laws & Regs. or 6.5 hrs. Other	Code A-I224-08
Friday	6.0 hrs. Other	Code A-I233.08
Saturday Field Trips	4.0 hrs. Other	Code A-I232-08

Thank you to the organizations that support the Symposium through their sponsorship and all the volunteers who contributed their time!

Cal-IPC 2008 Board of Directors

Jason Giessow, President
Santa Margarita / San Luis Rey Weed Management Area

Wendy West, Vice President
UC Cooperative Extension

Jennifer Erskine Ogden, Treasurer
UC Davis

John Knapp, Secretary
Native Range, Inc.

Dan Gluesenkamp, *Past President*
Audubon Canyon Ranch

Jason Casanova
Los Angeles / San Gabriel Rivers Watershed Council

Bob Case
California Native Plant Society

David Chang
Santa Barbara County Agricultural Commissioner's office

Chris Christofferson
Plumas National Forest

Joanna Clines
Sierra National Forest

Carolyn Cromer
The Land Trust of Napa County

Sharon Farrell
Golden Gate National Parks Conservancy

Doug Gibson
San Elijo Lagoon Conservancy

Beth Keer
East Bay Regional Parks Botanic Garden

Cheryl McCormick
Santa Lucia Conservancy

Tanya Meyer
Yolo County Resource Conservation District

Mark Newhouser
Sonoma Ecology Center

Kate Symonds
US Fish & Wildlife Service

[Affiliations for identification only]

Cal-IPC Staff

Doug Johnson, Executive Director
dwjohnson@cal-ipc.org

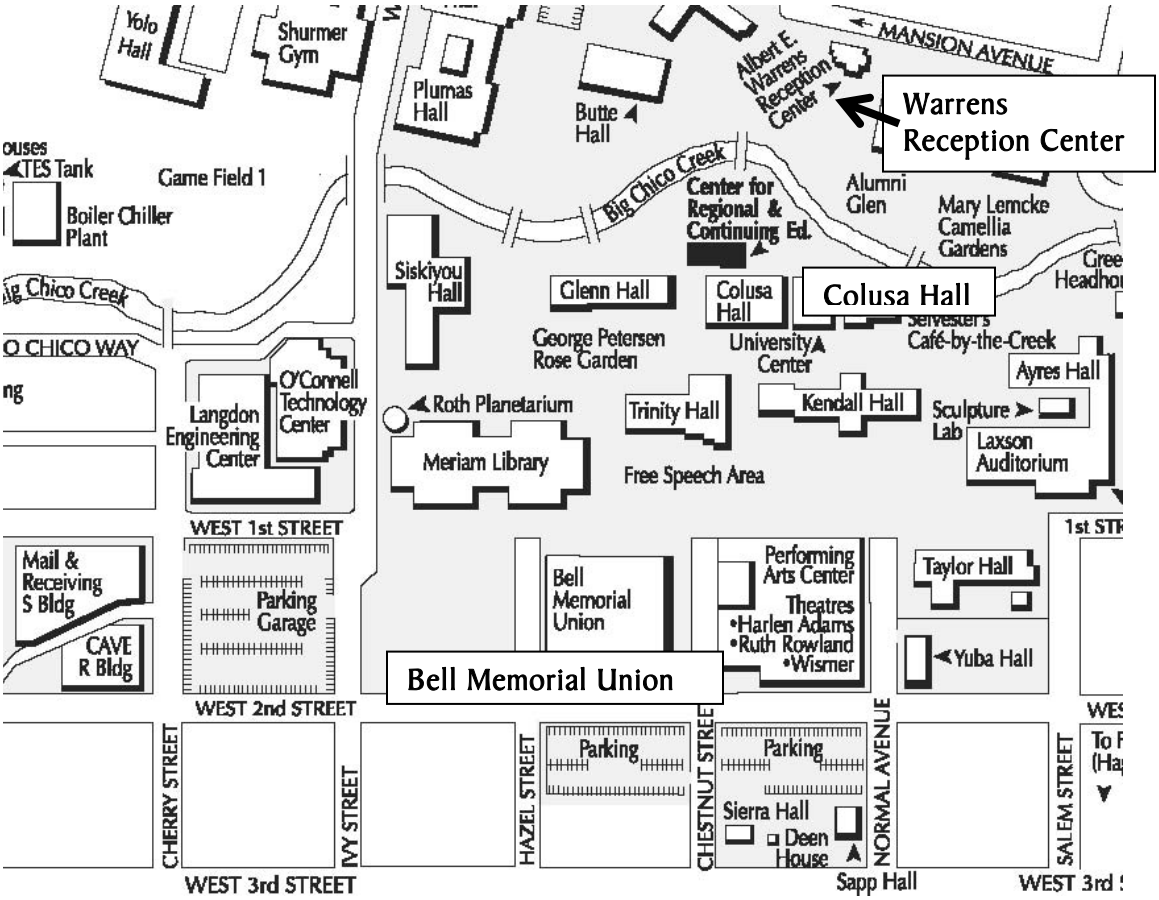
Elizabeth Brusati, Project Manager
edbrusati@cal-ipc.org

Heather Brady, Project Coordinator
hjbrady@cal-ipc.org

Bertha McKinley, Office Manager

Ginny King, Temporary Program Assistant

CSU Chico Campus Map



California Invasive Plant Council

2008 Symposium

"The Future of Invasive Plant Management"

Thursday, October 2

⚘ *Indicates items of special interest for students.*

** = presenter*

7:30 **Registration & Breakfast.**
Bell MU foyer.

Session 1 – New Horizons (theme session).
Bell MU ballroom. Chair: Cheryl McCormick, Santa Lucia Conservancy.

9:00 Learning to live with invasives we cannot control. *John Randall, The Nature Conservancy, Global Invasive Species Team, & Plant Sciences Dept., UC Davis.*

9:30 Warmer and weedier? Outlook for invasive plants in a changing world. *Jeffrey S. Dukes, Dept. of Forestry & Natural Resources, Purdue University.*

10:00 The five stages of grief: Invasive plants and the horticulture industry. *Sarah Reichard, University of Washington Botanic Gardens.*

10:30 **Break**

11:00 **Annual Membership Meeting**
Executive Director's report
Board of Directors report
Flickr photo demonstration
Weed Alerts! *John Randall*, TNC, & Joe DiTomaso, UC Davis.*

11:30 **Keynote Address**
The evolving people and landscapes of California. *Dr. Emilyn Sheffield, Recreation & Parks Management, CSU Chico.*

12:00 **Lunch** (provided) *Bell MU ballroom*

1:00 **Session 2 - Posters & Exhibits.**
Bell MU ballroom. See poster list page 10.

Session 3 – Student Paper Contest ⚘
(concurrent) *100 Colusa Hall. Moderator: Scott Steinmaus, Cal Poly San Luis Obispo*

2:00 Ecological remote sensing of invasion by perennial pepperweed. *Margaret E. Andrew* & Susan L. Ustin, Dept. of Land, Air, & Water Resources, UC Davis.*

2:20 Using airborne remote sensing to map sweet fennel on Santa Cruz Island. *Kyla Dahlin[1,2]*, Greg Asner[2], Chris Field[2], & Rebecca Shaw[3]. [1]Stanford University, Dept. of Biological Sciences, Stanford, [2]Carnegie Institution for Science, Dept. of Global Ecology, Stanford, [3]The Nature Conservancy.*

2:40 Prioritizing California's A-rated weed populations for eradication. *Gina M. Skurka Darin[1,2]* & Steve Schoenig[3], [1]Dept. of Plant Sciences, UC Davis, [2]CA Dept. of Food & Agriculture, [3]CA Dept. of Fish & Game.*

3:00 Prescribed fire and exotic plant effects on California grasslands. *S.J.M. Dickens*, E.B. Allen & L.S. Santiago, Dept. of Botany & Plant Sciences, UC Riverside.*

3:20 The role of resource heterogeneity on native plant response to invasive plant removal. *Robert Steers* & Edith Allen, Dept. of Botany & Plant Sciences, UC Riverside.*

3:40 Removing exotic annual grasses in coastal dunes: Effects on native solitary ground-nesting bees. *Ellen Tatum, Humboldt State University.*

Session 4 – DPR Laws & Regulations
(concurrent) *Bell MU ballroom. Chair: Bob Case, Contra Costa RCD. Provides 2.0 hrs. Laws & Regulations credit for licensed applicators.*

2:00 Herbicide registration, reregistration and use tracking: Tools to help make herbicide use safe and effective. *Denise Webster, CA Dept. of Pesticide Regulation.*

2:25 Mock DPR pesticide use monitoring inspection: Application dos and don'ts. *Bob Case[1]; Chris Christofferson[2], & John Knapp[3], [1]Contra Costa RCD, [2]Plumas Nat'l Forest, [3]Native Range, Inc.*

3:15 Planning the perfect application: Making sure your application is politically correct, ecologically correct and legal. *Panel discussion: Bob Case, Cal-IPC and CA Native Plant Society; Rich Marovich, CA Dept. of Pesticide Regulation; Navid Khan, Butte Co. Agricultural Commissioner's Office; Peggy Olofson, Invasive Spartina Project; Joel Trumbo, CA Dept. of Fish & Game.*

4:00 **Break**

Session 5 – Managing Invasive Plants

(concurrent) *Bell MU ballroom*. Chair: Sandy DeSimone, Audubon's Starr Ranch Sanctuary

4:30 A four-step approach to Himalayan blackberry (*Rubus discolor*) removal. *Michael Rogner*, River Partners.*

4:50 Exotic control and habitat enhancement in Southern Californian native grasslands at an Audubon California preserve. *Sandy DeSimone*, Audubon's Starr Ranch Sanctuary*

5:10 Perennial pepperweed (*Lepidium latifolium*) control in tidal marsh of San Pablo Bay. *Giselle Block[1]*, Ingrid Hogle[2], & Renee Spenst[3], [1]U.S. Fish & Wildlife Service, San Pablo Bay National Wildlife Refuge. [2]San Francisco Estuary Invasive* Spartina *Project, [3]Ducks Unlimited.*

4:30 **Discussion Groups** (concurrent)
Please see page 34 for descriptions.

1. Careers in wildland weed research and management. *Chris Christofferson, Plumas National Forest.* 100 Colusa
2. Weed management contractors: Future markets and needs. *Mark Heath, Shelterbelt Builders.* BMU 314
3. Weed control Q&A: Riparian weeds. *Mark Newhouser, Sonoma Ecology Center.* BMU 312
4. Weed control Q&A: Brooms and other woody invasives. *Janet Klein, Marin Municipal Water District.* BMU 210

5:30 **Social Hour and Raffle**
Albert E. Warrens Reception Center

7:00 **Banquet**
Bell MU Ballroom

8:00 **Awards Presentation**

- Jake Sigg Award for Service and Vision
- Golden Weed Wrench Award for Land Manager of the Year
- Wildland Weed Organization of the Year
- Catalyst Award
- Policy Award
- Student Paper and Poster Contest
- Photo Exhibit

Friday, October 3

7:00 **Breakfast**

Session 6 – Looking to the Future: Research and Prediction (theme session). *Bell MU ballroom. Chair: Kate Symonds, US Fish & Wildlife Service.*

8:00 Assessing research needs for invasive plants in California. *Mona Robison, California Botany & Cal-IPC.*

8:30 Follow the weeds: Assessing the risk of future spread. *Elizabeth Brusati, Cal-IPC.*

9:00 A new agenda for managing invasive species in California estuaries. *Edwin Grosholz* & Susan Williams. Dept. of Environmental Science & Policy, & Bodega Marine Lab., UC Davis.*

9:30 **Break**

Session 7 – Research and Assessment (concurrent) *Bell MU ballroom. Moderator: Edith Allen, UC Riverside*

10:00 Effects of nitrogen deposition on vegetation-type conversion in Riversidean sage scrub. *Edith B. Allen, Dept. of Botany & Plant Sciences & Center for Conservation Biology, UC Riverside.*

10:20 Assessing risks of herbicidal vegetation management in a sensitive watershed. *Erin Conlisk* & Susan Kegley, Pesticide Research Institute.*

10:40 The impact of the herbicides imazapyr and triclopyr triethylamine on larval bullfrogs. *Joel Trumbo, CA Dept. of Fish & Game, Pesticide Investigations Unit.*

11:00 Monitoring a declining, hybridizing weed. *Ingrid Hogle, San Francisco Estuary Invasive* Spartina *Project.*

10:00 **Discussion Groups** (concurrent) *Please see page 34 for descriptions.*

1. Weed control Q&A: Upland invaders. *Joe DiTomaso, UC Davis.* 100 Colusa
2. Future research needs for invasive plants. *Mona Robison, California Botany.* BMU 211
3. Ensuring successful weed control: Planning and monitoring *Susan Hubbard, Bureau of Land Management.* BMU 303
4. Weed control Q&A: Aquatic weeds. *Florence Maly, CA Dept. of Food & Agriculture.* BMU 312

11:30 **Lunch in downtown Chico**
On your own – See restaurant list in folder pocket.

1:30 **Session 8 – Career Panel** (concurrent) *Bell MU ballroom. Chair: Chris Christofferson, Plumas Nat'l Forest.*
Professionals from government, academia, consulting firms and nonprofits discuss the future of working in the wildland weed field. *Panelists: Linnea Hanson, USDA Forest Service; Christiana Conser, Sustainable Conservation; Tom Griggs, River Partners; Joe DiTomaso, UC Davis; Michelle Cox, Lassen Volcanic Nat'l Park.*

Session 9 –Early Detection & Rapid Response. (concurrent) *100 Colusa Hall. Moderator: Andrea Williams, San Francisco Bay Area Network Inventory & Monitoring Program*

1:30 Invasion potential of Chinese tallow (*Triadica sebifera*) in California. *Michael J. Bower* & Clare E. Aslan, Dept. of Evolution & Ecology, UC Davis.*

1:50 STEAL THIS PROTOCOL: The invasive plant species early detection protocol for the San Francisco Bay Area Network of National Parks. *Andrea Williams*, Jennifer Jordan, & Elizabeth Speith, San Francisco Bay Area Network Inventory & Monitoring Program.*

2:10 Stop-the-spread of yellow starthistle into the Sierra Nevada mountain range: Early detection and eradication on a regional scale. *Wendy West*, UC Cooperative Extension & CA Dept. of Food & Agriculture.*

2:30 Application of feral animal eradication techniques to invasive plants: Early detection and rapid response. *John Knapp[1]*, Coleen Cory[2], Kelvin Walker[1,3], and Norm*

Macdonald[1-3], [1]Native Range Inc., [2]The Nature Conservancy, [3]Prohunt Inc.

3:00 **Break**

Session 10 – Learning from the Past (theme session). *Bell MU ballroom. Chair: Cheryl McCormick, Santa Lucia Conservancy.*

3:30 Native Californian use of fire in weed management. *Don Hankins, Dept. of Geography, CSU Chico.*

4:00 History of herbicide use and development of herbicide resistance. *Scott Steinmaus, Biological Sciences Dept., Cal Poly San Luis Obispo.*

4:30 Reinventing our approach: Learning from past failures. *TBD.*

5:00 **Adjourn**

Posters

* = presenter

STUDENT POSTER CONTEST

Evaluating the potential for spread of an invasive forb, *Limonium ramosissimum*, in San Francisco Bay salt marshes. *Gavin Archbald* & Katharyn Boyer, Biology Dept., San Francisco State University.*

Effects of disturbance of biological soil crusts on the emergence of exotic plants in California sage scrub. *Rebecca R. Buenafe* & Darren R. Sandquist, California State University at Fullerton.*

Soil biota facilitate invasion within microhabitats in a California coastal prairie. *Taraneh Emam*[1], Bruce Pavlik[2], & Peter Alpert[3]. [1,2] Mills College, [3] University of Massachusetts.*

Interactive effects of population genetic diversity and resident community composition on the success of an annual exotic invasive species. *Heather McGray*, Marlyse Lombardo & Katharine N. Suding, UC Irvine.*

Spatial patterns in native and exotic submersed aquatic plant species in the Sacramento-San Joaquin River Delta. *Maria J. Santos*[1], Lars W. Anderson[2] & Susan L. Ustin[1], [1]Center for Spatial Technologies & Remote Sensing, & Dept. of Land, Air & Water Resources, UC Davis, [2]U.S. Dept. of Agriculture, Agricultural Research Service, Exotic & Invasive Weed Research.*

An analysis of the seedbank at Joshua Tree National Park in sites invaded by exotic grasses. *Heather Schneider* & Edith Allen. Dept. of Botany & Plant Sciences, UC Riverside.*

Patterns of change in water hyacinth distribution in the Sacramento-San Joaquin Delta. *Khanna Shruti*, Maria J. Santos, Erin L. Hestir, Jonathan A. Greenberg, & Susan L. Ustin, Center for Spatial Technologies & Remote Sensing, Dept. of Land, Air & Water Resources, UC Davis.*

Effects of glyphosate to control exotic annuals for coastal sage scrub restoration. *Kristin A. Weathers*[1], Edith B. Allen[1], Carl E. Bell[2] & Milton E. McGiffen[1], [1]Dept. of Botany & Plant Sciences, UC Riverside, [2]Cooperative Extension, UC San Diego.*

CONTRIBUTED POSTERS

Rimsulfuron, a new herbicide label for cheatgrass control. *Craig Alford*, John Cantlon & Ronnie Turner. DuPont Land Management.*

Results from the use of a novel method, HydroMechanical Obliteration, at the Golden Gate National Recreation Area in West Marin. *Maria Alvarez*[1], Cameron Colson[2], Maria Morales[2], Liz Ponzini[3], Aliza Segall, and Sarah Cusser[1]. [1]Golden Gate National Recreation Area, [2]CAMCO, [3]Golden Gate National Parks Conservancy.*

Prevention and early detection programs in Mendocino County. *Tara Athan*[1], Ray Harrie[2], Julie Rogers[3], & Chuck Williams[4], [1]alt2IS, [2]Mendocino Co. Dept. of Agriculture, [3]Mendocino Co. Fire Safe Council, [4]CA Native Plant Society - Sanhedrin Chapter.*

San Luis Rey River flood risk management area giant reed eradication. *Raquel Atik*[1], Italia Gray[1], Peter Tomsovic[1], & Thomas Keeney[2], [1]RECON Environmental, [2]U.S. Army Corps of Engineers.*

Invasive aquatic weeds: Implications for mosquito and vector management activities. *Charles E Blair, MD*, Trustee, Mosquito and Vector Management District of Santa Barbara County.*

Salmon River cooperative noxious weed program 1997-2008: Steps to success and obstacles to overcome at the watershed scale. *Petey Brucker, Salmon River Restoration Council.*

Lake Tahoe Aquatic Invasive Species Pilot Project: Measuring and adapting standard methods of control for use in an alpine environment. *Phil Caterino[1]*, Doug Freeland[2] & Giovanni Caterino[3], [1]Alpengroup, [2]Aquatic Consulting Evaluation, [3]Tahoe Divers Conservancy.*

Hybridization between invasive and native blackberries (*Rubus*) in California. *Lindsay Clark* & Marie Jasieniuk, Dept. of Plant Sciences, UC Davis.*

The evolution of artichoke thistle (*Cynara cardunculus*) data management at Camp Pendleton, CA (I984-present).*Meghan Dinkins* & Deborah Bieber, AC/S Environmental Security, Land Management Branch, Camp Pendleton.*

The role of cultivation and hybridization in invasive potential of *Pyrus calleryana*. *Nicole A.Hadiman* & Theresa M. Culley, University of Cincinnati.*

Ludwigia control as a precursor to restoration: Progress and challenges. *Julian A. Meisler, Laguna de Santa Rosa Foundation.*

Sinapsis alba seed meal as a pre-emergent control for French broom (*Genista monspessulana*) seedlings. *Ken Moore[1] & Carla Bossard[2]*, [1]Wildlands Restoration Team, [2]Biology Dept., St. Mary's College of California.*

"A" rated weeds on display: CDFA's internet mapping website. *Colleen Murphy-Vierra* CA Dept. of Food & Agriculture.*

Mechanical control coupled with native species planting as a cost-effective method of controlling Himalayan blackberry. *Nick Pacini, River Partners.*

Controlling an invasive grass in a grassland setting: Harding grass control in the bald Hills of Redwood National and State Parks. *Stassia Samuels*, Laura Julian & Scott Powell, Redwood National and State Parks.*

Invasive plant *Arundo donax*: Mapping and prioritizing its eradication in the Bay-Delta region of Northern California. *Bryan Sesser, Patricia Stiefer & Deanne DiPietro*, Sonoma Ecology Center.*

Adaptation and evaluation of "double tent" solar heating for eradicating weed seeds in remote areas. *James J. Stapleton[1]*, Susan B. Mallek[1], Ron Eng[2], & Albert Franklin[3], [1]UC Statewide IPM Program, [2]California Dept. of Food & Agriculture, [3]U.S. Dept. of the Interior, Bureau of Land Management.*

Goats defeat blackberries: Riparian habitat restoration following invasive plant removal at Vino Farms, Inc., Lodi, California. *Chris Stevenson*, Tom Griggs, & Chris Robbins, River Partners.*

Mapping invasive aquatic plant species in the Sacramento-San Joaquin River Delta using hyperspectral imagery. *Susan L. Ustin, Center for Spatial Technologies & Remote Sensing, Dept. of Land, Air & Water Resources, UC Davis.*

Control of jubatagrass and restoration of fountain thistle habitat in the San Francisco Public Utilities Commission peninsula watersheds. *Don Thomas*, Sonya Foree & Ellen Natesan, San Francisco Public Utilities Commission.*

October 4 – Field Trips

Field trip participants will meet in front of the Bell MU at 8:00 am.

I. Big Chico Creek Ecological Reserve

Invasive plants: *Arundo, French broom, Spanish broom, tamarisk*

Leaders: *Jeffrey Mott, Director, Big Chico Creek Ecological Reserve.*

Details*, Transportation and lunch provided. 8:00 am - 2:00 pm. Two-mile hike.*

The Big Chico Creek Ecological Reserve contains 3,950 acres of diverse canyon and ridge habitats, including 4.5 miles of Big Chico Creek, and is home to many species of plants and animals. It is owned and managed by the CSU Chico Research Foundation. The Reserve ranges in elevation from 700 feet to 2,044 feet and contains a wide variety of habitats, including creek riffles and pools, riparian areas, oak woodlands, chaparral, pine forest, rock cliffs, and springs. These diverse habitats support more than 140 different wildlife species, including a number of listed species and species requiring large tracts of undisturbed habitat.

The reduction of nonnative invasive plant species is one of the management goals for the reserve. Attendees will hike along a 2-mile trail and view the effects of burning, mowing, and hand pulling on yellow starthistle and discuss benefits and limitations of the various control measureas well as response of native plant communities to the removal of yellow starthistle. The hike will terminate at Big Chico Creek, where we will have lunch and discuss Spanish broom management.

2. Local Creek Restoration Projects

Invasive plants: *yellow starthistle, periwinkle, Japanese privet, and puncturevine.*

Leaders: *Susan Mason, Watershed Coordinator, Big Chico Creek Watershed Alliance.*

Details: *Transportation provided or carpools. 8:00 am – 12:00 pm. Includes weed pulling!*

We will view progress on a Big Chico Creek restoration project in downtown Chico, and on the Verbena Fields floodplain restoration. Both integrate invasive plant control with major hydrologic construction. The Big Chico Creek project includes "biotechnical" streambank stabilization to address the erosion that is threatening homes and Bidwell Avenue. Biotechnical approaches incorporate hard structures and native vegetation that work with a stream's natural functions while reducing bank erosion. The project also includes "floodplain excavation" where terraces are created when existing steep banks constrict the stream. These terraces allow the stream to spread out at high flows, which reduces flow velocity, flood peaks, settles sediments, improves water quality and allows native, streamside vegetation to flourish. We will discuss permitting, time requirements, working with private and public landowners, and invasive plant control.

At Verbena Fields, land heavily impacted by gravel mining is being restored to increase flood capacity. The project will expand and improve seasonal wetlands, restore native plantings, establish a Mechoopda Interpretive Place, construct a loop walking trail and provide public education as well as pre- and post-restoration site monitoring. Volunteers are removing yellow starthistle, periwinkle, Japanese privet, and puncturevine. Restoration plantings of native grasses, willows, wildflowers, oaks and many other native species will take place in winter 2008. **This will be a hands-on stop where participants will help with weeding.**

3. Peace Valley in the Sutter Buttes

Invasive plants: *purple loosestrife, red sesbania, rush skeletonweed*

Leader: *Jim Dempsey, California State Parks.*

Details*, Carpools. Lunch provided. 8:00 am – 5:00 pm. Some hiking.*

The Sutter Buttes are the remains of an eroded volcano in the Central Valley. This unusual geologic formation has been called "the world's smallest mountain range," and its "sky island" geography results in unique ecological character and historical resources. Access to Sutter Buttes is limited, and this is a special opportunity to visit property recently acquired by State Parks. Peace Valley is secluded behind the northern ramparts of the Sutter Buttes, where an easy two-mile hike will take us through blue oak forest, interesting geology, a pioneer settlement, and signs of thousands of years

of native habitation. We will discuss the assortment of resource management issues facing State Parks as they take over management of this property. On our trip to and from Sutter Buttes, we may stop at the Gray Lodge Wildlife Area's wetlands to discuss the role of invasives management in water conveyance for rice fields and canals as well as wildlife habitat. We may also arrange a stop at the Lake Oroville Afterbay to discuss weed issues facing the Feather River and Lake Oroville, including purple loosestrife and sesbania.

4. Lassen Volcanic National Park

Invasive plants/topics: *bull thistle, woolly mullein, cheatgrass*

Leaders: *Chris Christofferson, Plumas National Forest*

Details*, Transportation and lunch provided. 8:00 am - 5:00 pm. Some hiking.*

Situated at the southern end of the Cascade Range geologic province, Lassen Volcanic National Park lies at the crossroads of three great biological provinces: the Cascades range to the north, the Sierra Nevada mountains to the south and the Great Basin desert to the east. The myriad habitats of Lassen Volcanic National Park are produced by variations in environmental conditions such as elevation (5,000 to over 10,000 feet), moisture, substrate, temperature, isolation and prior disturbance (both natural and human-caused). Although Lassen is primarily known for its volcanic geology, the park boasts a rich diversity of plant and animal life. Over 700 flowering plant species grace the park, providing shelter and food for 250 vertebrates as well as a host of invertebrates. Field trip participants will hike through magnificent scenery while learning about the park's management.

According to the park's 2008 Weed Management Plan, Lassen has a relatively low number of invasive plants compared to other parks in California. A recent survey found 59 invasive plants within or adjacent to the park. However, most infestations are in habitats with high biological diversity, such as riparian areas and meadows, and have high potential for spread. Bull thistle (*Cirsium vulgare*) and woolly mullein (*Verbascum thapsus*) are the two most common species. Field trip attendees will learn about the park's management efforts, including the use of fire, and will hear how the park participates in the four adjoining Weed Management Areas.

Speaker abstracts

Alphabetical by first author.

Effects of nitrogen deposition on vegetation-type conversion in Riversidean sage scrub.

Allen, Edith B., Department of Botany and Plant Sciences and Center for Conservation Biology, University of California, Riverside, CA. edith.allen@ucr.edu 951-827-2123

Anthropogenic nitrogen deposition has been occurring in western Riverside County for the past half-century, and during the same time period there has been extensive vegetation-type conversion of Riversidean sage scrub to exotic annual grassland. Levels as high as 30 kg N/ha/yr occur as dry deposition from automobile emissions, with highest levels in urban northern regions and decreasing along a gradient southward. Vegetation was sampled along a N deposition gradient and also in N-fertilized plots at a site with relatively low N deposition. Exotic grass cover was positively related to elevated soil N along the gradient, while native shrub and forb cover and richness were negatively related to soil N. Fertilization with 60 kg N/ha/yr caused an increase in biomass in exotic grass after two years, while decreases in native forb cover occurred after 11 years of fertilization. Shrub cover did not change significantly during this time period. Grass biomass of 0.5-1 T/ha in soils with elevated N may be a cause of more frequent fire, as has occurred in the Riverside area. The combination of increased grass fuel for fire and more frequent fires may drive the conversion of Riversidean sage scrub to annual grassland.

Ecological remote sensing of invasion by perennial pepperweed.

Andrew, Margaret and Susan L. Ustin*, Department of Land, Air, & Water Resources, University of California, Davis, CA. meandrew@ucdavis.edu 530-752-5092

Hyperspectral and LiDAR remote sensing have the potential to address a wide variety of ecological questions. We present results of three ecological applications of remote sensing data to study the invasion of the San Francisco Bay/Sacramento-San Joaquin River Delta by *Lepidium latifolium* (perennial pepperweed). *Lepidium* is a noxious Eurasian weed aggressively expanding in the western US; understanding the ecology and management options for this weed are priorities. Hyperspectral image data has been used to map *Lepidium* distributions in several sites of the Bay/Delta annually over 2004-2007. Annual distribution maps allow quantification of *Lepidium* spread and dispersal: on Bouldin Island, the infestation has increased by 50% in three years; new patches were detected as far as 500m from preexisting ones. We have generated habitat distribution/susceptibility models for *Lepidium* at the Rush Ranch Open Space Preserve with data extracted from the hyperspectral distribution maps and environmental variables derived from hyperspectral and LiDAR datasets. This analysis found that *Lepidium* occurrence at this site is primarily a function of the distances from a channel and the upland-marshland margin. Finally, hyperspectral datasets of Rush Ranch and Cosumnes River Preserve revealed substantial spatiotemporal variation in *Lepidium* phenology. Variables extracted from the remote sensing datasets explained 33-56% of the spatial variation in phenology at these sites and interannual phenologic differences at the Cosumnes River Preserve were closely related to hydrology. Our results highlight the importance of microtopography and water availability to *Lepidium* distribution and phenology, increasing our understanding of this invasive species and informing better management.

Perennial pepperweed (*Lepidium latifolium*) control in tidal marsh of San Pablo Bay.

Block, Giselle[1]*, *Ingrid Hogle*[2], *Renee Spenst*[3], [1] U.S. Fish and Wildlife Service, San Pablo Bay National Wildlife Refuge, Petaluma, CA. [2] San Francisco Estuary Invasive *Spartina* Project, Berkeley, CA, [3]Ducks Unlimited, Rancho Cordova, CA *giselle_block@fws.gov 707-769-4200

The San Pablo Bay National Wildlife Refuge began a program in 2005 to control invasive perennial pepperweed *(Lepidium latifolium*) in tidal marsh of San Pablo Bay. A census of pepperweed was completed (mapped) in 2005 using GPS and the Weed Information management System (WIMS) and exported to a GIS database. Results showed pepperweed was primarily associated with the marsh-upland transition zone (53%), channel edges (18%), and low marsh tidal deposition zones (22%), areas influenced by a natural or man-made disturbance. Over 60 gross acres and 30 net acres were infested with pepperweed within 1,600 acres of tidal marsh between the Petaluma River and Sonoma Creek. Spatial data were combined with the best available scientific information to develop a control plan. Control efforts were initiated in 2007 and continued in 2008. Because of potential impacts on endangered species related to accessing tidal marsh, we transitioned from using backpack sprayers as the primary herbicide application tool to aerial spraying (helicopter) in 2008. Experimental plots were

established to test the efficacy of various control options. Preliminary results show the use of the herbicide imazapyr (Habitat) may be an effective tool for controlling this species in tidal marsh systems.

Invasion potential of Chinese tallow (*Triadica sebifera*) in California.

*Bower, Michael J.** and *Clare E. Aslan*, Dept. of Evolution and Ecology, University of California, Davis, CA. *mjbower@ucdavis.edu 530-902-8721

Triadica sebifera's aggressive spread in the southeast U.S. over the last 200 years has transformed grasslands and riparian areas into monocultural stands. Recent discovery of naturalized populations of *T. sebifera* along the American River and several other locations in the Central Valley have raised red flags about the potential for a serious invasion in California. Climate modeling also indicates that most of California's riparian habitat is susceptible to invasion. To understand more precisely where invasion could occur we conducted field tests of invasion potential of *T. sebifera* along an elevational gradient at Putah Creek, a San Francisco Bay-Delta tributary, using both germination and initial seedling growth/survival. Simulating the most common dispersal scenarios (by birds, water, and gravity) we found substantial germination in all treatments and controls at all elevations. Finding no barriers to germination, we investigated initial seedling growth using young seedlings transplanted from a greenhouse into the field over the same elevational gradient. After five months, only seedlings planted adjacent to the creek were alive, but these had grown rapidly and appeared healthy. Drought was the suspected cause of death in almost all cases. These results suggest substantial invasion risk in perennially moist areas—a potentially grim conclusion for California's riparian regions.

Follow the weeds: Assessing the risk of future spread

Brusati, Elizabeth[1*], *Doug Johnson*[1], and *Joe DiTomaso*[2]. [1]California Invasive Plant Council, Berkeley, CA; [2]UC Davis Dept. of Plant Sciences. *edbrusati@cal-ipc.org

Risk assessment -- the evaluation of current and potential future impacts -- is a critical component of invasive plant management and policy, and is essential to implementation of state and federal plans. In an era of reduced budgets, land managers need to know where to focus their work to produce the most effective ecosystem restoration. Predictive models can help early detection by showing where invasive plants may spread and predicting the effects of changing conditions under global climate change. We determined the current range and predicted spread of 36 invasive plants. We surveyed Weed Management Areas for data on current extent and population status (stable, increasing, decreasing due to control). To predict future spread, we researched native and introduced ranges of these plants globally and applied information through the climate-based modeling software Climex. Comparing climatic characteristics from each plant's existing range with those from California regions enabled us to extrapolate the potential success of that plant here. We then applied two climate-change assumptions to determine how climate change will affect predicted range. Results show that some of these species have the potential to greatly expand their ranges. Climate change produces mixed results, expanding the range of some species while restricting others.

Assessing risks of herbicidal vegetation management in a sensitive watershed.

*Conlisk, Erin**, *Susan Kegley*, Pesticide Research Institute, Berkeley, CA. *erin@pesticideresearch.com 868-776-2939

Treating invasive vegetation with herbicides is often economical and labor-efficient. However, herbicides can negatively affect ecosystem and human health. In an effort to mitigate risk, it is important to quantify the effects of herbicides on non-target wildlife and the public. We will present the methods and results of risk assessments performed for the Marin Municipal Water District as part of their Vegetation Management Program. The District is considering use of glyphosate (as Aquamaster) and triclopyr (as Garlon 4 Ultra) to control broom (*Genista monspessulana*, *Cytisus scoparius*, and *Spartium junceum*), thistle (*Centaurea solstitialis*, *Carthamus lanatus*, and *Centaurea calcitrapa*), teasel (*Dipsacus spp.*) and annual grasses (*Aegilops triuncialis* and *Taeniatherum caput-medusae*). The risk assessment involves three steps: (1) a review of the toxicology literature on glyphosate and triclopyr to determine toxicity reference values which account for uncertainties and gaps in the data, (2) an exposure estimate for a variety of human and wildlife exposure scenarios, and (3) a comparison of exposure estimates to toxicity reference values to determine problematic scenarios. Particular emphasis is given to the methodology and interpretation of toxicological data that are publicly available in government and non-profit databases. The goal is to provide vegetation managers with tools that can be used to perform project-specific risk analyses while simultaneously protecting sensitive resources.

Using airborne remote sensing to map sweet fennel on Santa Cruz Island.

Dahlin, Kyla[1,2]*, *Greg Asner*[2], *Chris Field*[3], *Rebecca Shaw*[3]. [1]Stanford University, Department of Biological Sciences, Stanford, CA. [2]Carnegie Institution for Science, Department of Global Ecology, Stanford, CA. [3]The Nature Conservancy, San Francisco, CA. *kmd35@stanford.edu, 415-238-1916.

Santa Cruz Island (SCI) is the largest of the Channel Islands off the coast of southern California and is owned by The Nature Conservancy and the National Park Service. Called the Galapagos of North America, SCI is home to 12 endemic species and has been a major restoration focus in recent years. Nearly all feral mammals (mostly sheep and pigs) have been removed from the island, and invasive plant control has begun as well. In August, 2007, the Carnegie Airborne Observatory (CAO) *beta* system surveyed the island, coincident with the blooming period for sweet fennel (*Foeniculum vulgare*), the most prevalent invasive plant on SCI. The CAO *beta* system combines the NASA Jet Propulsion Laboratory (JPL) Airborne Visible/Infrared Imaging Spectrometer (AVIRIS) with a light detection and ranging (LiDAR) sensor and an integrated navigational system. Together these sensors allow for the development of high resolution, high fidelity data products for vegetation structure, species composition, and underlying topography. On SCI, known areas of dense fennel were used to "train" the CAO data to classify areas as likely to have fennel infestations. Field reconnaissance then identified which areas were correctly classified and which were 'false positives.' This data was compared to a recent field-based invasive plant mapping effort for both accuracy and precision. We conclude that systems like the CAO can make valuable contributions to protected areas' invasive plant mapping and early detection/rapid response programs.

Prioritizing California's A-rated weed populations for eradication.

Darin, Gina M. Skurka[1,2]*, *Steve Schoenig*[3], [1]Department of Plant Sciences, University of California, Davis, [2]California Department of Food and Agriculture, Sacramento, [3]California Department of Fish and Game, Sacramento. *gina.darin@gmail.com 530-400-8992

California has many pioneer weed infestations worthy of eradication, but too few resources to respond to all of them. Traditionally, weed lists have guided weed eradication efforts in the state (e.g. A-rated species on the Noxious Weed List). However, all-or-nothing species evaluation systems have limitations when applied to prioritizing individual populations for eradication. Therefore, the California Department of Food and Agriculture's Noxious Weed Eradication Program developed a science-based, transparent, decision-making tool to help prioritize weed *populations* for eradication. This ranking model concentrates on the potential impact of weeds and the cost and feasibility of their eradication. Where it differs from previous approaches is that it incorporates a spatially explicit approach (GIS), using layers that correspond to the location of high-value assets and vectors of spread. It has been designed to be adaptable to many different scales.

Prescribed fire and exotic plant effects on California grasslands.

*Dickens, S.J.M.**, *E.B. Allen* and *L.S. Santiago,* Department of Botany and Plant Sciences, University of California Riverside, Riverside CA 92521 *sdick002@ucr.edu 303-549-2089

California grasslands have been invaded by a suite of Mediterranean, annual grasses for over 200 years. The effects of this conversion from a native bunchgrass and annual forb grassland to exotic, annual grassland has negative impacts on native vegetation and wildlife. It is less understood what the impacts on soils has been and if those impacts can be reversed. We partnered with Nature Conservancy managers at Santa Rosa Plateau Ecological Preserve to test the effectiveness of prescribed fire to control density of exotic grasses. Our objectives where: 1) examine the effectiveness of spring, prescribed burns in controlling exotic grasses, 2) determine an optimal burn regime to reduce exotic grasses and release native plant spp. , 3) determine if soil characteristics (nutrient pools and fluxes) were responding to exotic grass reduction. Soil total C and N and NO3 differs between areas burned in different years and having differing levels of exotic grass cover. Phosphorus and NH4 were not different in soils under differing levels of exotic grass invasion. Prescribed burns reduced exotic grass cover and native forbs increased in the absence of exotic grasses. However, exotic grass cover returned to preburn levels within five years indicating a five year burn frequency may be optimal to initially gain control of the exotic grasses.

Exotic control and habitat enhancement in Southern Californian native grasslands at an audubon California Preserve.

DeSimone, Sandy, Audubon's Starr Ranch Sanctuary, Trabuco Canyon, CA. sdesimone@audubon.org 949-858-0309

After 1 – 2 years of non-chemical control of the grassland invader, artichoke thistle (*Cynara cardunculus*) at Audubon's 4000-acre Starr Ranch, field crews initiate native grassland enhancement. Because of seed collection constraints and low success of active restoration, the focus is now on maintenance and enhancement of about 300 acres of needlegrass (*Nassella pulchra)* grassland. Ongoing mapping (for some species) and non-chemical control of exotic species continue long term for Italian thistle (*Carduus pycnocephalus*), bull thistle (*Cirsium vulgare*), tocolate (*Centaurea melitensis*), and others. From 1999-2004 we monitored native grassland stands for native bunchgrass density and cover and richness of all species. After a record-breaking drought in 2001-02, our data indicated a dramatic decline in bunchgrass density. So, in spring 2003 we began the first of our multi site, multi year experiments and trials on mowing to enhance the existing native grassland. Results from our first smaller scale (2 x 2 m plots) experiment indicated that a second, early season mow (at about 6") may have negative effects on needlegrass density and cover. The next season we scaled up (5 x 20 m plots) and reduced mowing frequency. Treatments are ongoing and each season we put in a new mowing experiment modified from what we've learned to test treatments in a different site and a different rainfall season. In spring 2007 we initiated bird monitoring to assess habitat quality in 220 acres (13 stands) of needlegrass grassland. Results indicated that one rare species, Grasshopper Sparrow, is present in all 13 stands.

Warmer and weedier? Outlook for invasive plants in a changing world.

Dukes, Jeffrey S. Department of Forestry and Natural Resources, Purdue University, West Lafayette, IN. jeffrey.dukes@umb.edu 617-287-6614

Biological invasions and climate change pose two of our greatest environmental challenges. Individually, each of these challenges has received increasing attention. However, few studies of invasions have considered climate change, and *vice versa*. Such research is important, because biological invasions could drastically alter the responses of communities to a changing climate, and climate change is likely to lead to changes in both the movement of species around the planet and the susceptibility of natural ecosystems to invasion.

In general, climate change might be expected to increase the success of invasive species, for a variety of reasons. For instance, a rapidly changing climate should favor species that can extend their ranges quickly, and that can tolerate a wide range of climatic conditions. Both of these traits are shared by many invasive plant species. Climate change will also reduce evolutionary advantages that native species have accrued as they adapted to their region's climate.

Few studies have directly addressed the general mechanisms through which climate change could benefit invasive species. However, several studies have characterized responses of invasive plants in a specific area to year-to-year differences in environmental conditions, or to individual environmental changes. My own research in California suggests that *Centaurea solstitialis* (yellow starthistle) can respond strongly to increases in atmospheric carbon dioxide concentrations, and so may become more problematic in a future atmosphere.

Climate change will bring new challenges to those managing invasive species, and will increase the need for regular environmental monitoring and coordination among land managers.

Reinventing our approach: learning from past failures

Farrell, Sharon, Associate Director of Park Projects, Golden Gate National Parks Conservancy, San Francisco. sfarrell@parksconservancy.org.

The word "failure" is often taboo in the world of land management. As a label, it can conjure up many dismal memories ranging from community outcry against eucalyptus removal to images of dense annual grasses quickly dominating acres of coastal dune habitat following iceplant removal. Yet discussing and understanding these failures can ultimately increase success, and is critical to moving our work forward, adapting our strategies and developing innovative weed management approaches. Embracing and publishing them as learning opportunities for peers and future managers, rather than hiding them as shameful actions will help ensure that they are not continually repeated throughout time, and that our work as weed managers becomes more efficient and adaptive as we expand our efforts. This presentation will highlight a number of past "failures" and ultimately the lessons learned, as well as principles that can guide our future work. "Failures" highlighted include examples of unsuccessful removal techniques, limitations in post control restoration activities, spiraling public relations, unreasonable expectations of volunteers, consequences

of single species control, and limitations in documentation/monitoring/data analysis.

A new agenda for managing invasive species in California estuaries.

*Grosholz, Edwin** and *Susan Williams*. University of California, Davis, CA. tedgrosholz@ucdavis.edu 530-752-9151

Although invasive species are widely acknowledged to be one of the primary threats to coastal estuaries, there is also broad agreement that substantial gaps persist at the intersection of science and policy that complicate the management of invasive species. We highlight some of the issues that have either facilitated or impeded the successful union of the science and management of introduced species including the underlying regulatory framework. We draw on recent examples of eradication attempts in coastal estuaries to underscore these points. In an effort to push forward a more constructive approach to bringing science and management more closely together, we suggest a research agenda that focuses on science that can really assist invasive species management and that incorporates the views and opinions of managers facing the daunting task of managing invasive species in coastal habitats. In addition to emphasizing issues such as early detection and rapid response, we also focus on population connectivity, the potential for rapid evolution, responses to climate change, and approaches to decision support that will help to guide the management of invasive species now and into the future.

Native Californian use of rire in weed management

Hankins, Don L., Department of Geography and Planning, California State University, Chico. Dhankins@csuchico.edu

Management of weeds poses a significant problem for various cultures globally. Undoubtedly Native Californians identified native weeds which were managed, frequently with fire, to keep them at bay. Since European arrival a vast array of new invasive species have colonized the landscape, and have created management challenges for Native Californians. While Native Californian land tenure has changed over the last several hundred years, the concern for resource management has not, and there are numerous examples of Native Californians interest and activity in weed management traditions. The considerations of traditional fire management and the response of vegetation to the parameters of fires pose a unique and appropriate tool for contemporary land managers. Case studies in traditional fire use will be examined with a primary focus on riparian management.

Monitoring a declining, hybridizing weed.

Hogle, Ingrid, San Francisco Estuary Invasive *Spartina* Project, Berkeley CA ibhogle@spartina.org 510-548-2461

Eradication of the highly invasive hybrid between introduced Atlantic Smooth Cordgrass (*S. alterniflora*) and native Pacific cordgrass (*Spartina foliosa*) has been the mission of the San Francisco Estuary Invasive *Spartina* Project ISP) since its inception 8 years ago. As the ISP Control Program successfully coordinates regional treatment of invasive *Spartina*, the ISP Monitoring Program is challenged to detect and document the remaining weakened and fragmented populations of this once obvious invader. Invasive *Spartina* has become more difficult to identify not only because of successful control efforts, but also because of the selection for highly backcrossed, morphologically "cryptic" hybrid plants. After over 10 generations of backcrossing, it has become difficult if not impossible to distinguish some hybrid plants from native plants in the field. Our monitoring methods use GPS-intensive field methodologies combined with lab-intensive DNA testing to assist with the detection and ultimate eradication of the invasive *Spartina* remaining in the San Francisco Estuary.

Mock DPR Pesticide Use Monitoring Inspection. Application dos and don'ts.

Knapp, John, *Chris Christofferson*, Botanist and Certified Applicator, USFS, Plumas National Forest, *Bob Case*, Retired Deputy Agricultural Commissioner and Contra Costa Resource Conservation District Associate Board of Directors

DPR form PR-ENF-104 will be used as a template to perform a mock application inspection. A county deputy agricultural commissioner will perform an inspection on two applicators that are involved in an herbicide application. The inspection will feature experienced applicator Johnny Sprayright and Zed, a novice applicator. The right and wrong way to perform an application will be presented with an emphasis on the laws and regulations of pesticide use covered by the form. Both the inspector and the experienced applicator will tutor Zed to ensure his application will be safe and legal.

All major sections of the form will be explored including methods of application, materials used, accurate measurement, equipment used, labeling requirements, transportation and storage.

As the inspection proceeds, the inspector will ask questions related to preparation for the application such as the applicator's training and knowledge of the label on the herbicide to be used in the application.

The inspector will check for personal protective equipment and precautions taken to insure that people and the environment will not be adversely affected.

Application of feral animal eradication techniques to invasive plants: Early detection and rapid response.

Knapp, John[1]*, *Coleen Cory*[2], *Kelvin Walker*[1,3] and *Norm Macdonald*[1,3], [1]Native Range Incorporated, [2]The Nature Conservancy, and [3]Prohunt Incorporated, Lompoc, CA. *jknapp@native-range.com 805-794-3194

There are few large-scale success stories where land managers have outpaced invasive species spread and establishment. Early detection and rapid response (ED-RR) is considered the most effective method to address the onset of an invasion since the costs to tackle incipient weed populations are much less than managing established widespread weeds. Implementing ED-RR programs although effective can be time consuming and expensive, with more time spent searching for and accessing populations than treating them. Recently, a New Zealand based firm, Prohunt Incorporated, eradicated over 5,000 feral pigs from Santa Cruz Island, California in only 22 months with the support of a small two-person helicopter, demonstrating that eradication projects once thought to be impossible are achievable. Their feral animal ED-RR techniques were modified, to systematically survey for 55 invasive plant species across the island in 2007, and to treat 14 species to zero density in 2008 by their California-based sister company, Native Range Incorporated. The ED portion of the project, which also served as a baseline survey, took only 41 days to complete, and the RR portion required only one month to treat over 360 populations, using a helicopter to transport or "leap frog" workers directly to weed infestations. Weed workers treated infestations quickly, thus conserving energy to tackle subsequent populations and conduct ad hoc weed surveys while in transit from one infestation to the next. The systematic use of a small, highly-maneuverable helicopter for EDRR programs is the advancement that will allow land managers to detect and treat all individuals, and outpace invasive plant establishment - necessary requirements for eradication.

Planning the perfect application, making sure your application is politically correct, ecologically correct and legal.

Marovich, R, California Environmental Protection Agency-Department of Pesticide Regulation Endangered Species Program, *Joel Trumbo*, Environmental Services Division, California Department of Fish and Game, *Bob Case*, California Native Plant Society Invasive Exotics Committee Co-Chairman, *Navid Khan*, Butte Co. Agriculture Dept., *Peggy Olofson*, Invasive Spartina Project.

Stream alteration permits, endangered species regulations, NPDES permits, volunteer training requirements and other legal requirements can be confusing and difficult to negotiate for some land stewards who are planning herbicide applications to manage invasive plants. In addition some non-governmental organizations have concerns about the use of herbicides by land stewards, professional applicators and volunteers. This session will make use of agency and organization experts to help plan the perfect application. In addition to the required permits and regulations, pre-application public relations and basic public related environmental concerns will be addressed.

Panelists will comment on various scenarios that occur during applications in sensitive areas. Both well-planned and faulty applications will be analyzed to point out the right way to plan and perform an application. After the comments on the scenarios questions will be taken from the audience.

Learning to live with invasive plants we cannot control.

Randall, John M. The Nature Conservancy, Global Invasive Species Team, and Plant Sciences Department, University of California, Davis, CA jrandall@tnc.org

The goal of biodiversity conservation is to protect viable native species populations and communities and the biological, abiotic and ecosystem processes on which they depend. This requires preventing, minimizing or mitigating threats, including those posed by invasive plants and other invasive species. Unfortunately, in some cases there is no practical or affordable way to control certain invasive plants across areas large enough support and protect the native species and communities they harm. In such situations we need to find other ways to promote the survival and long-term viability of the native species and communities, and the processes they need. Four different, but overlapping, approaches to this problem can be identified:

I. Provide native species with refugia from invasive species or their harmful effects such as competition, vectoring disease, promoting increased wildfire frequency and intensity.

2. Manage/restore ecosystem processes that favor natives (e.g. fire, hydrology).
3. Identify individuals/populations of native species with increased abilities to compete with or persist alongside the invasive species and use propagules from them in restoration efforts
4. Change the conservation goal from restoration of a pre-existing community to the 'rehabilitation' of a portion of that community consisting of the sub-set of native species which can survive under the conditions imposed by the invasive species, or in the most difficult cases to a goal of maintaining or creating a 'new' mixed community which supports key native species along with non-natives and which has desirable ecosystem functions and properties.

All four of these approaches have been implemented and are underway in a variety of protected areas and other lands valuable for conservation scattered around the world. This is an attempt to provide a comprehensive and systematic overview of how biodiversity can be protected and promoted in situations where one or more harmful invasive plant species cannot be controlled.

The five stages of grief: Invasive plants and the horticulture industry.

Reichard, Sarah, University of Washington Botanic Gardens, Seattle, WA. reichard@u.washington.edu 206-616-5020

While the majority of introduced plants are beneficial and serve their intended purpose, a small number do move from cultivation into wildlands. Most invasive plants are introduced for horticultural use by nurseries, botanic gardens, and horticulture groups. Those who introduce and use these plants are often surprised to hear of their invasiveness and those who have not witnessed the invasions often do not understand or believe it. There is a grieving process, much like that following other losses. There is the denial of the problem, often followed by anger towards those bearing the information. There may be a bargaining for limited use of the plant or its cultivars. If scientists and land managers are willing to work with and listen to them, horticulturists may come to accept that a small number of cultivated plants should not be used. Lessons learned from projects around the world will be discussed.

Assessing research priorities for invasive plants in California.

Robison, Ramona, California Botany and California Invasive Plant Council, Sacramento, CA Mona@calbotany.com

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. In addition, the limited availability of funding for management and control programs makes it important to know where current research gaps are and where future research should be focused. The Research Needs Assessment project was formed in 2005 at UC Davis. The project summarizes existing research pertaining to invasive plants in California through literature review and interviews with researchers, and identifies high-priority needs for future research. It addresses I0 topics including biology, effects of human alterations (i.e. climate change, nitrogen deposition), weeds of horticultural origin, and policy. Through this effort, it seeks to further energize the academic and land management communities by: (I) facilitating connections between disciplines through 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 talk presents many research needs gleaned from interviews with 40+ experts in invasive plant research and management. A draft of our findings is available, as well as a directory of invasive plant researchers in California. We encourage input and will be incorporating feedback and preparing a final document by the end of 2008.

A four step approach to Himalayan blackberry (*Rubus discolor*) removal.

Rogner, Michael, River Partners, Chico, CA. mrogner@riverpartners.org 530-894-5401 x232

In February 2007, River Partners entered into an agreement with the City of Redding to restore 76 acres of city-owned property bordering Turtle Bay Exploration Park. The restoration is atypical in that there is already in place a mature overstory (50+ years) composed primarily of Fremont cottonwood, valley oak, and Gooding's willow; and the primary focus is to remove and replace the invasive under and mid-story, including 46 acres of Himalayan blackberry. A four-pronged approach to blackberry removal was developed to accommodate several concerns including a neighboring pair of bald eagles, heavy public use, and variable topography remnant from the site's previous

use as a gravel mine for the construction of Shasta Dam. A herd of 1000 goats was used to defoliate the plants and improve visibility and safety for heavy equipment operators. The remaining canes were masticated using a Franklin Environmental Brush Cutter. Following this, re-sprouts were sprayed with Garlon©. After six months of chemical control the site was replanted with 4,900 native plants, and until February 2010 the invasive blackberry sprouts will continue to be monitored and chemically treated, while the native plants will be irrigated for rapid growth to displace unwanted weed species. Additionally, 26,136 *Carex barbarae* plugs will be planted in fall 2008. Baseline data of the avian community was collected in 2007 prior to any weed removal, using variable circular plot point count surveys, and 2008 data is currently being collected and analyzed for presentation, as avian metrics are being used to help evaluate the project.

The evolving people and landscapes of California.

Sheffield, Emilyn, California State University, Chico esheffield@csuchico.edu

California is projected to pass the 50 million milestone before 2040 and add 21 million to its population between 2000 and 2050. From local parks to national icons, California's rich public land heritage forms the backdrop for thriving communities and future prosperity. Consider three key demographic drivers that are changing the face of California, and three lifestyle trends that are transforming the timeless relationship between people and nature. Learn how to connect to an increasingly diverse and urban California, and in turn build broader relevance for our stewardship and landscape management efforts. Start planning for tomorrow today, and embrace the immense opportunity to use your unique professional strengths to connect people to nature, and enrich, engage, and inspire Californians now and into the future.

The role of resource heterogeneity on native plant response to invasive plant removal.

*Steers, Robert** and *Edith Allen*, Department of Botany and Plant Sciences, University of California, Riverside. robert.steers@email.ucr.edu 951-505-2168

The purpose of this study was to evaluate the response of native annual plants to the removal of invasive annual grasses and forbs in two contrasting microhabitats, resource poor shrub interspaces and relatively resource rich fertile island understories. The study took place over four years in Coachella Valley, California. Four sites were used that varied in their abundances of native annuals, invasive annual grasses, *Erodium cicutarium*, and *Brassica tournefortii*. Invasive grasses were removed with Fusilade-II, a 'grass-specific' herbicide, and invasive forbs were weeded by hand. We found that invasive plants were more abundant in understory than interspace microhabitats and that competition intensity was higher in the understory. Native species richness was greater in the interspace but had the largest relative increase in the understory once invasives were removed. We then compared the removal of all invasive plants (R), as described above, to a treatment utilizing only Fusilade-II. At sites where the invasive species composition was mostly grasses and *E. cicutarium*, Fusilade-II worked as effectively as R since it is also lethal to *Erodium* species. Use of this herbicide should be relevant to other vegetation types invaded by exotic annual grasses and *Erodium*. Finally, while our results suggest prioritizing resource rich microenvironments for invasive species control, this may not always be optimal. For example, interspace grass invasions in arid shrublands connect widely spaced shrubs, fueling disastrous wildfires. Where this occurs, targeting interspaces may be more important. Clearly, site-specific factors and various ecosystem processes must be considered when controlling invasive plants.

History of herbicide use and development of herbicide resistance

Steinmaus, Scott, PhD. Biological Sciences Department, California Polytechnic State University, San Luis Obispo ssteinma@calpoly.edu

Salt may have been the first chemical recognized as an herbicide when it was used to kill unwanted plants (prevent crop growth) when the Romans brought down Carthage in 146 BC. Salts of the metallic compounds, copper, iron, and arsenate were used in the early 1900's to control water hyacinth in the southern US and broadleaf weeds in cereals. But it was not until 1941 with the discovery of 2,4-dichlorophenoxy acetic acid (2,4-D) and closely related MCPA that relatively small amounts of a chemical could selectively kill a group of plants while sparing others. Soon after came: phenyl substituted ureas (monuron) in 1951, the corn herbicides (triazines) in 1955, dinitroanalines such as trifluralin (Treflan) in the 1960s, sulfonylureas (ALS inhibitors) marketed in late 1970's, and glyphosate marketed as Roundup in the late 1980's. Originally used in agroecosystems, modern herbicides began to be used in rangelands around the late 1950's and in wildlands in the 1960's. Every class of modern herbicide has examples of weeds that are resistant to their modes of action. The rate of herbicide resistance is a function of: duration of herbicide exposure due to frequency of application and residual activity, force of selectivity and whether tolerance/resistance is genetically determined. Resistance to the triazines was

first recognized in the 1970's most likely because of frequency of application and long residual activity of this group of herbicide. Herbicides such as the ALS inhibitors that act on single gene traits where there are several mutations, each one of which confers tolerance, are more likely to see resistance develop quickly often within a decade of their introduction.

Removing exotic annual grasses in coastal dunes: Effects on native solitary ground-nesting bees.

*Tatum, Ellen**, Humboldt State University, Arcata, CA
ert3@humboldt.edu
916-441-2556

Exotic annual grasses are invading many of California's coastal habitats. In coastal dunes in Humboldt county, European hairgrass (*Aira praecox*), silver hairgrass (*A. caryophyllea*), and squirreltail fescue (*Vulpia bromoides*) are invading dune forest, swales, and dune mat. Researchers at the Humboldt Bay National Wildlife Refuge Lanphere Dunes Unit have found that flaming exotic annual grasses with a propane torch is the most efficient and effective removal method. There is concern, however, that flaming may increase mortality of an important native pollinator, the leaf-cutter bee (*Megachile wheeleri*), which builds shallow nests in areas invaded by exotic annual grasses. Plots were set up with a known number of bees buried at 2 cm, 5 cm, and 8 cm, the range of natural nest depth. Plots were either control, treated with a propane torch, or treated with a radiant heater, an alternative method thought to penetrate heat less deeply into the soil. Emergence was monitored and compared among treatment and control plots. Results indicate no increased mortality due to either treatment method. Emergence was around 24% for treatment and control plots, and temperature data showed low heat penetration by both the propane torch and the radiant heater. This is good news for land managers trying to restore our coastal dunes. It is important for managers to consider the effect of invasive plant management on native pollinators, which are essential for restoring and maintaining a functioning ecosystem.

The impact of the herbicides imazapyr and triclopyr triethylamine on larval bullfrogs.

Trumbo, Joel, California Department of Fish and Game, Pesticide Investigations Unit, Rancho Cordova, CA.
jtrumbo@ospr.dfg.ca.gov 916-358-2952

The imazapyr-based herbicides Stalker® and Habitat® and the triclopyr-based herbicide Garlon® 3A are commonly used to control invasive, exotic plants in wildland settings where non-target amphibian species may be present. Of particular concern is the federally-threatened California red-legged frog, *Rana aurora draytonii,* (CRLF). In order to assess the toxicity risk to amphibians, acute toxicity tests were conducted with the herbicide formulations and their active ingredients, using bullfrog, *Rana catesbeiana*, tadpoles. All of the herbicides, with the exception of Stalker®, were within the U.S. EPA's "practically non-toxic" category for aquatic toxicity. Stalker® was found to be in the 'slightly toxic' range. The calculated toxicity values were then compared to herbicide environmental concentrations using the risk quotient (RQ) method. RQ values for all the herbicides were below the U.S. EPA's level of concern for listed aquatic species (RQ •0.05). The results of this study indicate that aquatic applications of these herbicides for invasive species control pose no significant acute toxicity risk to larval ranid frogs.

Herbicide registration, reregistration and use tracking, tools to help make herbicide use safe and effective.

Webster, Denise, California Environmental Protection Agency, Department of Pesticide Regulation, Pesticide Registration Branch, Sacramento, CA.
dwebster@cdpr.ca.gov
916-324-3522

Pesticides play a unique role in environmental protection. Contradicting the usual preventive approach, pesticides are toxic by design and deliberately released into nature. This paradox is explained by the fact that, when used properly, both natural and synthetic pesticides protect people and their environment from pests – animal, plant or microbial – that threaten human health and the balance of nature. Indeed, nature created the first chemical pesticides, produced by some plants and animals to repel their natural enemies.

DPR continually reevaluates the health and environmental impacts of the pesticides it regulates, stressing risk reduction and, whenever possible, encouraging less use of pesticides in favor of more natural pest controls. Reevaluation is a tool DPR uses to find out whether specific pesticides are harming human health or the environment.

California's pesticide use reporting program is internationally recognized as the most comprehensive of its kind. DPR annually collects more than 2.5 million records of chemical applications. Reports include the amount and name of pesticide applied, date and

location of the application, and crop, if the application was agricultural.

Over time, people observed, adapted, and improved on natural pest management. Like most human endeavors, the beneficial use of pesticides depends on information and sound judgment. Scientific knowledge of pesticides continually evolves and improves. California's approach is based on a strong scientific foundation and has built the most comprehensive pesticide regulation program in the nation. Our task is to ensure that pesticides are used safely. Our standards are uncompromising, as is our commitment to protect people and the environment.

Stop-the-spread of yellow starthistle into the Sierra Nevada mountain range–early detection and eradication on a regional scale.

West, *Wendy*, University of California Cooperative Extension/California Department of Food and Agriculture, Placerville, CA. wkwest@ucdavis.edu 530-621-5533

Yellow starthistle (*Centaurea solstitialis*) is one of the most ecologically and economically damaging invasive plants in California. Although areas of California remain uninfested, Yellow starthistle (YST) has shown it can invade most bioregions. YST has invaded the foothills of the Sierra Nevadas and is poised to expand into the higher elevations including the Lake Tahoe Basin.

A coordinated, regional project to control YST populations at an eastern leading edge line across fourteen (14) foothill counties was initiated by California Department of Food and Agriculture in 2007. This project is one of the first in California to address invasive species in a coordinated manner over a large region. Project elements include: 1) control of YST at the eastern leading edge, 2) detection and eradication of outlier YST populations beyond the "no-spread" line, 3) establishment of a centralized GIS database to document results and 4) "Weed-Free Zones" (WFZs) along the YST stop-the-spread line with educational signage and contact information for when YST populations are detected beyond the WFZ. By implementing a regional-scale early detection and eradication plan utilizing the Weed Management Area infrastructure and a project coordinator, collaboration among landowners and local, state and federal agencies has increased to utilize resources more effectively. Project results, including summer 2008 data and evaluations, will be summarized and the benefits and challenges of this regional collaboration will be highlighted.

Steal this protocol: The invasive plant species early detection protocol for the San Francisco Bay Area Network of National Parks

*Williams, Andrea**, *Jennifer Jordan*, and *Elizabeth Speith*, San Francisco Bay Area Network Inventory & Monitoring Program, Sausalito, CA. *Andrea_Williams@nps.gov 415-331-0639

The San Francisco Bay Area Network of National Parks (SFAN) includes Point Reyes National Seashore, Golden Gate National Recreation Area, Pinnacles National Monument, and several smaller parks. The network supports collaborative monitoring of nonnative plants in a wide variety of habitats. A protocol for the early detection of invasive plant species was field-tested at Golden Gate and Point Reyes over the past few field seasons. Park units were broken into subunits that allowed managers to identify and quantify baseline invasive plant information. Subunits were ranked by number and degree of current infestations, risks of further infestation, priority of resources present, and other characteristics based on inventory information available and management priorities. Invasive plant species were ranked based on ease and feasibility of control, and high-priority species placed on lists for early detection throughout the park, or detection in currently uninfested areas. Surveys were targeted in high-risk or high-priority areas, and plant occurrences mapped according to the protocol using the GeoWeed database and its ArcPad applet. Negative data, points, and polygons were collected for priority species, and presence/absence by subunit gathered for lower-priority invasive species. Results informed list, protocol and methods revisions; the protocol has been peer-reviewed and is publicly available for use, as are supporting training materials and identification cards. Rankings and survey results will also be used to inform restoration and removal activities.

Poster abstracts

Alphabetical by first author.

Rimsulfuron, a new herbicide label for cheatgrass control.

*Alford, Craig**, *John Cantlon* and *Ronnie Turner*, DuPont Land Management, Lakewood, CO. *craig.alford@usa.dupont.com. 303-716-3909.

Downy brome (*Bromus tectorum)* and medusahead (*Taeniatherum caput-meduseae*) are harmful winter annual grasses that infest over 50 million acres of land in the western U.S.A. DuPont Landmark XP herbicide, rimsulfuron and imazapic herbicides were tested at various rates to control downy brome and medusahead in non-cropland sites. Sites include California and other western states. The new label attributes and use patterns will be outlined for this market segment. The herbicide rates determining efficacy and longevity are reviewed to insure a restoration program is successful. IPM methods are offered for the successful release of selected desired grasses or the restoration of other desired plant species to provide directions for proper timing, use precautions, grass tolerance and overall program success for the land manager managing atrophied systems.

Results from the use of a novel method, HydroMechanical Obliteration, at the Golden Gate National Recreation Area in west Marin.

*Alvarez,Maria**[1], *Cameron Colson*[2], *Maria Morales*[2] ,*Liz Ponzini*[3], *Aliza Segal*[1], and *Sarah Cusser*[1], [1]Golden Gate National Recreation Area, CA, [2]CAMCO, CA, [3]Golden Gate National Parks Conservancy, CA. *Maria_alvarez@nps.gov 415-331-0732

HydroMechanical Obliteration (H_M_O), a new method, was used on six invasive plant species in Marin County, California at the Golden Gate National Recreation Area, GGNRA. In 2006, treatment of Harding grass (*Phalaris aquatica*) was funded by a grant from the National Fish and Wildlife Foundation for the Marin Municipal Water District, Marin State Parks, Audubon Canyon Ranch and the GGNRA. The National Park Service funded the treatment of the additional five species. H_M_O uses a water spray at high PSI levels for the precision removal of vegetation, producing an on-site mulch. Harding grass received four treatments over 18 months resulting in 100% reduction in seed head production. Cape-ivy (*Delairea odorata*) and English ivy (*Hedera* sp.) both had significant reductions with a single treatment. H_M_O was used successfully as a follow-up to a prior mechanical removal for Cape–ivy and panic veldt grass (*Ehrharta erecta*). On jubatagrass (*Cortaderia jubata*) 50% of the smaller plants were removed after one treatment; larger plants needed three to four treatments over 12 months. Larger specimens such as mature French broom (*Genista monspessulana*) growing among compacted rock was rapidly pulled and hauled off-site. We found H_M_O a beneficial and cost-effective addition to our IPM toolbox.

Evaluating the potential for spread of an invasive forb, *Limonium ramosissimum*, in San Francisco Bay salt marshes.

*Archbald, Gavin**, and *Katharyn Boyer*, Biology Department, San Francisco State University, San Francisco, CA, and Romberg Tiburon Center for Environmental Studies, Tiburon, CA. *gavinarchbald@gmail.com 510-381-0859

Invasive species threaten to alter the outcome of San Francisco Bay's tidal marsh restoration efforts. In 2006 and 2007, Algerian sea lavender (*Limonium ramosissimum*), a salt tolerant invasive forb prevalent in southern California marshes, was found in restored and disturbed marshes in San Francisco Bay. While this suggests future restoration sites are at risk of invasion by *L. ramosissimum*, the extent to which the plant has invaded and the elevational range of greatest potential impact is unknown. To address these questions, we located and mapped invasive *Limonium* populations in San Francisco Bay and are surveying soil and vegetation parameters in 3 invaded marshes. Mapping results show all eight populations of *L. ramosissimum* are clustered on the southwest edge of the Bay with the largest populations centrally located- suggesting spread is occurring north and south along the Bay's western edge. Initial survey results of three invaded marshes show *Limonium* is present in the mid to high marsh and is commonly interspersed with *Sarcocornia pacifica*, *Jaumea carnosa*, *Distichlis spicata* and *Grindelia stricta*, indicating *Liminium*, unlike many other invasive plants, is not restricted to marsh edges. Near total monocultures occur in the high marsh where *Limonium* grows on average 8 cm taller and produces 22 more flowers per plant than in mid marsh elevations, suggesting rare species growing at high marsh elevations are at greatest risk. The results of these studies will help determine where, within future restored marshes, invasions are likely to occur.

Prevention and early detection programs in Mendocino County.

Athan, Tara[1]*, *Ray Harrie*[2], *Julie Rogers*[3], *Chuck Williams*[4], [1]alt2IS, Redwood Valley, CA, [2]Mendocino County Department of Agriculture, Ukiah, CA, [3]Mendocino County Fire Safe Council, Ukiah, CA, [4]California Native Plant Society - Sanhedrin Chapter. tara_athan@alt2IS.com 707-485-1198

The Weed Management Areas of Mendocino County put their highest priorities on prevention to avoid introducing or dispersing invasive species, and early detection of eradicable infestations. We have developed several approaches to outreach and planning that may provide a template for other organizations to use. These include:

- a Red Alert poster/flyer
- a Prevention and Early Detection webpage
- online, interactive weed distribution maps
- an online weed reporting form
- a Weed Prevention Area program, including planning templates
- a Weed-Free Materials Best Management Practices Guidelines, including Weed-Free Sand and Gravel Pit Certification program.

These programs support the efforts to keep Mendocino County wildlands free of red sesbania (Sesbania punicea) and purple starthistle (Centaurea calcitrapa), and to prevent the dispersion of weeds of limited distribution, including distaff thistle (Carthamus lanatus) and water primrose-willow (Ludwigia hexapetala).

San Luis Rey River Flood Risk Management Area giant reed eradication.

Atik,Raquel[1]*, *Italia Gray*[1], *Peter Tomsovic*[1], *Thomas Keeney*[2], [1]RECON Environmental, San Diego, CA, [2]U.S. Army Corps of Engineers, Los Angeles, CA. ratik@recon-us.com 619-308-9333

The U.S. Army Corps of Engineers (USACE) in collaboration with RECON Environmental, Inc. implemented a giant reed (*Arundo donax*) eradication program within the San Luis Rey River Flood Risk Management Area (SLRRFRM), City of Oceanside, California. Giant reed is detrimental to native riverine ecosystems because it forms dense, monotypic stands that displace native vegetation, reduce groundwater availability; alter stream flow, and increase potential for wildfires and flood risk. The SLRRFRM Project goal is to increase flood conveyance in the channel and maintain habitat within the channel and detention ponds for resident endangered species and their critical habitat. The project has been permitted by the U.S. Fish and Wildlife Service, the Regional Water Quality Control Board, the California Department of Fish and Game, the National Marine Fisheries Service, and the California Coastal Commission. Giant reed control activities consisted of foliar application of glyphosate herbicide in the fall, allowing the herbicide to translocate to its rhizomes, and then mowing the large dead stands in late winter and early spring. Approximately 40 acres of giant reed were treated and subsequently mowed. This treatment method has proven very effective, with trials having almost 100% efficacy when foliar applications occur in the appropriate season. Although fall foliar applications are most effective, repeat treatments are necessary for complete giant reed eradication. Although a newly approved imazapyr-based herbicide has proven very effective in treating giant reed during spring months, repeat treatments are pending regulatory agency approval for work during the breeding season of sensitive avian species.

Invasive aquatic weeds: Implications for mosquito and vector management activities.

Blair, Charles E., MD, Trustee, Mosquito and Vector Management District of Santa Barbara County (MVMDSBC) and active member of Cal-IPC & CNPS , Lompoc, CA. blairce@verizon.net

Healthy natural wetlands *are far less likely* to be breeding areas for disease-carrying mosquitoes than degraded ones. Degradation of these bodies of water by invasive aquatic weeds and other influences can result in their being potential habitat for mosquitoes that can carry the West Nile Virus, encephalitis, and other diseases. Control of these invasive plants can be an important part of the Integrated Weed/Pest Management efforts of both Weed Management Areas and Mosquito and Vector Control Agencies. Adverse effects of Water Hyacinth, *Eichhnorina crassipes,* hydrilla, *Hydrilla verticillata,* Smooth Cordgrass, *Spartina foliosa x alterniflora,* and other species on water quality and facilitating mosquito breeding will be shown along with the importance of healthy vernal pools. Presentations on the importance of S*. foliosa x alterniflora* in San Francisco Bay were made at recent statewide Cal-IPC *and* Mosquito and Vector Control Conferences. Information from on-site visits to the San Mateo Mosquito Abetment District will be included. Demonstration of these relationships can enhance both agency and public awareness of their importance.

Salmon River cooperative noxious weed program 1997-2008: Steps to success and obstacles to overcome at the watershed scale.

Brucker, Petey, Salmon River Restoration Council, pbrucker@srrc.org 530 462 4665

The Salmon River Restoration Council, with its partners in the Siskiyou Management Area group, are managing several priority species of invasive plants throughout the almost half million Salmon River watershed, highlighting the overwhelming reduction of spotted knapweed (Centaurea maculosa). In addition to achieving over 99% reduction in the number of known spotted knapweed plants found throughout this wildland watershed, this program has targeted and is managing 12 additional prioritized species. Effective control techniques have relied upon the early detection and rapid response to new populations and have involved a persistent and thorough treatment of each site, using the right tools for the Salmon River. Mapping, planning and monitoring are some key elements of this program. Several of the managed invasive plant populations are associated with other habitat restoration activities associated with the Salmon River Subbasin Strategy. This work has been funded by different public and private entities, as well as had overwhelming support from the local landowners and community.

Effects of disturbance of biological soil crusts on the emergence of exotic plants in California sage scrub.

Buenafe, Rebecca R and Darren R. Sandquist*, California State University at Fullerton, CA. *trailmixed@gmail.com 949-294-7502

Invasion by non-native species is shifting the composition of California sage scrub (CSS) from native perennial shrubland to exotic annual grassland. Disturbance of biological soil crusts (BSCs) is hypothesized to increase emergence of exotic plants. BSCs, comprised of soil particles and cyanobacteria, green algae, fungi, lichens, and bryophytes, occupy the soil surface and provide integral ecosystem services in myriad abiotic-stressed systems, including CSS. Using a field and greenhouse experiment, I tested the hypothesis that disturbance of BSC increases emergence of exotic plants in a coastal CSS plant community. At Whiting Ranch Wilderness Park in Lake Forest, California, 42 paired subplots were established and emergence of exotic and native plants was compared between control subplots containing intact BSC and disturbed BSC subplots. In the greenhouse experiment, intact BSC cores were extracted from CSS and half were disturbed. Seeds of exotic and native plants were placed in BSC cores by species and then observed daily to determine seed fate (emerged, missing, or did not emerge, n = 6). In the field, disturbance of BSC significantly increased total exotic emergence (Wilcoxon-signed rank test, $p < 0.01$). Total emergence of native species did not differ between treatments (Wilcoxon-signed rank test, $p < 0.69$). In the greenhouse, seed fates significantly differed between treatments for all exotic species (contingency analysis, $p < 0.0001$). Results for native plants were species specific. These results will assist CSS land managers by considering BSCs as an ecological structure affecting exotic plant invasions and a component of overall ecosystem health.

Lake Tahoe Aquatic Invasive Species Pilot Project – Measuring and adapting standard methods of control for use in an alpine environment.

Caterino, Phil[1]*, *Doug Freeland*[2] and *Giovanni Caterino*[3], [1]Alpengroup, Tahoe City, CA, [2]Aquatic Consulting Evaluation, Spirit Lake, Idaho, [3]Tahoe Divers Conservancy, Carnelian Bay, CA. *pcaterino@mac.com 775-544-9109

Lake Tahoe is designated an *Outstanding National Resource Water* due to its extraordinary clarity. The Tahoe Divers Conservancy (TDC), a volunteer nonprofit organization, in partnership with the Tahoe Resource Conservation District (TRCD), The Tahoe Regional Planning Agency (TRPA), California State Lands Commission (CSLC), and California State Department of Parks and Recreation (CSDPR) is conducting a three-year project to remove the invasive Eurasian Watermilfoil (*Myriophyllum spicatum*) from Emerald Bay (A California State Underwater Park) and Ski Run beach in South Lake Tahoe, California. The Bureau of Reclamation (BOR) funds this project. Intended outcome and critical component of the project is the development of an Invasive Aquatic Plant Monitoring Protocol which will determine the effectiveness of adapting standard removal techniques to Lake Tahoe. The purpose of the protocol is to provide a mechanism to record and inventory invasive aquatic plant species infestations via diver surveys, provide an accurate record of removal efforts in the project areas and provide follow-up monitoring to sites where invasive aquatic plant species are removed to determine the efficacy of the treated areas. Because water quality standards restrict *any* chemical use in the waters of Lake Tahoe, the standard methods of treatment/removal of aquatic weeds in Lake Tahoe to be assessed will only include diver-assisted suction removal, involving divers hand pulling the plants by the roots to feed into a suction hose attached to a small dredge and bottom barriers, which is a cloth or screen that covers the bottom surface to prevent light and

smothers the plants. While both these methods have great promise for effective removal and control at Lake Tahoe, the process must be monitored for effectiveness and environmental impacts, such as habitat disruption and elevated turbidity.

Hybridization between invasive and native blackberries (*Rubus*) in California.

*Clark, Lindsay** and *Marie Jasieniuk*. Department of Plant Sciences, University of California – Davis. *lvclark@ucdavis.edu 530-752-0508

Hybridization between native and introduced species has the potential to generate highly invasive populations of weeds, as most infamously demonstrated by *Spartina*. The genus *Rubus* includes a number of aggressive weeds of natural areas, in particular Himalayan blackberry (*R. armeniacus*), an invasive weed of California and the Pacific Northwest as well as elsewhere in the world. Given the large number of species in this genus and the morphological variation within species, *Rubus* hybrids and introgressed individuals may be difficult to identify visually. Using molecular genetic tools, we detected natural hybridization of the native Pacific blackberry (*R.ursinus*) with both the invasive *R.armeniacus* and the introduced Pennsylvania blackberry (*R.pensilvanicus*) in California. We are currently investigating whether this hybridization has led to the introgression of non-native genetic material into *R.ursinus*. Future studies will investigate the potential of hybrid *Rubus* to contribute to invasive populations in California and/or reduce the fitness of native *R.ursinus* populations through outbreeding depression.

The evolution of artichoke thistle (*Cynara cardunculus*) data management at Camp Pendleton, CA (1984-present).

*Dinkins, Meghan** and *Deborah Bieber*, AC/S Environmental Security, Land Management Branch, Camp Pendleton, CA. *meghan.dinkins.ctr@usmc.mil 760-820-6369

Artichoke thistle is considered to be one of Marine Corps Base Camp Pendleton's "10 Most Wanted Weeds." In addition to being non-native and invasive, spiny artichoke thistle also directly impairs military operations. Camp Pendleton's artichoke thistle program is unique in the respects of its duration (24-years), consistency of the data being collected by one contractor, and its success in terms of reducing artichoke thistle numbers. With the advent of GIS, record keeping in the artichoke thistle control program has evolved and improved in quality.

The historic data management methods (hard copy maps) combined with GIS has yielded specific conclusions. First, artichoke thistle populations have decreased considerably base-wide since 1984. Second, mapping large monocultures of thistles is very different than mapping isolated individuals characteristic of today's trace densities. Program data management techniques are discussed here and the resulting maps are used to illustrate artichoke thistle population patterns on Base.

Soil biota facilitate invasion within microhabitats in a California coastal prairie.

*Emam, Taraneh **[1], *Bruce Pavlik*[1], *Peter Alpert*[2]. [1]Mills College, Oakland, CA. [2]University of Massachusetts, Amherst, MA. *taraneh.emam@gmail.com 510-827-2377

Relationships between plants and soil biota greatly influence the ability of non-native plants to invade a native soil. Soil biotic communities, and plant-soil interactions, can vary widely between microhabitats. On the Bodega Marine Reserve (BMR), soil microhabitats influenced by *Lupinus arboreus* have been shown to facilitate growth of non-native grasses through increasing soil nitrogen availability. This experiment compared the effects of soil from differing microhabitats on the emergence and biomass accumulation of *Bromus diandrus*, a prolific non-native annual grass, and *Hordeum brachyantherum*, a native perennial grass. Lupine-influenced soil, *B. diandrus* - influenced soil, and relatively pristine native grassland soil from the BMR were the three microhabitat types tested. *H. brachyantherum* experienced strong negative effects on biomass accumulation from live lupine and grassland soils compared to sterilized soils (relative feedbacks of -1.54 and -0.43, respectively). *B. diandrus* experienced far less severe effects on biomass (-0.049 on lupine soil and -0.070 on grassland soil). The effect of conspecific soil on *B. diandrus* was minimal (-0.00089), which may indicate enemy release. Emergence rates were also affected by soil type. The largest relative difference between *B. diandrus* and *H. brachyantherum* was seen in native grassland soil, where *H. brachyantherum* emergence fell 58% on live soil and *B. diandrus* only 12%. These findings indicate that the success of both native and invasive plants may vary significantly over small distances due to differing soil communities, and that the native soil community may be promoting the growth of invasive plants while hindering native plants.

The role of cultivation and hybridization in invasive potential of *Pyrus calleryana*.

*Hadiman, Nicole A.**, *Theresa M. Culley*, University of Cincinnati, Cincinnati, OH.
*nhardiman@gmail.com, 513-556-9705

Pyrus calleryana is an emerging invasive species that appears to have had a recent and rapid increase in the rate of population spread. The species was virtually unknown as an invasive five years ago, but since then naturalized populations have been identified in 26 states. The species is a very popular ornamental tree, with as many as 29 different cultivated varieties. Genetic analyses have shown that invasive trees are highly admixed hybrid progeny of these different cultivars. Measures of reproductive and establishment ability were also used to compare different cultivars and hybrid types in terms of an advantage in contribution to invasive populations. All groups were found to be highly fecund, have low mortality, and have high biomass accumulation. Invasive trees also produced greater numbers of seeds than cultivated individuals, indicating an increase in establishment ability for that group. Cultivated populations, therefore, appear to be the source for invasive populations, and invasive populations appear to be highly productive, stabilized hybrid swarms. In the case of the Callery pear, availability of multiple cultivar types and widespread horticultural use seems to have provided a demographic release, allowing the species to not only naturalize, but to also increase reproductive output.

Interactive effects of population genetic diversity and resident community composition on the success of an annual exotic invasive species.

*McGray, Heather**, *Marlyse Lombardo*, *Katharine N. Suding*, University of California, Irvine,
*hmcgray@uci.edu 949-824-1559

Ecological theory predicts that the success of exotic invasive species may be affected by the genetic diversity of the invasive population as well as the species composition of the invaded community. We tested how exotic population genetic diversity and resident community composition affected the success of the invasive annual grass, *Avena barbata*. We tested whether: (1) increased genetic diversity of the exotic population caused increased invasion success, (2) diverse resident communities better resisted exotic invasion, and (3) resident communities composed of species functionally similar to the exotic better resisted invasion. In a fully-factorial greenhouse experiment, we established resident communities which varied in species diversity (1, 2, or 3 species) and functional group composition (annual grass, perennial grass, and annual forb). These communities were invaded by *Avena* populations, which varied in genetic diversity (1, 5, or 10 genotypes). We measured invasion success using dry weight above ground biomass of *Avena*. There was a marginal, yet not significant, positive effect of genetic diversity on *Avena* performance, while increasing resident community diversity decreased *Avena* performance. There was a negative main effect of the presence of *Nassella*, indicating that the presence of a perennial grass, not the functionally similar annual grass, was responsible for increasing community resistance to invasion. However, in functionally similar communities (composed of annual grass) increased genetic diversity positively affected *Avena* performance. These results indicate that understanding the interaction of invasive genetic diversity and resident community composition may be important for predicting invasive potential of exotic species in differing communities.

Ludwigia control as a precursor to restoration: Progress and challenges.

Meisler, Julian A. Laguna de Santa Rosa Foundation, Santa Rosa, CA. julian@lagunafoundation.org

The Laguna de Santa Rosa Foundation has completed a three year effort to control *Ludwigia* sp. (creeping water primrose) in five miles of channel and one hundred acres of perennially inundated floodplain in Sonoma County, CA. Methods included application of herbicide followed by mechanical removal where feasible. The results varied widely with rapid regrowth in shallow channels and areas where complete removal was not possible. Deeper channels experienced far slower re-growth. Future maintenance will be required until more effective methods of control are identified and underlying conditions favoring *Ludwigia* are addressed at both a watershed and site specific scale. This should factor into but not preclude restoration planning and implementation.

Sinapsis alba seed meal as a pre –emergent control for French broom (*Genista monspessulana*) seedlings.

*Moore, Ken**, ken@wildwork.org 831-469-4690, and *Carla Bossard* * Biology Dept., St. Mary's College of California, Moraga, CA, 94575. cbossard@stmarys-ca.edu, 925-631-4032

The authors tested *Sinapsis alba* pressed seed meal as a pre-emergent inhibitor of French broom seedlings in 2007-2008 at Quail Hollow County Park. S. alba seed meal is known to contain 4-hydroxybenzyl isothiocyanate which releases a quinone that hydrolyzes in soil to form SCN-, a known bioherbicide. The meal was applied by broadcasting it on the surface of the soil of the 4 m by 4 m blocks at a rate of approximately 8.8 kg of SCN-/ha. A significant decrease of broom seedlings was observed in treated plots compared to

controls (F=14.2, P=0.001). While there were no significant differences found in quality or quantity of soil fauna between treated and untreated blocks, there was a slightly elevated (6% higher) level of nitrogen observed in treated blocks. While this concentration of *S.alba* seed did inhibit seedling germination over one 8 month germination season, it did not stop germination of all French broom seedlings limiting its usefulness as a control agent at this level of application.

"A" rated weeds on display: CDFA's internet mapping website.

Murphy-Vierra, Colleen, CDFA, Sacramento, CA.
cmurphy@cdfa.ca.gov 916-654-0683

CDFA's Noxious Weed Internet Mapping Service (IMS) site is a collection of data consolidation from a long list of contributors. The intended purpose of these IMS sites is to provide information and gather more information about "A" Rated Weeds throughout California. This project started in 1996 with the creation of the Aweed Database by Integrated Pest Control Branch. Collection of the data has occurred over the years from historic records, County Agriculture Departments, Weed Management Areas, US Forest Service, Bureau Land Management, and CDFA personal. This database maintains data about the centroids of populations of "A" Rated Weeds. There are two sites, a public site and a private site. The public site displays the database information in the MTR grid and gives general information. The private site shows the centroids of populations and details about the populations. The IMS sites are a ongoing project of CDFA and updated regularly.

Mechanical control coupled with native species planting as a cost-effective method of controlling Himalayan blackberry.

Pacini, Nick, River Partners, Chico, CA.
npacini@riverpartners.org 530-894-5401

River Partners is conducting an ecological enhancement project as part of the riparian restoration taking place at the Bear River Setback Levee Project in Yuba and Sutter Counties. The Three Rivers Levee Improvement Authority (TRLIA) is setting back the levee in order to enhance flood safety along the lower Feather River. The enhancement project includes control of numerous Himalayan blackberry (*Rubus discolor*) stands that have invaded an area of remnant vegetation. We mowed the stand using a Bobcat forestry cutter in March of 2008. The cutter proved to be a very efficient means of removing the blackberry brambles in small areas (<1 acre) that also contain desirable native vegetation including trees and large shrubs. In a relatively small amount of time, we were able to clear many large stands, limited only by topography. We followed with two months of treating resprouts with Garlon® (triclopyr). We then planted a diverse palette of native vegetation including box elder (*Acer negundo*), Oregon ash (*Fraxinus latifolia*), virgin's bower (*Clematis ligusticifolia*) and the native California blackberry (*Rubus ursinus*). In the fall and winter months we will be planting willow cuttings and an herbaceous understory. Early observations reveal that native recruits such as Santa Barbara sedge (*Carex barbarae*) are already colonizing sites once dominated by the blackberry. We anticipate that following up the mowing with aggressive resprout control and active planting, native vegetation will become established and out-compete the Himalayan blackberry.

Controlling an invasive grass in a grassland setting – Harding grass control in the Bald Hills of Redwood National and State Parks.

Samuels, Stassia[*], *Laura Julian* and *Scott Powell*, Redwood National and State Parks, Orick, CA.
*stassia_samuels@nps.gov
707- 465-7784

Redwood National and State Parks is using Aquamaster to treat a Harding grass (*Phalaris aquatica*) infestation in the coastal prairies of the Bald Hills. This project is funded by the National Park Service, and California Department of Food and Agriculture. Harding grass has invaded over 40 acres of coastal prairie, with two main population centers and many pioneers scattered amongst 1200 acres of grassland. After two years of small scale treatments and one year of more aggressive treatment, over 30 acres of Harding grass will have been treated with a foliar application of Aquamaster. Monitoring plots have been installed to assess treatment effects. This poster will discuss initial results, lessons learned and plans for the future.

Spatial patterns in native and exotic submersed aquatic plant species in the Sacramento-San Joaquin River Delta.

Santos, Maria J.[1*], *Lars W. Anderson*[2] and *Susan L. Ustin*[1], [1]Centre for Spatial Technologies and Remote Sensing and Department of Land, Air and Water Resources, University of California, Davis, Davis, CA, [2]U.S. Department of Agriculture, Agricultural Research service, Exotic and Invasive Weed Research, Davis, CA.
*mjsantos@ucdavis.edu 530-752-5092

Submerged aquatic plant species act both as ecosystem engineers and as service providers, affecting the dynamics of freshwater ecosystems. The Sacramento San Joaquin River Delta is an example of an aquatic ecosystem that is highly modified by the cumulative effects of human activities and biological invasions. At

the regional scale, the submerged aquatic community is undergoing modification towards an exotic species dominated plant community. We have monitored the spatial distribution of the submersed aquatic community since 2003 to 2007 using hyperspectral remote sensing. In the areas that consistently showed presence of the submersed aquatic plant community, we sampled species composition during the autumn using a rake (point) sampling. Our results show that the submersed aquatic plant community in the Delta is composed mainly of five native and four non-native species, with the non-native *Egeria densa* being the most frequently detected species in monospecific stands (33.28% of detection events) followed by the native *Ceratophyllum demersum* (1.74%). These two species frequently co-occur (25.19%) and have a generalized distribution throughout the area. The distribution of species shows that native and exotic species currently share available niches, with exotic species occupying a greater area (3092.07ha) than that of native species (2069.9ha), with 58% overlap (1779.6ha). Non-native invasive species as *Egeria densa,* and *Myriophyllum spicatum* and native *Ceratophyllum demersum* have the greatest contribution to submersed aquatic vegetation biomass in the Delta. This shift toward non-native invasive species dominance alters irreversibly the native community composition; however, it is still unclear if it alters functionality at the ecosystem level.

An analysis of the seedbank at Joshua Tree National Park in sites invaded by exotic annual grasses.

*Schneider, Heather** and *Edith Allen*. Department of Botany & Plant Sciences. University of California, Riverside, CA *hschn001@ucr.edu 630-247-2071, edith.allen@ucr.edu

Exotic annual grasses and forbs are invading California's deserts and out-competing natives. Anthropogenic nitrogen deposition favors invaders by increasing resource availability. Invasive species have a negative impact on native species abundance in natural systems. Many desert species are adapted to using soil seed banks to insure long-term survival in an unpredictable environment. In this study, we examined how exotic invasions and nitrogen deposition affect the soil seed bank. We examined four sites along a natural nitrogen deposition gradient in Joshua Tree National Park that have been part of a long-term nitrogen fertilization study. Soil cores were collected from control (0kg N/ha) and high (30kg N/ha) plots at each site. These soils were spread out in the greenhouse, watered liberally, and subsequent germination was recorded by species. We compared the seed bank composition between fertilization treatments as well as between sites. There was no significant difference due to nitrogen fertilization in the seed bank, although grass cover was significantly high with N in field vegetation surveys. Exotic percent cover was inversely related to native percent cover and seed bank density. Examinations of soil seed banks can provide valuable information about the status of plant populations, invasions, and potential for restoration.

Invasive plant *Arundo donax*: Mapping and prioritizing its eradication in the Bay-Delta region of northern California.

Sesser, Bryan, *Patricia Stiefer* and *Deanne DiPietro**, Sonoma Ecology Center, Eldridge, CA. deanne@sonomaecologycenter.org 707-996-0712 ext. 114

The invasive plant *Arundo donax* has become widespread in California. In Southern California some riparian habitat has been reduced to monotypic stands and eradication has been costly. In Northern California, Arundo infestations are less widespread. However, eradication began later and has occurred in a piecemeal fashion as individual organizations fight local infestations. It is generally accepted by the invasive plant control community that there insufficient funding to eradicate all problem weeds and control efforts must be strategically focused. To support this work, Team Arundo del Norte, a collaboration of organizations working on the control of Arundo, has completed a map of Arundo observations in the San Francisco Bay and Delta Regions and developed recommended eradication priorities based on the value of the threatened habitat. Available mapping data from 21 organizations was consolidated, critical gaps were field mapped and all data combined into a single GIS layer. This data is available on BIOS and CRISIS Maps. To identify eradication priorities, habitat suitability data for a suite of representative riparian species were combined with federal and state threat listings to derive a multi-species conservation value. At a given location, this index suggests the eradication priority for any threatening Arundo. This ranking of Arundo sites will be useful to weed managers, who can combine the information and maps with local expert opinion to assist in development of their weed control strategy.

Patterns of change in water hyacinth distribution in the Sacramento-San Joaquin Delta.

*Shruti, Khanna **, *Maria J. Santos*, *Erin L. Hestir*, *Jonathan A. Greenberg*, and *Susan L. Ustin*, Center for Spatial Technologies and Remote Sensing (CSTARS), Department of Land, Air and Water Resources,

University of California, Davis, CA
*shrkhanna@ucdavis.edu 916-952-9017

Water hyacinth (*Eichornia crassipes*), known to be the fastest growing macrophyte in the world, has been recorded in the Sacramento-San Joaquin Delta since 1904. By 1984, it already covered 506 hectares or 22% of the waterways in the Delta resulting in huge economic and ecological costs. CSTARS has been mapping water hyacinth in the Delta since 2004. Through analysis of hyperspectral HyMap imagery flown over the Delta in June of 2004, 2005, 2006 and 2007, we have been successful in mapping water hyacinth and two other floating species (water pennywort and water primrose) with over 80% accuracy. Because of the extensive eradication efforts to control its distribution in recent years combined with unfavorable environmental conditions, it has steadily decreased in cover over the past decade. By 2008, only 56 hectares of hyacinth were mapped across the entire Delta indicating a near successful eradication program. However, without total eradication, which is nearly impossible, it can spread from nursery sites and resurge if conditions become more favorable. We present the results of this study which focused on describing patterns in water hyacinth distribution and the turnover between all three floating species as revealed by the analysis of this multi-year dataset.

Adaptation and evaluation of "double tent" solar heating for eradicating weed seeds in remote areas.

Stapleton, James J.[1]*, *Susan B. Mallek*[1], *Ron Eng*[2], and *Albert Franklin*[3], [1]UC Statewide IPM Program, Parlier, CA, [2]California Department of Food and Agriculture, Sacramento, CA, [3]U.S. Department of the Interior, Bureau of Land Management, Folsom, CA.
*jim@uckac.edu 559-646-6570

A discovered infestation of live and skeleton plants of the Class 'A' weed pest, Iberian starthistle (*Centaurea iberica*), in Mariposa County prompted initiation of a field and laboratory project to adapt solar heating techniques for seed eradication. To facilitate off-site methods testing, seeds of invasive, but non-quarantined, tocolote (*C. melitensis*), collected from the Santa Monica Mountains Recreation Area in Ventura County, also were used. Initial field testing showed that an adaptation of the double tent solarization technique (www.solar.uckac.edu), designed for soil disinfestation, could provide inside air temperatures of more than 70 C (158 F) during warm summer days. Field and laboratory testing pointed out the critical need for moisture in the seed bags in order to obtain desired efficacy. Thermal inactivation studies were conducted on seeds exposed at 42, 46, 50, 60, and 70 C. The studies showed that, at the higher temperatures of 60 and 70 C, seeds of both *Centaurea* species tested could be inactivated over the course of a single day of treatment under the Mariposa County field conditions. This technique may be of value for on-site eradication of seeds from localized infestations of invasive weed pests. It could be adaptable to on-site use for infestations discovered in remote areas, where attempted transport of seeds or seed-bearing material might result in unwanted seed dispersal.

Goats defeat blackberries: Riparian habitat restoration following invasive plant removal at Vino Farms, Inc. Lodi, California.

*Stevenson, Chris**, *Tom Griggs* and *Chris Robbins*, River Partners, Modesto and Chico, CA.
*cstevenson@riverpartners.org 209-521-1700

In 2007, Vino Farms, Inc. partnered with River Partners to implement a private-lands habitat restoration project on approximately 22.5 floodplain acres adjacent to their Molekumne River vineyards. This project is part of their well-established sustainable agriculture program. The goal of this project is to improve wildlife habitat by removing invasive plant species and planting native vegetation to increase plant species diversity and improve habitat structure. Before restoration, this area was dominated by invasive Himalayan blackberry (*Rubus armeniacus*), tree-of-heaven (*Ailanthus altissima*) and black walnuts *(Junglans hindsii)*. Approximately twelve acres of Himalayan blackberry were grazed by brush goats for 4 weeks to reduce foliage density before the canes were cleared by a mechanical masticator. Black walnuts were mechanically removed from 14.5 acres, and tree-of-heaven was cleared from 1 acre. Sprouts of all invasive species will be spot-treated during the following growing seasons. In spring 2008, River Partners planted approximately 6,000 native riparian plants which including native trees species such as Fremont cottonwood (*Populus fremontii*) and a dense native understory which included California blackberry (*Rubus ursinus*). This restoration is expected to benefit a number of native riparian species including Neotropical migrant songbirds, Swainson's Hawk, and the valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*). This project also has the potential to improve aquatic habitat conditions and provide a future source for in-stream large wood critical to restoring salmon habitat in this region. The first plant survival census will be conducted in fall 2008.

Control of jubatagrass and restoration of fountain thistle habitat in the San Francisco Public Utilities Commission Peninsula Watersheds.

*Thomas, Don**, *Sonya Foree* and *Ellen Natesan*, San Francisco Public Utilities Commission, San Francisco, CA. *dethomas@sfwater.org 650-401-8890

The San Francisco Public Utilities Commission (SFPUC), over a period of several years, has been conducting a project to restore the habitat of the federally endangered fountain thistle (*Cirsium fontinale* var *fontinale*), which has been invaded by jubatagrass (*Cortaderia jubata*). This rare native thistle occurs only in a few populations in serpentine seep and wetland habitat on the San Francisco Peninsula. Jubatagrass control has been achieved through mechanical removal of foliage and treatment of cut stems with glyphosate (50% Rodeo™). Approximately 5,000 square feet of habitat have been cleared of jubatagrass to-date. Population counts and mapping of populations were performed in 2007 to allow for monitoring of recolonization by fountain thistle. Follow-up assessments indicate successful recruitment of the thistle into cleared habitat, mainly on the periphery of the population. Restoration trials are planned to evaluate methods for supplementing natural recruitment.

Mapping invasive aquatic plant species in the Sacramento-San Joaquin River Delta using hyperspectral imagery.

Ustin, Susan L., Centre for Spatial Technologies and Remote Sensing, Department of Land, Air and Water Resources, University of California, Davis, Davis, CA slustin@ucdavis.edu 530-752-0621

Submersed assembladges of invasive species within aquatic ecosystems pose a significant threat to ecosystem functioning and biodiversity. Effective control of invasive aquatic species requires detailed knowledge of their spatial distribution and a way to monitor changes over time. For five years, in one of the largest airborne mapping campaigns, my lab has analyzed high spatial resolution hyperspectral images measured at 3 m pixel resolution, in 126 spectral bands across the visible to shortwave infrared (0.4 to 2.5 µm) wavelength region, collected each June over 54,858 acres of waterways in the Sacramento-San Joaquin Delta. These data were used to identify locations of of the native and invasive submerged life form and emergent aquatic species using a decision tree approach to identify feature parameters from the spectrum of each target species. Map accuracy varied between 80-93% depending on year and species or life form, which was assessed using field measured GPS locations of different species and water throughout the delta. I will discuss factors related to detection of invasives in the delta and how distributions have changed with time.

Effects of glyphosate to control exotic annuals for coastal sage scrub restoration.

Weathers, Kristin A.,[1]*, *Edith B. Allen*[1], *Carl E. Bell*[2] and *Milton E. McGiffen*[1], [1]Department of Botany and Plant Sciences, University of California, Riverside, CA. [2]Cooperative Extension, University of California, San Diego, CA. *kristinweathers@mac.com. 951-897-4430

Barnett Ranch is a new San Diego County Park with a history of grazing and is dominated in part by dense stands of *Erodium botrys*, an exotic forb, and invasive annual grasses. Plots were established to determine whether broadcast application of glyphosate herbicide could be used to restore native Coastal Sage Scrub vegetation. There were two treatments—an early season broadcast application of glyphosate, and an early season broadcast application followed by a late season spot treatment of glyphosate—and a control. Two sites were treated; one a hillside dominated by *E. botrys* and the second a swale site dominated by exotic grasses. At the *E. botrys* dominated site, both treatments had significantly increased native forb cover and decreased exotic forb and exotic grass cover in relation to the control, but the two treatments did not differ significantly from each other. At the grassland site, native forbs increased and exotic grasses decreased significantly in both treatments compared to the control, however, exotic forbs also increased significantly with the removal of exotic grass. Again the two treatments did not vary significantly from each other, suggesting that one application of glyphosate is sufficient.

Guide to Discussion Groups

Please Refer to map on page 5 of your program for room locations.
Discussion group coordinator: Joanna Clines, Sierra National Forest, cell phone **(559) 760-3618**

Thursday, October 2 4:30 – 5:30pm

1. Careers in wildland weed research and management 100 Colusa Hall

Leaders: Chris Christofferson, Plumas National Forest

Facilitator: Linnea Hanson, Plumas National Forest

This discussion group will provide an informal venue for questions, answers, and the exchange of ideas about the future of careers in wildland weed work. This session will complement the more formal panel discussion scheduled for Friday at 1:30. Many of Friday's panelists will be present in a more approachable, small-group setting. This group is suitable for aspiring weed workers, for natural resource managers of all sorts, and for academics (both students and teachers).

2. Weed management contractors: Future market and needs Bell MU 314

Leader: Mark Heath, Shelterbelt Builders

Facilitator: David Chang, County of Santa Barbara Agricultural Commissioner's Office

OK, let's just admit it; this is a confusing area for many people. An overview to clarify some basics about what is legal, required, and advisable under various scenarios will be provided, followed by a Q & A. Specific questions to be addressed: What types of contractors can legally perform weed management work? What are the benefits and disadvantages of the different types of professional licenses? How does one go about finding a contractor and how do you make sure you get the results you're paying for? How does one set up and become a successful wildland weed control contractor? Contracts – Is everything negotiable?

3. Weed Control Q & A: Riparian weeds Bell MU 312

Leader: Mark Newhouser, Sonoma Ecology Center

Facilitator: Gretchen Coffman, WRA Environmental Consultants

Explore the mysteries of riparian weed control as we delve into the murky world somewhere between the terrestrial and aquatic. Discussion will include weed control challenges, new techniques and successful combinations, tricks of the trade and traps to avoid. Group participants are encouraged to prepare questions or scenarios and at least one gold nugget of advice to share. Rewards for best technique, worst scenario, best question, and best advice.

4. Weed Control Q & A: Brooms and other woody invasives. Bell MU 210

Leader: Janet Klein, Marin Municipal Water District

Facilitator: Carla Bossard, St. Mary's College of California

In February of this year, 45 broom managers from around the state gathered for a raucous discussion of the good, the bad, and the ugly in broom control. Join us as we move the conversation beyond tools to the more complex issue of achieving sustainable control on a landscape scale. Summary information from the February meeting will be distributed and discussed.

Notes for all sessions will be posted on the Cal-IPC website and published in the Symposium Proceedings.

Friday, October 3, 2008 10:00 - 11:30am

1. Weed Control Q & A: Weed control for invaders of uplands. 100 Colusa Hall

Leader: Joseph DiTomaso, University of California, Davis

Facilitator: Tanya Meyer, Yolo County Resource Conservation District

Leaders will summarize new and innovative control news, focusing on thistles and knapweeds (including yellow starthistle), and then field questions. Two of California's experts will discuss some of the new techniques for weed control and where they best fit, as well as their limitations. Participants are encouraged to discuss their current difficult weed problems. Group leaders and other experts in the audience will try to come up with some best management options.

2. Future research needs for invasive plants Bell MU 211

Leader: Mona Robison, California Botany

Facilitator: Gina Darin, University of California, Davis

Help set the research agenda for invasive plant management in California! Cal-IPC recently prepared a draft of invasive plant research needs for California. We will briefly review the findings and ask for input from workshop participants. The ten research needs areas covered were: Biology and Ecology; Distribution, Biogeography and Range Modeling; Ecological Impacts; Control and Management Methods; Restoration; Human Activities Affecting Invasion; Economic Impacts; Social Issues; Risk Assessment; and Policy and Laws. We will also discuss research funding opportunities.

3. Ensuring successful weed control: Planning and Monitoring! Bell MU 303

Leader: Susan Hubbard, Bureau of Land Management

Facilitator: Ken Moore, Wildlands Restoration Team

Controlling invasive plants obviously involves time in the field actually removing weeds. But what else is necessary to have a successful program to control invasive plants? This workshop will focus on planning and monitoring – the things you need to do before and after weed removal. We will look at some of the basic concepts that will prevent you from making time consuming and costly mistakes and suggest how to develop a plan to ensure that you are being the most effective you can be. And we will look at monitoring and making sure we can document our successes (and learn from our failures). After covering the basics we will open up the discussion to see what has worked and not worked for those present and together answer questions.

4. Weed Control Q & A: Aquatic weeds. Bell MU 312

Leader: Florence Maly, California Department of Food and Agriculture

Facilitator: Patrick Akers, California Department of Food and Agriculture

Participants will have an opportunity to hear about tried-and-true as well as new techniques for aquatic weed control from the perspective of the on-the-ground weed manager. The sensitivity of working in aquatic systems where regulations are especially stringent requires careful choice of weed control options for a good integrated weed management program. Participants are encouraged to discuss their current difficult weed problems and to ask questions of the leaders and the group members. Appropriate for both seasoned weed workers and those new to aquatic weed control.