California Invasive Plant Council 2012 Symposium

Contents:

Front pocket:
- Sponsors

Back pocket:
- Annual report
- Discussion groups
- Raffle & auction
- Cal-IPC resources
- Attendee list

Pulling *Parentucellia viscosa* (yellow glandweed) is the focus of an annual volunteer workday at the Van Hoosear Wildflower Preserve in Sonoma County. Photo: Mark Newhouser.

Bay to Basin: Coordinating Response to Invasive Plants across California

Doubletree Sonoma Wine Country, Rohnert Park
October 11-13, 2012

Welcome to the 21st Annual Cal-IPC Symposium!

For some of you, this will be your first introduction to Cal-IPC. Others may have attended more Symposia than you can count. All Symposium attendees receive a 2013 membership, joining fellow members throughout California and beyond! Membership includes our quarterly newsletter; updates and discounts on field courses; and information about advocacy events and next year's Symposium.

Session Locations: Most paper sessions will take place in Salons I-III or Salon IV. Posters are located in the Chardonnay Room. Discussion groups will be held in Salon IV, Sonoma/Santa Rosa, and Bodega/Cotati; see the Discussion Group descriptions and the agenda for specifics.

Keynote Speaker: Please join us in welcoming Dr. Kent Lightfoot of the Anthropology Department at UC Berkeley. His research interests include North American prehistory, coastal hunter-gatherer societies, the emergence of early village communities, and culture contact between Native peoples and European explorers and colonists. His research sites include Fort Ross on the Sonoma County coast.

Discussion Groups: Discussion groups will run concurrently with paper sessions at 1pm Thursday and Friday. Anyone may attend any group. Please see the Discussion Group flyer for descriptions and rooms.

Sponsors: Our sponsors help offset the cost of the Symposium while providing information and services to Cal-IPC members. Sponsor exhibits are located in Chardonnay and Vineyard. Please take time to visit with sponsor representatives at breaks, lunch, and during the poster/sponsor session.

Thursday Evening: Join us for the annual Social Hour, Raffle, and Silent Auction in Vineyard and Chardonnay, followed by the Awards Banquet in Salons I-IV. The raffle features books, wine, local contributions, and weed tools, while the silent auction will highlight several special contributions. See the flyer in the folder pocket for a partial list of items. Tickets are $1 each or 25 for $20, and will be available next to the Sales table or at the Social Hour and Raffle.

Student Chapter: The Cal-IPC Student Chapter invites all students to join them in the Bodega/Cotati Room during lunch on Friday to discuss ideas for student involvement in Cal-IPC.

GeoWeed Meeting: GeoWeed (http://geoweed.org/) is a geospatial database that is an offspring of WIMS and is used to manage invasive plant locations and treatment history. This meeting will generate ideas for improvements to the software. Our goals are to attract new users, ease database management burdens, and improve data sharing among different entities. Friday at lunch in Sonoma/Santa Rosa.

Field Trips: All field trip participants should meet at the podium after the sessions on Friday for additional information. Meet in the front of the hotel at 8:00 am Saturday. All transportation will be by carpools. **Please bring water, sun protection, and a jacket.**

Photo Exhibit: Vote for your favorite photo! Cal-IPC members contributed their best shots to the Photo Exhibit. Be sure to vote Thursday before the Social Hour and Raffle; the winner will be announced at the banquet.

Sales: Need reference books on invasive plants? A pint glass or coffee mug? Carry them or your groceries in our new sling bag. Visit our sales table in the ballroom. We accept cash, checks, and credit cards.

NEW! Tool Tailgate: Come outside to see the rigs and tool selections of several long-time resource managers!

Presentations Online: This year's presentations will be posted on our website, as are previous years' presentations and symposium proceedings. www.cal-ipc.org/symposia/archive/

Continuing Education Credits: Continuing Education hours are available from the California Department of Pesticide Regulation. See the Continuing Education table in the Ballroom Foyer for attendance sheets and scantron forms. Keep the codes and hours listed below for your records.

PLEASE NOTE: We need to check your ID and DPR card to confirm your identity and license number. Please be prepared to show these to the DPR table attendee. We are using scantrons with carbon paper; please keep the yellow copy for your records.

Codes and hours:

Restoration Workday	Please ask us.	
Thursday	7.0 hrs. Other	Code M-0915-12
Friday	Credits vary depending on whether you attend Laws and Regulations.	
	To receive credit for Laws and Regs, you must sign the separate attendance sheet at the beginning of the session and turn in a separate scantron at the end of the session. If not attending the Laws and Regulations, you may receive Other credit for those hours. You must also fill out a scantron and sign the attendance sheet for the Other hours.	
	6.5 hrs. Other	Code M-0916-12
	Or	
	7.0 hrs. Other and	Code M-0916-12
	2.0 hrs. Laws & Regulations	Code M-0917-12
Field Trips	4.0 hrs. Other	Code M-0918-12

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

Cal-IPC 2012 Board of Directors

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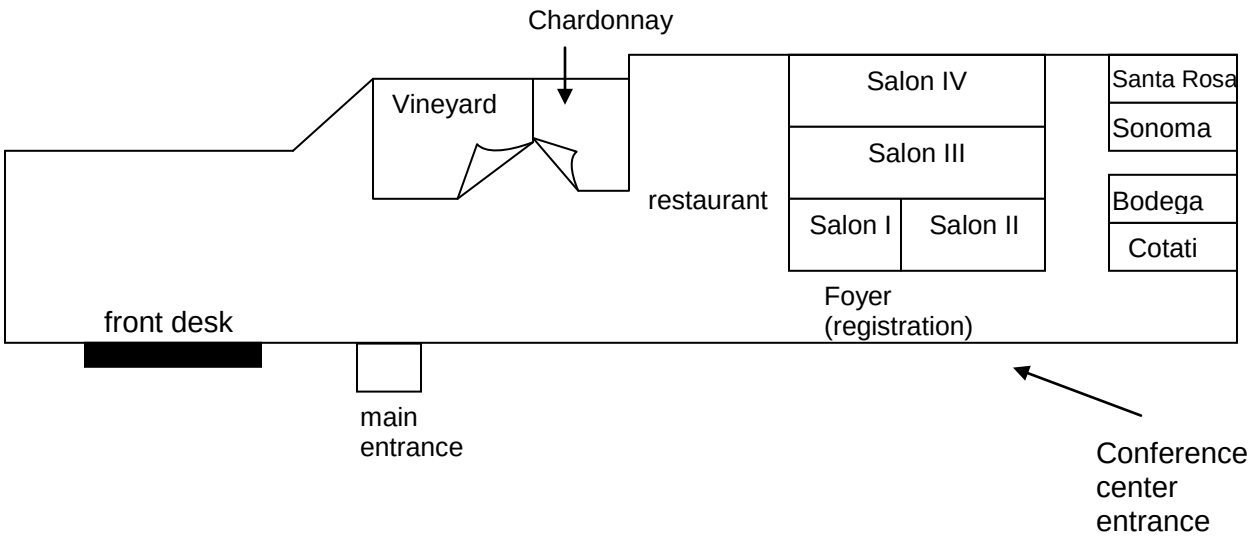
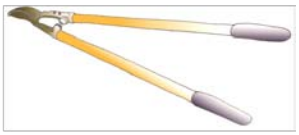
DoubleTree meeting rooms



21st Annual Cal-IPC Symposium:
"Bay to Basin: Coordinating Response to Invasive Plants across California"

DoubleTree Sonoma Wine Country, Rohnert Park, CA

Illustrations by Ryan Jones



Wednesday, October 10

Habitat Restoration Workday: Nathanson Creek Preserve, Sonoma

Thursday, October 11

Abstracts are available at www.cal-ipc.org/symposia.

7:45 Registration and Breakfast (Ballroom Foyer)

8:45 **Welcome and Opening Remarks** *Ann Howald, Garcia & Associates*

9:00 **Session 1. Working Across Landscapes** (Salon I-IV)

What stewardship programs are demonstrating our ability to operate at the landscape scale? Hear about regional goals and accomplishments of today's most effective programs.

Moderator: *TBD*

9:00 Landscape management practices in Late Holocene California: implications for contemporary stewardship.
Kent Lightfoot, UC Berkeley

9:30 The California Landscape Conservation Cooperative.
Christine Howell, USDA Forest Service

10:00 The Bay Area Upland Habitat Goals Project.
Stuart Weiss, Creekside Center for Earth Observations

Break 10:30-11:00 (Ballroom Foyer)

11:00 **Session 2. Annual Member Meeting** (Salon I-IV)

11:00 New Weed Alerts! *Dean Kelch, California Department of Food & Agriculture*

11:15 Cal-IPC Progress. *Doug Johnson, Executive Director, and John Knapp, Board President*

11:30 Battle of the marshes: invasive plants and wetland restoration North and South.
Sam Schuchat, California State Coastal Conservancy

12:00-1:00 Lunch (provided) (Salon I-IV)

1:00 Session 3. Tools and Strategies for Effective Invasive Plant Management

(Salon I-III) Moderator: *Joel Trumbo*

1:00 Operational performance of a Herbicide Ballistic Technology (HBT) helicopter platform targeting incipient populations of miconia (*Miconia calvescens*) in Hawaiian watersheds. *James Leary, University of Hawaii*

1:20 Use and effectiveness of landscape-scale surveys in developing weed management strategy. *Jutta Burger, Irvine Ranch Conservancy*

1:40 Seed bank limitation, management and overcoming cycles of exotic plants species hierarchical shifts. *Sara Jo Dickens, UC Berkeley*

2:00 The Butterfly Effect: Assessing herbicide impacts to invertebrates. *Joel Trumbo, California Dept. of Fish & Game*

1:00 Discussion Groups

1. New Weed Control Handbook. (Salon IV)
Come hear about this major new reference source, and get your management questions answered. *Joe DiTomaso, Guy Kyser, and John Roncorroni*

2. Prevention Best Management Practices. (Sonoma/Santa Rosa)
Come see a new prevention video and discuss ways to implement prevention BMPs into your operations. *Garrett Dickman, Yosemite National Park*

3. Reducing Potential for Herbicide Impacts on Wildlife. (Bodega/Cotati)
Come hear the results of Cal-IPC's survey of herbicide use by land managers and share innovative strategies for reducing the potential for wildlife impacts. A sneak preview of our upcoming BMP manual. *Susan Kegley, Pesticide Research Institute*

2:20-3:40 Poster Session & Sponsor Exhibits (Vineyard and Chardonnay)
See poster list page 12.

3:40 Session 4. Student Papers (Salon I-III)

Moderator: *Ramona Robison, CA State Parks*

3:40 Development and validation of a more accurate weed risk assessment tool for evaluating the invasive potential of ornamental plants. *Christiana Conser, UC Davis*

4:00 Effects of soil inocula on the growth responses of native annual forbs and the invasive annual grass, *Bromus diandrus*. *Bridget Hilbig, UC Riverside*

4:20 Divergence in acquisition and allocation patterns among native and introduced

3:40 Session 5. Managing Grassland Weeds (Salon IV)

Moderator: *Paul Aigner, UC Davis*

3:40 Preserving serpentine grasslands: ten years of research and management to control barbed goatgrass (*Aegilops triuncialis*) at the McLaughlin Reserve. *Paul Aigner, UC Davis*

4:00 Controlling the spread of velvet grass (*Holcus lanatus*) in California coastal prairies: the benefits and constraints of five management techniques. *Michelle Cooper, UC Bodega Marine Reserve*

populations of an annual grass contribute to invasiveness. *Matt O'Neill, UC Riverside*

4:20 Pre-emergent control of medusahead on California annual rangelands with aminopyralid. *Guy Kyser, UC Davis*

4:40 Control of yellow starthistle and reintroduction of native perennial bunchgrasses. *Jennifer Tiehm, Pinnacles National Monument*

5:00 Social Hour, Raffle, & Silent Auction (Vineyard and Chardonnay)

See Raffle & Auction flyer for a description of the amazing items that have been donated!

6:30 Banquet and Awards (Salon I-IV)

Jake Sigg Award, Golden Weed Wrench, Ryan Jones Catalyst Award, Invasive Plants Policy & Media Award, Wildland Weeds Program Award, Student Paper Contest, Photo Contest

Friday, October 12

7:00 Registration and Continental Breakfast (Ballroom Foyer)

8:00 Session 6. Working Across Taxa (Salon I-IV).

Exploring the matrix of organisms and trophic levels in which invasive plants thrive.

Moderator: *Ingrid Parker, UC Santa Cruz*

8:00 Plant-microbe interactions and plant invasions. *Ingrid Parker, UC Santa Cruz*

8:30 Native pollinators and invasive plants: Implications for agriculture and restoration. *Victoria Wojcik, Pollinator Partnership*

9:00 Mutualisms between native and non-native species: Global trends and Californian case studies. *Clare Aslan, Arizona-Sonora Desert Museum*

9:30-10:00 Break (Ballroom Foyer)

10:00 Session 7. Pesticide Laws & Regulations (Salon IV)

2.0 hrs of Laws and Regs credit for certified pesticide applicators.

Moderator: *Ed Duarte, Alameda County Dept. of Agriculture*

10:00 Laws and regulations for pesticide Applicators. *Andrew Smith, Sonoma*

10:00 Session 8. Invasive Plant Management and Programs I (Salon I-III)

Moderator: *Andrea Williams, Marin Municipal Water District*

10:00 Use of spatially-referenced inventory data to inform management of *Lepidium latifolium* in tidal marshlands of the San Francisco Estuary. *Giselle Block, US Fish*

County Dept. of Agriculture

10:30 Field safety for pesticide applicators. *Mark Heath, Shelterbelt Builders*

11:00 Calibration of herbicide applications for natural areas. *Guy Kyser, UC Davis*

11:30 California's revised NPDES aquatic pesticide permit update: What's new? *Mike Blankinship, Blankinship & Assoc.*

& Wildlife Service

10:20 California's RCDs: Partnering to combat invasive plants statewide. *Karen Buhr, California Assoc. of Resource Conservation Districts*

10:40 Controlling harding grass (*Phalaris aquatica*) in a grassland setting: An interim report. *Stassia Samuels & Laura Julian, Redwood National & State Parks*

11:00 Controlling invasive plants in Pacific Gas & Electric's hydroelectric watersheds. *Shannon Dinis, Pacific Gas & Electric Company*

11:20 To be announced. *Rob Klinger, USGS*

12:00-1:00 Lunch (Ballroom Foyer)

Student Lunch *Cal-IPC student chapter* (Bodega/Cotati)
Updating GeoWeed (Sonoma/Santa Rosa)

12:30-1:00 Tool Tailgate (parking lot)

1:00 Session 9. Invasive Plant Management and Programs II (Salon I-III)

Moderator: *Mark Newhouser, SEC*

1:00 Coordinated regional strategy in the central Sierra using CalWeedMapper. *Wendy West, UC Cooperative Extension*

1:20 Restoration, flood conveyance, and stormwater management: Emerging criteria for vegetation management in urban streams and flood-prone areas. *Mark Newhouser, Sonoma Ecology Center*

1:40 Reliably reducing milk thistle (*Silybum marianum*) to zero density: A treatment model for annual weeds with plastic life cycles. *Tony Summers, Catalina Island Conservancy*

2:00 European dune grass control: 15 years of adaptive management. *Tim Hyland, California State Parks*

1:00 Discussion Groups

4. Wild Pollinators and Weeds. (Bodega/Cotati) Discuss the interactions between pollinators and invasive plants, including implications for restoration and agriculture. How can pollinator protection be integrated into your stewardship activities? *Vicki Wojcik, Pollinator Partnership, and Peter Beesley, Pacific Gas & Electric*

5. A Coordinated Statewide Management Strategy for Stinkwort (*Dittrichia graveolens*). (Sonoma/Santa Rosa) Discuss the biology of stinkwort, its recent expansion, and the status of current management efforts. What should our statewide strategy be? *David Bakke, USDA Forest Service, and Rachel Brownsey, UC Davis*

6. Seeking Funding in a Competitive Environment. (Salon IV) Discuss the range of evolving funding sources for projects and programs, and key components of strong grant proposals. *Jason Giessow, DENDRA, Inc.*

2:20-2:40 Break

2:40 **Session 10. Working Across Time** (Salon I-IV)

In the coming decades, climate change will make "restoration" even more of a moving target. Talk of "novel ecosystems" and "assisted migration" is growing more common. A panel of practitioners and researchers will discuss the challenge of setting goals for research and stewardship.

Moderator: *Katie Suding, UC Berkeley*

Panelists:

Jutta Burger, Irvine Ranch Conservancy
Sandra DeSimone, Audubon Starr Ranch Sanctuary
Karen Holl, UC Santa Cruz
Rob Klinger, USGS Western Ecological Research Center
John Knapp, Native Range, Inc.
Lisa Micheli, Pepperwood Preserve

4:00 Adjourn

Field trip participants meet at front of ballroom to organize carpools.

Please watch for an email from us next week with an evaluation form. Your comments help us improve the Symposium.

Assessing multiple treatment methods to control *Festuca arundinacea* using prescribed burning, herbicide, brushcutting and hydro-mechanical obliteration (H_M_O).
Maria Alvarez, Golden Gate National Recreation Area

Invasive aquatic weeds: implications for mosquito and vector management activities.
Charles E. Blair, Mosquito & Vector Management Dist. of Santa Barbara Co.

Slope instability increased by *Cryptomaria japonica* in Sichuan earthquake zone.
Carla Bossard, St. Mary's College of California

The California firewood task force: A multi-agency response to forest health threats posed by movement of firewood.
Susan Frankel, US Forest Service

Searching for a silver bullet: reducing the invasive Sahara mustard while preserving native wildflowers.
Chris McDonald, UC Cooperative Extension, Riverside

Setting regional strategies for invasive plant management using CalWeedMapper.
Dana Morawitz, Cal-IPC

Is mastication plus prescribed burning an effective control method for multi-acre medusahead (*Elymus caput-medusae*) infestations?
Courtney Rowe, Plumas National Forest

Is imazapyr an effective alternative to glyphosate for the control of jubatagrass?
Don Thomas, San Francisco Public Utilities Commission

Differential terrestrial pulmonate gastropod species composition inside and outside eucalyptus forests.
Michael Walgren, California Department of Parks & Recreation

Preventing the introduction and spread of invasive weeds: engaging the construction, aggregate, and utility industries and land managers.
Wendy West, UC Cooperative Extension

Saturday, October 13
Field trips

1. Mount Tamalpais: From Broomy Bottom to Tall Fescue Top

Full Day: 8:00 am – 4:00 pm. Lunch provided. Carpool. Leaders: *Andrea Williams and Janet Klein, Marin Municipal Water District (MMWD)*

The distinctive profile of Mt. Tam is a Bay Area icon on the north side of the Golden Gate. Our trip begins at Phoenix Lake with a tour of the diverse ways MMWD has tried to manage broom over the past decade, and current efforts without conventional herbicides. Along the tour we will visit older restoration sites that have been replanted, current volunteer sites, a fuel break management site, as a recent grassland/oak woodland restoration following a pipeline replacement, and a periwinkle removal site. We will discuss yellow starthistle and Douglas-fir removal work. At the meadow, we will discuss how the native perennial grassland, including endemic Mt. Tamalpais thistle, is threatened by a spreading infestation of tall fescue, velvet grass, and pennyroyal.

2. Blue Ridge-Berryessa Natural Area

Full Day: 8:00 am – 4:00 pm. Lunch provided. Carpool. Leaders: *Paul Aigner, UC Davis McLaughlin Reserve; Sara Husby, Tuleyome; Ray Krauss, BRBNA; Stacy Martinelli, California Dept. of Fish and Game*

Venture deep into the wilds of northern Napa to restoration sites and learn about the effort to create the Berryessa Snow Mountain National Conservation Area. We will visit a serpentine grassland at the University of California's McLaughlin Reserve. Then we will travel to the boundary of the McLaughlin Reserve and the Department of Fish and Game's Knoxville Wildlife Area to talk about the Eticuera Creek habitat restoration project. The third stop will be the Gamble Ranch at the north end of Lake Berryessa, where we will talk about tamarisk management and jointed goatgrass. Finally, we will see the Cedar Roughs Wilderness area. The trip will conclude at the Doubletree at 4:00.

3. Wild Pollinators, Weeds and Permaculture

Half-Day: 8:00 am – 1:00 pm. Carpool. Leaders: *Paul Kaiser, Singing Frogs Farm*

Sonoma is a world hotspot of sustainable agricultural, where new innovative practices are born. Visit Singing Frogs Farm in Sebastopol to hear from farmer Paul Kaiser about their native hedgerows and the intersections between wild pollinators, invasive plants, and sustainable agriculture.

4. Sonoma Restoration Hotspots

Half-Day: 8:00 am – 1:00 pm. Carpool. Leaders: *Sonoma Ecology Center*

Discover Sonoma's coastal conservation hot spots including the recently acquired Jenner Headlands and Willow Creek State Park. Learn how their invasive plant projects relate to other conservation efforts.

California Invasive Plant Council 2012 Symposium

Abstracts

Thursday, October 11

Session 1. Working Across Landscapes

Indigenous landscape management practices in Late Holocene California: implications for contemporary stewardship. *Lightfoot, Kent G., Department of Anthropology, UC Berkeley, klightfoot@berkeley.edu*

Anthropologists have long argued that Native peoples strategically employed various kinds of landscape management practices, particularly anthropogenic burning, to enhance the abundance, diversity, and availability of economically valued plants and animals in various regions of California. However, criticisms have been recently raised about the scale of these practices, the overall impact they had the environment, and the evidence used to support these arguments. The purposes of this presentation are twofold. One is to provide a brief overview on the issues and debate about indigenous landscape management practices in California. The other is to discuss the development of new kinds of collaborative, interdisciplinary eco-archaeological programs involving Indian tribes and state and federal resource managers that are providing a fresh approach for the study of past management practices. This latter point will be highlighted with a case study from Central California.

The California Landscape Conservation Cooperative. *Howell, Christine A. USDA Forest Service, Pacific Southwest Region, Vallejo, CA. cahowell@fs.fed.us*

In 2009, the Department of the Interior created Landscape Conservation Cooperatives (LCCs) which are a network of public-private partnerships providing science to resource managers who ensure the sustainability of America's land, water, wildlife and cultural resources. In general, LCCs seek to identify best conservation and research practices, connect conservation and research efforts, identify information gaps, and avoid duplication through improved conservation planning, design, and communication. Partner agencies and organizations coordinate with each other while working within their existing authorities and jurisdictions. There are 22 individuals LCCs of which four include portions of the state of California. The California LCC is the largest LCC within the state of California and is a management-science partnership working to address the impacts of climate change and other stressors within and across ecosystems by promoting integrated science, natural resource management and conservation. Though relatively new, LCCs already are providing invaluable support in working across landscapes to address conservation challenges including invasive species management.

The Bay Area Conservation Lands Network: A unified vision for regional biodiversity conservation. *Weiss, Stuart B. Creekside Center for Earth Observation stu@creeksidescience.com*

The San Francisco Bay Area is a biodiversity hotspot, supporting a wide range of ecosystems and endemic species. The Bay Area Open Space Council initiated the Upland Habitat Goals Project in 2006, and in 2011 the Conservation Lands Network (CLN) plan was released. Building on a long legacy of land conservation that has already conserved ~1.2 million acres in fee title and easements, the CLN seeks to expand and connect existing protected lands to represent the diversity of the region in a viable network. But, protection from development is only the first step in conserving our rich biodiversity. Viability and stewardship issues are discussed in some detail, and invasive plants are a common thread among stewardship issues that include invasive weeds themselves, and drivers such as climate change, nitrogen deposition, fire, and ecological succession. One basic conclusion is that stewardship funding needs to be greatly increased if the biodiversity goals of the CLN are to be met on an expanded network of parks, preserves, working rangelands, and policy protected open spaces. Efforts by groups like Cal-IPC and the Bay Area Early Detection Network are necessary to complement ongoing weed management efforts by numerous land conservation agencies. Establishment of long-term funding for Weed Management Areas is a

high priority for dealing with invasive plants across jurisdictional boundaries.

Session 2. Annual Member Meeting

Battle of the marshes: Invasive plants and wetland restoration North and South. *Sam Schuchat, California State Coastal Conservancy, Oakland. sschuchat@scc.ca.gov*

The State Coastal Conservancy (SCC) is working on nearly 40,000 acres of wetland restoration in San Francisco Bay, and another 5,000 acres in Southern California. These wetlands perform essential ecological functions, and invasive plant management is a key aspect of their restoration. For invasive plant management, the SCC's goals have been to find the most effective and least costly approaches that allow the restoration goals to be achieved. The SCC is approaching 90% eradication of non-native *Spartina* in the San Francisco Bay, and has successfully cleared extensive acreage of *Arundo* in Southern California. These projects are protecting habitat for numerous wildlife species. The SCC brings a regional approach that integrates efforts from the local level to the landscape level. This approach is critical because it allows the SCC to achieve landscape-level restoration goals and to get local and private landowner agreement for proposed efforts. Some lessons that have been learned include: it is always more expensive than you think it will be; our regulatory system is ill-suited to landscape and regional level approaches; and s__t happens.

Session 3. Tools and Strategies

Operational Performance of a Herbicide Ballistic Technology (HBT) helicopter platform targeting incipient populations of miconia (*Miconia calvescens*) in Hawaiian watersheds. *Leary, James K.[1*], Jeremy Gooding[2], Adam Radford[3], Brooke Mahnken[3], John Chapman[4], Guy Kyser[5], Coleen Cory[6], John Knapp[7]. [1] Department of Natural Resources and Environmental Management, University of Hawaii at Manoa, Kula, HI; [2] Pacific Exotic Plant Management Team, National Park Service, Makawao, HI; [3] Maui Invasive Species Committee, Piiholo, HI; [4] Kauai Invasive Species Committee, Lihue, HI; [5] Department of Plant Sciences, University California at Davis; [6]Santa Cruz Island Preserve, The Nature Conservancy; [7]Native Range Inc., Ventura, CA; *leary@hawaii.edu*

Herbicide Ballistic Technology (first introduced at the Cal-IPC Symposium 2009) is a novel application technique that pneumatically delivers 0.68 caliber, encapsulated herbicide projectiles with long range accuracy and surgical precision to targeted weeds. Operational performance of an HBT helicopter platform were recently recorded during miconia (*Miconia calvescens* DC) surveillance operations in Hawaii's remote watersheds. Parameters empirically measured included area search efficiency, target acquisition rate, target detection efficacy and target mortality factor. Herbicide use rates recorded in these trials were just over 1% of the maximum label rate, highlighting the light footprint of this application technology. The HBT platform presents a new capability for real-time target elimination during aerial weed surveillance operations leading to more efficient use of flight time resources and effective management of difficult-to-access natural areas. This calibration research is a critical component to a comprehensive technology transfer program that coincides with approval by the Hawaii Department of Agriculture for a FIFRA Section 24c Special Local Needs label for HBT-G4U200 with Garlon® 4 Ultra. We anticipate that HBT also has the potential to serve special local needs for targeting incipient weed populations in California. Initial trials have already been conducted on cliff side populations of pampas grass (*Cortaderia* sp.) on Santa Cruz Island. The efficiency of this technique, coupled with lack of disturbance and collateral damage to native habitat, is substantial over more traditional herbicide application methods in rugged terrain.

Use and effectiveness of landscape-scale surveys in developing weed management strategy. *Burger, Jutta C.*, Henry DiRocco, Jennifer Naegele, and John Knapp. Irvine Ranch Conservancy, Irvine CA, DiRocco Environmental Services, Anaheim CA, Orange County Parks, Irvine CA, Native Range, Ventura CA. jburger@irconservancy.org*

Good management practices require a thorough understanding of natural resources and threats to them. Land managers are, however, often tasked with having to

act with insufficient data. For example, invasive control programs commonly lack knowledge about the landscape-wide distribution of target species. Here, we describe the results, reliability, and implications of a 2011 aerial survey of 35 invasive species across 31,000 acres of protected lands centered within and adjacent to the Irvine Ranch Open Space in Orange County, California. The survey mapped 35 previously identified priority species by helicopter over 12 days. Species' abundance patterns are compared to older survey data and changes in species' status are highlighted. Population number and size are used to provide an initial ranking of species from aerial surveys. Spatial distribution and other management priorities are incorporated into prioritizations. We describe how this ranking and fine-scale knowledge of the distribution of populations has helped to re-direct efforts away from species and areas with high infestations. To address questions regarding species' detectability, we compare 2012 foot survey results to 2011 aerial survey data for a single species, *Cynara cardunculus*. Both surveys missed populations, but missed plants were uncommon and usually linked to individuals being obscured by a tree canopy.

Seed bank limitation, management and overcoming cycles of exotic plants species hierarchical shifts. *Dickens, Sara Jo M*, Seema Mangla, Kris Preston and Katherine N Suding. University of California-Berkeley Dept. of Environmental Science, Policy, and Management, Berkeley, CA. and The Nature Reserve of Orange County, Irvine, CA *sara.jo.dickens@berkeley.edu*

One implicit assumption in weed control efforts is that the reduction of a target weed will allow for recovery of native species. However, recovery is also dependent on the ability of natives relative to remaining exotic species to establish following weed control. Here, we focus on the seed bank – natives and exotics – as one key indicator of recovery. We analyzed soil seed banks of 126 sites along a gradient of environmental conditions and management levels in Orange County, CA. On average, the majority of seed banks were composed of exotic species (55%) with a quarter of all viable seeds being exotic grasses. In areas of passive restoration (weed control only), 47 % of seed banks were exotic species; whereas, 33 % was *Juncus bufonius* (a moist soil, native rush with low above-ground abundance) and only 38 % was composed of other native species. Over two centuries of exotic plant invasion and anthropogenic disturbance has created a relatively equal ratio of native and weed seed in these seed banks. Equal recruiting success of native and weed species would lead to similar ratios of native and weed abundance above-ground. However, the earlier phenologies of most weed species found in these seed banks would favor greater recruitment of weed species and persistence of an invaded state. Results from this study suggest control of exotic propagules and input of native propagules will be important to restoration success.

The Butterfly Effect: assessing herbicide impacts to invertebrates. *Trumbo, Joel. Staff Environmental Scientist, Lands Program California Dept. of Fish & Game, jtrumbo@dfg.ca.gov*

The U.S. EPA requires pesticide manufacturers to submit at least 50 animal toxicology studies as part of its pesticide evaluation and registration process. However, only one invertebrate study, a honeybee contact toxicity test, is required for federal approval. This lack of data makes it difficult to accurately assess the risks that herbicides pose to invertebrates, including protected species. While very little applied research has been conducted on this subject, at least one recent study…involving an endangered butterfly and three commonly-used herbicides…suggests the potential for direct toxicological effects.

This data gap issue challenges the assumption that honeybees are suitable surrogates for assessing herbicide risks to other invertebrates. Unless species-specific invertebrate data is developed, land managers hoping to select the lowest-risk herbicide option must rely on other information, even if the taxonomic relationship between the species is distant. For example, readily-available fish toxicity studies may prove to be a suitable alternative. In fact, the factors that make certain herbicides toxic to fish may be the same factors that contribute to elevated invertebrate risk. While perhaps not completely defensible from an empirical standpoint, this approach may provide a practical first-tier screening process for land managers.

Ecological risk is based on evaluating both pesticide toxicity and exposure potential. Even if laboratory studies suggest an elevated toxicity risk, the influence of

exposure must also be considered. Factors such as the application method used, application timing, surfactant selection and the use of exposure-lessening strategies like buffer zones can significantly mitigate risk. Most of these field-level factors are not considered, or accurately represented, in laboratory toxicity tests.

Session 4. Student Papers

The development and validation of a more accurate weed risk assessment tool for evaluating the invasive potential of ornamental plants. *Joseph M. DiTomaso[1], *Christiana Conser[1]*, Lizbeth Seebacher[2], and Rachel Brush[1]. [1]UC Davis, Department of Plant Science, One Shields Avenue, Davis, CA 95616; [2]WA Dept. of Ecology. *cconser@ucdavis.edu*

This research addresses the challenge the nursery industry faces in assessing the potential invasiveness of new ornamental plant introductions. A weed risk assessment (WRA) is a systematic process that uses available evidence to estimate the risk of a plant species becoming invasive in a specified region. The original WRA tool was developed for screening plant imports to Australia and has been adapted for use globally. This tool is accurate in predicting invasive plants but varies widely in its accuracy in correctly categorizing non-invasive plants, limiting its utility for the nursery industry. Sustainable Conservation's PlantRight campaign has developed a modified version of the Australian WRA tool. This research compares the accuracy and time requirements of the PlantRight and Australian WRA models in predicting both invasive and non-invasive plants. Three independent evaluators screened ~180 plants using the PlantRight and Australian WRA tools, half were known invasive plants and half non-invasive ornamental plants. We found significant differences between the types of questions in the two tools, but no differences in the amount of time to screen plants between the tools. For the Australian WRA, all three evaluators were 100% accurate in predicting invasiveness, but differed dramatically in their ability to predict non-invasiveness (48-91%). In contrast, the three evaluators averaged 96% accuracy in predicting invasiveness using the PlantRight WRA and were 99% accurate in predicting non-invasiveness, with only one false positive. The deviations among the scores of the three evaluators for high, moderate, and limited invasiveness, as well as total invasive and non-invasive species, were far lower with the PlantRight WRA compared to the Australian WRA. This indicates that there is less subjectivity with the PlantRight WRA in the outcome of a species evaluation. Our results show that the PlantRight WRA may be a more accurate method to evaluate plants for the nursery industry.

Effects of soil inocula on the growth responses of native annual forbs and the invasive annual grass, *Bromus diandrus*. *Hilbig, Bridget E.* and Edith B Allen. University of California-Riverside Dept. of Botany and Plant Sciences, Riverside, CA. *bhilb001@ucr.edu*

Invasive plants have the ability to alter the rhizosphere microbial community upon establishment and form either positive or negative feedbacks that affect their dominance. Associated native forb species may also form positive or negative feedbacks, and the direction of feedbacks will affect competitive interactions between native and invasive plants. We tested plant-soil feedbacks as a potential mechanism altering native plant growth and diversity in a southern California annual grassland dominated by *Bromus diandrus*, an exotic annual grass. Four native forbs with varying sizes were chosen for study: *Amsinckia menziesii*, *Layia platyglossa*, *Lasthenia californica*, and *Plantago erecta*. A greenhouse study was conducted in which the native annuals and *B. diandrus* were grown from seed for seven weeks in monocultures and in competition in sterile soils, native inoculum, and invaded inoculum. Inoculum consisted of 15g of soil collected from the rhizosphere of native or invasive plants, and added to 800 g of sterile soil in pots. Overall, *L. platyglossa*, *L. californica*, and *P. erecta* showed increased shoot biomass when grown with native inoculum in mixture, but only *P. erecta* had a positive response to inoculum in monoculture suggesting high dependence on mycorrhizal fungi. In contrast, *A. menziesii* and *B. diandrus* had the greatest shoot biomass in sterile soils and the lowest shoot biomass in invasive soils. Increased growth in sterile soil

may indicate a build-up of microbes that cause negative feedback.

Divergence in acquisition and allocation patterns among native and introduced populations of an annual grass contribute to invasiveness. *O'Neill, Matt*, Edith B. Allen, Louis S. Santiago and Michael F. Allen. University of California-Riverside Dept. of Biology, Riverside, CA, *monei003@ucr.edu*

Invasive plant species tend to exhibit more vigorous growth habits in introduced relative to native ranges. Classic hypotheses propose that release from inhibitory biotic factors provide immediate benefit and drive these observed invasive habits. In contrast, recent hypotheses propose that adaptation to novel environments may be the causal mechanism underlying such divergent growth. If selection for these habits has occurred in introduced ranges, then these genotypes should outperform native genotypes in growth rate and allocation patterns. To test this prediction, we compared the rate of carbon acquisition (photosynthetic performance) and biomass allocation patterns of *Bromus rubens* populations from Spain (native range) and California (introduced range) grown under common conditions. The introduced population was significantly larger than those of the native range. The total biomass and shoot height of the Californian population were 45% and 26%, respectively, larger than the Spanish populations (total biomass: $F = 15.23$, $P < 0.0001$, shoot height: $F = 39.23$, $P < 0.0001$). However, Spanish populations showed 38% greater photosynthetic performance ($F = 7.01$, $P < 0.01$). This divergence in acquisition and allocation pattern may reflect an adaptive trade-off independent of biotic influences. For example, the negative correlation between photoperiod and photosynthetic performance ($r = -0.55$, $P < 0.01$) suggests that decreased allocation to photosynthetic machinery may reduce associated maintenance respiration costs, allowing for increased allocation to biomass. These results suggest that introduced genotypes of *B. rubens* experience selective pressures in novel environments that could contribute to differences in habitat distribution, abundance, and invasiveness.

Session 5. Managing Grassland Weeds

Preserving serpentine grasslands: ten years of research and management to control barbed goatgrass (*Aegilops triuncialis*) at the McLaughlin Reserve. *Aigner, Paul A.*[1], Case, Erica J.[2], Harrison, Susan P.[1], and Howard V. Cornell[1]. [1]Department of Environmental Science and Policy, University of California, Davis, CA; [2]Graduate Group in Ecology, University of California, Davis, CA. *paaigner@ucdavis.edu*

Serpentine soils support some of the best remaining native grasslands in California, because their unusual chemistry and low nutrients provide resistance to invasion by the Eurasian annual grasses and forbs that have come to dominate grasslands on more benign soils. Barbed goatgrass (*Aegilops triuncialis*) is a serpentine-tolerant Mediterranean annual grass that has invaded serpentine grasslands over the past three decades and threatened their status as hotspots of native and endemic diversity. Ten years of research and management at the McLaughlin Reserve in the inner North Coast Range has resulted in the control of barbed goatgrass on 240 hectares of serpentine grassland and chaparral. An early summer prescribed burn followed by two years of broadcast herbicide (clethodim or fluazifop) application has been most effective for control and also controls Italian ryegrass (*Festuca perennis*), which also tolerates serpentine soils. Mowing is a good alternative to burning as a first year treatment and can be substituted for herbicides if necessary. On 200 monitoring plots distributed across the treated grasslands, goatgrass control resulted in dramatic increases in native species cover and little secondary invasion. The non-native forb, *Lactuca serriola*, increased in abundance following goatgrass removal, but this increase was transient and limited by herbivory. Native pollinator activity increased nearly fourfold following goatgrass control. An experiment to test the effect of soil and competition on the success of barbed goatgrass showed that goatgrass required the removal of competitors to invade high productivity sites but established without competitor removal in low productivity sites regardless of soil chemistry (serpentine versus non-serpentine). Many serpentine and other low productivity grasslands throughout the state will be susceptible to barbed

goatgrass invasion in the absence of disturbance and will require sustained effort to prevent or control invasion.

Controlling the spread of velvet grass (*Holcus lanatus)* in California coastal prairies: the benefits and constraints of five management techniques. *Cooper, Michelle* and Suzanne Olyarnik. University of California-Davis, Bodega Marine Reserve, Bodega Bay, CA. *mlcooper@ucdavis.edu*

California's coastal prairie is considered the most diverse of all grassland systems in North America, but it is under serious threat from the invasion of non-native species. *Holcus lanatus* is an exotic, perennial grass that is extremely invasive in coastal prairie systems, forming dense, nearly mono-specific stands that have been expanding rapidly in recent years. To address knowledge gaps in how to control this species and support the development of ecologically based weed management strategies, we partnered with public and private landowners to explore different management techniques at five sites in Sonoma County over a three-year period (2010-2013). On Bodega Head, we are comparing two herbicide treatments, using a monocot-specific herbicide at Bodega Marine Reserve and Aquamaster, a broad-spectrum herbicide at California State Parks. We are also assessing the effects of sheep grazing at Bodega Pastures Sheep Ranch and cattle grazing at Sonoma Land Trust's Estero Americano Preserve in Bodega. In addition, we are examining the effectiveness of mowing and raking at Occidental Arts and Ecology Center and Ocean Song Farm and Wilderness Center. To evaluate treatment effectiveness, we have been tracking species richness and percent cover; plant and thatch height; and *H. lanatus* frequency at all sites. I will present preliminary results for the first two years of treatment, along with the constraints and benefits of management techniques experienced at each site.

Preemergent control of medusahead on California annual rangelands with aminopyralid . *Kyser, Guy B.*, Vanelle F. Peterson, Josh S. Davy, and Joseph M. DiTomaso. Department of Plant Sciences, University of California, Davis, CA (GBK and JMD); Dow AgroSciences LLC, Mulino, OR (VFP); University of California Cooperative Extension, Tehama, Glenn, and Colusa counties, Red Bluff, CA (JSD). *gbkyser@ucdavis.edu*

Medusahead (*Taeniatherum caput-medusae* [L.] Nevski), the most problematic invasive grass on many California rangelands, is difficult to control selectively in grasslands. Prescribed burning, grazing, and herbicides have been tested with some success but are not practical in all situations. The selective herbicide aminopyralid, normally used for control of certain broadleaf species such as thistles, suppresses some annual grasses when applied pre- or early postemergence. In 2009-2010 we tested the efficacy of aminopyralid for medusahead control in preemergence applications at three foothill rangeland sites in northern California. We compared a rate series of aminopyralid (53, 88, 123, and 245 g · ha^{-1} acid equivalent [ae]) with rimsulfuron (18 and 35 g · ha^{-1} active ingredient) and imazapic (140 g · ha^{-1} ae). Plots were 3 m by 9 m with four replications at each site. Treatments were applied in early fall 2009. In May 2010, we took visual cover estimates and biomass/seedhead samples in three quadrats per plot. In regression analysis, medusahead cover was found to decrease consistently with increasing rates of aminopyralid. Medusahead control at the highest rates of aminopyralid was consistent across the three sites, averaging 89% ± 3 SD with 245 g · ha^{-1} ae and 59% ± 10 SD with 123 g · ha^{-1} ae. Aminopyralid at lower rates, rimsulfuron, and imazapic were less consistent. Cover of other annual grasses increased in plots treated with aminopyralid at all sites. Aminopyralid has potential utility for suppressing medusahead, particularly in sites also infested with invasive members of the Asteraceae. However, the most effective rate (245 g · ha^{-1} ae) is registered for use only as a spot application. In situations where this rate can be justifiably used, it would be expected to give season-long control of medusahead, as well as longer-term control of thistles and some perennial species.

Control of yellow starthistle and reintroduction of native perennial bunchgrasses. *Johnson, Brent and Tiehm, Jennifer*. Pinnacles National Monument, Paicines, CA. Jennifer_Tiehm*nps.gov*

In 2009, Pinnacles National Monument embarked on the initial phase of a large-scale restoration effort on over 140 acres of degraded grassland and valley oak savannah system acquired by the monument in 2006. These grasslands had previously been used for the past century for farming and cattle grazing. This intensive utilization

likely contributed to the elimination of most native vascular plant taxa while allowing non-native taxa to thrive, including yellow starthistle (YST). Restoration efforts involved a native perennial bunchgrass revegetation experiment, multiple integrated pest management (IPM) techniques to control YST, and extensive monitoring and mapping of target species and plant community response to treatments. The experiment was specifically designed to determine the most effective revegetation approaches for future, large scale restoration of the site using perennial grasses. IPM techniques included prescribed burning, broadcast herbicide (Milestone) application, timed mowing, goat grazing, and manual hoeing or pulling. Results from the revegetation trials indicate seed drilling may be the most effective approach for increasing native perennial bunchgrass density at this site. The park has used this information to plan a large-scale seed drilling project, beginning with 55 acres in 2013. The park has effectively lowered the density, and halted seed production and spread of YST for four consecutive years on these lands, and, perhaps more importantly, protected adjacent private and park lands from becoming infested. YST is a significant problem in the community around the monument, and is of great concern to ranchers and landowners close to Pinnacles. Neighbors have taken interest in how Pinnacles is restoring these grasslands, and the monument has responded by sharing results and information with the public through community meetings, events, and rancher workshops.

Friday, October 12

Session 6. Working Across Taxa

Plant-microbe interactions and plant invasions. *Parker, Ingrid M.*[*1], Gregory S. Gilbert[2], and Sarah M. Swope[3]. [1]University of California-Santa Cruz, Department of Ecology and Evolutionary Biology. Santa Cruz, CA. [2]University of California-Santa Cruz, Department of Environmental Studies. Santa Cruz, CA. [3] USDA Agricultural Research Service, Great Basin Rangelands Research Unit, 920 Valley Rd., Reno, NV. *imparker@ucsc.edu*

Microbes are everywhere in our environment and interact with plants in multiple ways, playing both negative and positive roles in plant growth. For example, all plants interact with a suite of disease-causing fungi and bacteria that can sometimes be our allies in combatting plant invaders. Our expectation is that introduced plants will "leave their natural enemies behind" in their native range, but how often and when this occurs is an area of important current research. The effects of pathogens on introduced plants should depend on factors such as the host-specificity of dominant pathogens, and whether microbes tend to show global or more restricted distributions. Host-pathogen interactions may also be modulated by evolution, leading to rapid changes in disease dynamics on novel hosts. In addition to their ubiquitous roles in natural ecosystems, pathogens have potential use as biological control agents. One example in California is the introduction of the rust *Puccinia jaceae f.s. solstitialis* to control yellow starthistle. The *Puccinia*/starthistle system illustrates some important complexities of biocontrol using pathogens, including how interactions between the pathogen and other interacting species may influence control outcomes for invasive weeds.

Native pollinators and invasive plants: Implications for agriculture and restoration. *Wojcik, Victoria,* and Laurie Davies Adams. Pollinator Partnership, 423 Washington Street, 5th floor, San Francisco CA 94111. *vw@pollinator.org*

Native pollinators and invasive plants can have antagonistic and supportive interactions. Populations of native pollinators can be supported by invasive species in landscapes that otherwise present a food desert; the reproduction and dispersal of invasives can also be facilitated by pollinators. Conversely, invasive species can disrupt foraging and pollination systems, or subject pollinators to incomplete nutrition resulting in developmental issues. The keystone role that pollinators play in the sustainablity of agricultural and wildland

systems underscores the need to approach invasive species management in a way that balances risks to pollinators. We will discuss pollinator biology, research on pollinator-invasive species interactions, chemical pest management techniques that minimize risks to pollinators, and landscape level approaches to pollinator conservation and weed management.

Mutualisms between native and non-native species: global trends and Californian case studies. *Aslan, Clare E.[1]*, Benjamin Sikes[2], and Keryn Bromberg Gedan[3]. [1]Arizona-Sonora Desert Museum, Tucson, AZ. [2]University of Texas-Austin. [3]Smithsonian Environmental Research Center. * caslan@desertmuseum.org*

Non-native species invasions create novel ecological communities, structured by interactions between native and non-native species. Positive interactions (facilitation or mutualisms) can boost ecological fitness of native and non-native species alike, potentially altering competitive regimes, assisting non-native species invasions, and even improving native species performance. We review novel mutualisms in aboveground terrestrial, belowground terrestrial, and marine ecosystems to seek overarching patterns and to identify common characteristics. We find that most novel mutualisms are facultative, diffuse, and highly generalized. Novel reproductive mutualisms are particularly well-represented in aboveground terrestrial ecosystems, while novel nutritional mutualisms are common in belowground ecosystems. There has been little research examining novel marine mutualisms or novel microbial mutualisms. In a case study of regional novel mutualisms, we examined dispersal of non-native plant species by native birds in the northern Central Valley of California. Californian birds readily incorporate non-native fruits into their diets, implying that dispersal limitation is unlikely for fleshy-fruited species introduced to this region. High-efficiency spread detection results suggest that bird-mediated dispersal may generate future riparian invasions in California by two case study species: glossy privet (*Ligustrum lucidum*) and Chinese tallow (*Triadica sebifera*).

Session 7. Pesticide Laws and Regulations

Laws and Regulations for Pesticide Applicators. *Smith, Andrew, Sonoma County Department of Agriculture*

Pesticide laws and regulations for pesticide applicators. Topics covered will include; Department of Pesticide Regulation licensing and registration requirements, pesticide records and use reporting, hazard communication and notification requirements, medical supervision, worker protection, safety, and training requirements, Personal Protective Equipment, Pesticide Safety Information Series, respiratory protection programs, proper pesticide storage and container disposal, labels and labeling requirements, standards of care, the inspection process and enforcement response policy.

Calibration of herbicide applications for natural areas . *Kyser, Guy, Specialist, Weed Science Program, Department of Plant Sciences, University of California, Davis, gbkyser@ucdavis.edu*

Calibration of herbicide application equipment is often neglected outside of conventional agriculture. However, calibration can significantly impact the efficacy and cost of herbicide applications in habitat preservation work. Under-application can result in failure to control target weeds, requiring repeat visits. Over-application results in increased labor and material costs and increased potential for harm to non-target species. Spray-to-wet treatments, commonly used in directed applications because of their simplicity, are often over-applied: plants should be sprayed until shiny, not dripping, and crews should practice applications together before going into the field. In low-volume treatments, the herbicide concentration in the tank is doubled compared to a spray-to-wet treatment and only half as much spray solution is applied to each target plant. This represents a 50% savings in time for application and refilling. 'Drizzle' and other directed applications are also effective but require the applicator to adjust the length of time spent on each target based on the size of the target. Broadcast applications use a boom sprayer to apply selective herbicides over a wide area; for example,

aminopyralid may be used to selectively remove yellow starthistle from a grassland. Since the amount of chemical applied is critical for achieving the desired selectivity, boom sprayers must be carefully calibrated. Hand-held boom applications are calibrated by determining the rate of output, calculating how much time is required to cover one acre, and setting the applicator's walking pace to deliver a known rate (gallons per acre) of spray solution. This determines the fraction of an acre covered by each tank load, which in turn dictates the amount of chemical going into each tank mix. Equipment-mounted boom applications are calibrated by determining the rate of output and deciding on an operating speed. This allows calculation of the gallons per acre to be applied, the area covered by each tank load, and the amount of chemical going into each tank mix.

California's revised NPDES aquatic pesticide permit update: what's new? *Blankinship, Michael S., Blankinship & Associates, Inc. Agricultural & Environmental Consultant, 322 C St., Davis, CA 95616 mike@h2osci.com*

Aquatic weed managers working for drinking water, flood control, restoration and the irrigation community manage algae and a variety of aquatic weeds including submersed, floating, emergent and riparian species. These weeds can create flow restrictions in irrigation canals and flood control structures and pose taste, odor and aesthetic problems in drinking water storage and conveyance facilities. Intentional introduction of pesticides into Waters of the US to control these weeds requires a permit. Recently proposed revisions to the California permit will be presented with an emphasis on the key elements that must be understood to achieve and maintain compliance.

Session 8. Invasive Plant Management and Programs I

Use of spatially-referenced inventory data to inform management of *Lepidium latifolium* in tidal marshlands of the San Francisco Estuary. *Block, Giselle[1]*, Vannessa Tobias[2], and Emilio Laca[2]. [1]U.S. Fish and Wildlife Service, National Wildlife Refuge System, Inventory and Monitoring Program, Fairfax, CA. Giselle_block@fws.gov. [2]University of California, Department of Plant Sciences, Davis, CA. vtobias@ucdavis.edi, ealaca@ucdavis.edu.*

Surveys or inventory of invasive plant distribution and abundance provide a wealth of information a land manager can use to strategically plan and implement invasive plant management actions. Spatially-referenced inventory data can be used to set management goals and objectives, inform development of weed management plans, estimate management costs, predict future spread and increase public awareness. Inventory data can also be used to identify environmental features that are susceptible to invasion or evaluate spatial or environmental variation in treatment response. In 2005, the San Pablo Bay National Wildlife Refuge initiated a long-term program to eradicate populations of perennial pepperweed (*Lepidium latifolium*) in tidal marsh of the San Francisco Estuary. Pepperweed is a highly invasive herbaceous perennial in the mustard family (Brassicaceae) which occupies a range of environments including fresh and saltwater wetlands, uplands, and agricultural lands. We provide a summary of inventory results and how they were used to inform management planning, treatment, and post-treatment efficacy. We highlight use of a raster-based spatial analysis to document the distribution of pepperweed in a saltmarsh and examine how the effectiveness of herbicide (imazapyr) varied by environmental characteristics such as distance to channels, elevation, and vegetation cover.

RCDs: partnering to combat invasives statewide. *Buhr, Karen, California Association of Resource Conservation Districts, Sacramento, CA. karen-buhr@carcd.org*

Resource Conservation Districts are working with their communities to address local invasive issues that have impacts far beyond their borders. This presentation will tour the State. From Tahoe to Monterey, San Diego to

Yreka we will highlight inspirational community efforts to stop invasives where they start- in our own backyards

The local approach allows effective and appropriate programs and methods to target invasives while utilizing the resources of all the partners involved. There have been some tremendous successes. However, with dwindling state funding and a new limited funding reality, local efforts are challenged and may disappear altogether. This presentation will address the challenges and successes of local invasive efforts and what this means in the new reality of funding. Topics will include the challenges of partnering and finding funding, particularly with the absence of weed management area funding. It will also cover the successes and secrets of success for some of the most comprehensive community efforts including the Lake Tahoe boat inspection program.

Controlling Harding grass (*Phalaris aquatica*) in a grassland setting – an interim report. *Samuels, Stassia and Laura S. Julian*. Redwood National and State Parks, P.O. Box 7, Orick, CA 95555. stassia_samuels@nps.gov; Laura_Julian@nps.gov*

After observing Harding grass (*Phalaris aquatic*) begin to expand from a small historic infestation into two major drainages in the grasslands of the Bald Hills, Vegetation Management staff at Redwood National and State Parks embarked on a three-phase Harding grass control program in 2005, using a glyphosate-based herbicide. Phase I included pilot treatments in easily accessible locations and the installation of treatment monitoring plots. Once pilot treatments were seen to be effective, we initiated Phase II, mapping and treatment of outlier populations, and initiating treatment along the edge of the infestation's heart. Phase III is initiated in 2012, where we will attempt to treat all known infestation polygons every year for three years, with an ultimate goal of bringing the population to a maintenance/control level, with periodic mapping and treatment.

Challenges have included training field crews in the identification of one grass amongst a sea of other grasses, finding and mapping Harding grass infestations over hundreds of acres of grassland, short treatment window of 8-10 weeks between flowering and browning out, choosing a dye color that is visible in bright spring grass, mapping and tracking daily work, days lost to weather (rain, wind, fog, heat), keeping seasonal student and SCA field crews motivated, keeping funding flowing and managing contract crews.

Treatment monitoring has included the establishment of formal monitoring plots, as well as ocular estimate of cover in the mapped polygons over time. A student senior thesis study was also conducted on the effect of herbicide application on seed germination rates when applied at various stages of seed development.

Controlling invasive plants in Pacific Gas & Electric's hydroelectric watersheds. *Dinis, Shannon. Pacific Gas and Electric Company, Technical and Scientific Support, San Ramon, CA. sxdm@pge.com*

Pacific Gas and Electric Company (PG&E) operates facilities that generate clean hydroelectric power throughout the Sierra Nevada from the Pit River in the north to the Kern River at the southern end of the service territory. As part of the Federal Energy Regulatory Commission (FERC) project licenses, PG&E has developed, in coordination with the United States Forest Service and other resources agencies, programs to prevent and control the spread of ecologically-damaging invasive plants. Many of the prevention practices PG&E uses are consistent with recent best management practices developed by Cal-IPC for land managers and for transportation and utility corridor managers. Currently, there are six projects with active invasive weed control programs and several more will be active in the coming years, as new project licenses are issued. The focus of this presentation will be on progress that has been made over several years of invasive plant control throughout PG&E's hydroelectric watersheds in the Sierra Nevada. In some cases, there has been great success to significantly decrease populations or eradicate species from project lands. In other cases, achieving population control has been more challenging. Controlling a variety of invasive plants across wide elevation gradients and landscapes poses several challenges including appropriate timing, adapting to dynamic conditions, and implementing an effective adaptive management strategy. Examples of several restoration projects on the Pit River are included to demonstrate how collaboration with agency

stakeholders can provide a unique opportunity to restore native species habitat in locations of suitable invasive plant habitat and with high potential for the establishment of invasive plants.

Long-term effects of burn severity and fire frequency on vegetation and seedbanks in the Mojave Desert .
Klinger, Robert*[1], Matt Brooks[2], and Randy McKinley[3]. [1]USGS, Yosemite Field Station, 568 Central Avenue, Bishop, CA, 93514; [2]USGS, Yosemite Field Station, 5083 Foresta Road, El Portal, CA, 95318; [3]USGS Earth Resources Observation and Science Center, Sioux Falls, South Dakota, 57198. * rcklinger@usgs.gov

Most published information from the Mojave Desert has focused on short-term effects of fire, but it is the long-term trajectory of plant communities that management plans are designed to influence. In this presentation we compare vegetation structure, species composition, and diversity of aboveground vegetation and the soil seedbank in unburned areas and areas that burned 3 to 35 years ago. We evaluate these patterns across a range of fire frequency (1 – 3 burns), burn severity classes (low to high) and among different vegetation types (low to high elevation zones), and interpret these patterns relative to traditional deterministic succession theory and more recent metacommunity theory. Initial analyses indicate that vegetation structure often returned to levels similar to that in unburned conditions but species composition did not. There was a high degree of heterogeneity in species composition and diversity among areas, primarily along gradients of fire frequency, fire severity, and elevation zone. Areas that burned once but at high fire severity or burned multiple times tended to be characterized by persistent changes in plant community composition and tended to be dominated by non-native annuals with relatively low levels of woody and herbaceous diversity. Non-native annuals occurred in a very high proportion of soil seedbank samples across all elevation zones, including unburned areas. The critical findings in this study are: (1) a grass-fire cycle is not necessary for transitions of previously native dominated woody vegetation communities to non-native herbaceous dominated communities; and, (2) metacommunity processes will frequently result in multiple alternative vegetation states.

SESSION 9. INVASIVE PLANT MANAGEMENT AND PROGRAMS II

Coordinated regional strategy in the Central Sierra with CalWeedMapper. *West, Wendy*, and Scott Oneto, University of California Cooperative Extension – Central Sierra, wkwest@ucdavis.edu*

Coordinated regional strategy is important to improve the effectiveness of weed management while providing opportunities to secure funding. Cal-IPC's online tool, CalWeedMapper, provides maps of invasive plants and summarizes which species pose the best opportunities for surveillance, eradication, or containment in a specified region. Five counties in the Central Sierra (Alpine, Amador, Calaveras, El Dorado, and Tuolumne) are working together to use CalWeedMapper combined with local knowledge to determine high-priority species for their region. This group serves as a pilot project for coordinated regional strategy in regions across the state.

The coordinated regional strategy lays out which species these counties will focus on for mapping, eradication, public education, and funding efforts. A group of local weed experts, including representatives from UC Cooperative Extension, county agriculture, US Forest Service, and the National Park Service, met to narrow down the report generated from CalWeedMapper into a more manageable list. They also incorporated information on existing local projects, priorities, and regulatory requirements. Subsequent work by the group added details on the extent of populations and estimated cost of removal. In the end, they chose 12 species for regional eradication, nine for surveillance, and two for public education. Particular populations of several species more widespread in the region were also selected for leading edge priorities for removal.

The Central Sierra group used the results of this process to develop a funding proposal that was submitted to the National Fish and Wildlife Foundation. If funded, this project will support regional partners in eliminating key populations on-the-ground.

Restoration, flood conveyance, and stormwater management - Emerging criteria for vegetation management in urban streams and flood-prone areas.

Newhouser, Mark, Sonoma Ecology Center, Eldridge, CA, mnewhouser@sonomaecologycenter.org

Stream restoration success is diminished by the cumulative impacts of development and poorly designed stormwater conveyance. Historic stream channelization and past flood control management practices denuded stream banks, eliminating critical fish and wildlife habitat, and allowing the introduction of invasive species into terrestrial and aquatic habitats. Recent developments in restoration practices have increased the compatibility of habitat enhancement in urban creeks and the use of woody vegetation in flood prone areas. Criteria for vegetation management in flood prone areas are designed to maintain flood conveyance, enhance fish and wildlife habitat, suppress invasive weeds, prevent erosion, improve water quality, and reduce future maintenance requirements. Low Impact Design (LID) and other passive stormwater management features can also be incorporated into weed control and native plant restoration projects to reduce concentrated runoff, prevent erosion and retrofit storm drain outfalls. This presentation will discuss the current challenges and future prospects of restoration in urban creeks and flood prone areas, and how multi-benefit projects, that include stormwater management and TMDL implementation, improve funding prospects and contribute to restoration project success.

Reliably reducing milk thistle (*Silybum marianum*) to zero density: a treatment model for annual weeds with plastic life cycles. *Summers, Tony M. Catalina Island Conservancy, Avalon, CA. tsummers@catalinaconservancy.org*

Annual weedy species present a unique challenge for land managers because of temporally narrow treatment windows, highly plastic life cycles, and density-dependent treatment complications. Many annual species are able to germinate over a wide time window and still produce viable seed before the onset of seasonally adverse weather conditions. A large potential germination period and high likelihood of leaf overlap reduces the efficacy of post emergent control of milk thistle (*Silybum marianum*) and, potentially other similar species.

Milk thistle has been observed to germinate on Catalina Island as early as October and as late as May. As a result, plants can range in height from 8 feet to 4 inches tall. Post emergent herbicide treatment has resulted in large mature plants not receiving lethal doses of herbicide because of leaf overlap and late-germinating individuals escaping treatment. This case study examines an effective treatment and monitoring strategy that addresses these difficulties in order to reduce milk thistle to zero density at all known populations on Catalina Island. This methodology could be applied to other annual weeds in the *Asteraceae* family in both accessible and roadside situations.

European dune grass control: 15 years of adaptive management. *Hyland, Tim. California State Parks, Santa Cruz District *thyla@parks.ca.gov*

The Santa Cruz District of California State Parks has been restoring coastal dunes through the removal of European Beach Grass (*Ammophila arenaria*) since 1995. Initial efforts were restricted to hand removal using volunteers. In 2000, in an effort to increase both our acreage treated, and reduce costs, the district began a program of prescribed burning followed 12 months later with a foliar application of a 7% solution of Roundup Pro herbicide. While other dune restoration efforts in the region invested heavily in revegetation the district relied entirely on natural recruitment to re-establish the native plant communities. Although this method was effective and relatively inexpensive, the herbicide used resulted in only about 60% control for any given application requiring multiple retreatments, and was even less effective if not combined with prescribed burning.

In 2008, the district learned of the successful use of an Imazapyr based herbicide in controlling European dune grass at the Ten Mile Dunes in MacKerricher State Park. This prompted the district to experiment with the use of tank mix consisting of 1.5% Stalker, 2% Roundup Pro Concentrate with a nonionic surfactant, following burning. This mixture resulted in roughly 90% to 95% control of dune grass after one treatment when properly applied, and to date has had no apparent negative effects on natural revegetation. It also resulted in rapid (2 to 3 weeks, depending on weather) browning of the dune grass, facilitating follow up treatments.

While this change in herbicide represents a marked reduction in cost and effort, early indications are that Imazapyr based herbicides, without the use of Glyphosate may prove effective even without burning. This would further lower the cost of controlling European dune grass, and expand the areas that can be treated to include those where it is not feasible to burn.

Session 10. Working Across Time

Invasive plants and novel ecosystems: setting attainable goals in a changing world. *Katie Suding, Department of Environmental Science, Policy & Management, UC Berkeley, Berkeley, CA.* *suding@berkeley.edu*

In the coming decades, rapid climate change will make "restoration" a moving target. Some ecologists suggest that the concept of "non-native" species may not be useful in the future. Others advise that we need to accept "novel" ecosystems with altered plant communities, especially given that some species are difficult, too expensive, or even impossible to control. A panel of practitioners and researchers will describe how they prioritize invasive species for research and management, and address questions such as: How will our conservation goals evolve in the future? How will invasive species impacts change over time? How do land managers set attainable goals and prioritize species for control?

Moderator: Katie Suding, UC Berkeley. Panelists: Jutta Burger, Irvine Ranch Conservancy; Sandra DeSimone, Audubon Starr Ranch; Karen Holl, UC Santa Cruz; Lisa Micheli, Pepperwood Preserve, Sonoma Co. ; Rob Klinger, USGS, Bishop; and John Knapp, Native Range.

Assessing multiple treatment methods to control *Festuca arundinacea*, using prescribed burning, herbicide, brushcutting and hydro_mechanical_obliteration (H_M_O). *Alvarez, Maria E., and Elizabeth Ponzini, Christine Sullivan, Amanda Magallanes, and Jim Cartan. Golden Gate National Recreation Area, Sausalito,CA. *maria_alvarez@nps.gov*

Festuca arundinacea, commonly referred to as tall fescue, is an invasive perennial bunch grass that forms dense monocultures, reducing plant diversity and the quality of wildlife habitat. On September 27th 2011, a controlled burn was conducted by NPS staff on eight acres of tall fescue in the Gerbode Valley, Marin Headlands, Sausalito, CA. The goal of the burn was to significantly reduce tall fescue thatch in order to apply additional control treatments and begin the habitat restoration of a coastal swale plant community. The burn was a success and reduced the absolute cover of tall fescue from 99% to 22%, compared to pre-burn conditions from 2006 data. Plots were subsequently installed to determine the results of three follow-up control treatments: treatment with herbicide, brushcutting, and (H_M_O). Currently, data shows that herbicide treatment was the most effective at reducing the re-growth of *F. arrundinacea.* Following those treatments, one of two revegetation techniques were implemented: broadcast seeding or native out-planting. A total of 14 pounds of seed was broadcast and 4,882 native plants were planted across the larger site as well as within selected plots. The story will be continued since the results from the restoration component are too early to report. We'll continue with fescue control too, so watch for results on the site's succession and the planting success of natives to be reported within the next year.

Invasive aquatic weeds: Implications for mosquito and vector management activities. *Charles E Blair, MD, Trustee, Mosquito and Vector Management District of Santa Barbara County (MVMDSBC) 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. This poster focuses on continuing problems with control of Water Evening-primrose, *Ludwigia* spp. Successes in on-going control of Smooth Cordgrass, *Spartina spp., S. densiflora x foliosa,* in the San Francisco Estuary will be shown. Presentations on the importance of Smooth Cordgrass in San Francisco Bay have been made at recent statewide Cal-IPC and Mosquito and Vector Control Conferences. Demonstration of these relationships can enhance both agency and public awareness of their importance.

Slope instability increased by *Cryptomaria japonica* in Sichuan earthquake zone. *Bossard, Carla, St. Mary's College of California, Dept. of Biology; Tang Ya, Sichuan University, Dept. of Environmental Science. cbossard@stmarys-ca.edu*

We examined the relationship between slope stability, degree of slope, slope substrate and % tree cover of *Cryptomaria japonica* versus % mixed native tree forest cover in regard to landslides in Yang Ching Gou, Sichuan, China, site of a severe earthquake in 2008. The degree of slope in the area ranges from 20-85 degrees. Substrate at the surface is most commonly a mixture of unconsolidated soil and rocks, although some bedrock outcroppings occur in this area. The native mixed forest is 95% a mixture of four tree species, *Metasequoia glyptostroboides*, *Magnolia officianalis*, *Cunningham lanceolata*, and *Carya hunanensis*. All these species have a tap root that is thick and sturdy and extends at least 3 m into the earth at tree maturity. The first three species have as well thick secondary roots which extend broadly away and down from the tap root. *Cryptomaria japonica* is a non-native, naturalized species that can spread from its own seed rain but is planted extensively in the area as a timber source since it grows rapidly. It has a root that bends horizonally about 10cm below the surface with a mass of fine, thin (<2mm) roots emerging from it that extend no more than 1.2 m maximum depth at tree maturity. Many of the mountain slopes in Yang Ching Gou had partial or complete landslides during the

2008 earthquake. After a binomial logistic regression analysis of data we found a statistically significant correlation between interaction of degree of slope and % *Cyptomaria japonica* cover, with slopes that suffered landslides during the 2008 earthquake. Our research indicates *Cyptomaria japonica* should not be planted on slopes 35 degrees or greater and where it has naturalized on such slopes in cover greater than 30 % it should be removed to avoid increasing slope instability.

Is mastication plus prescribed burning an effective control method for multi-acre medusahead (*Elymus caput-medusae*) infestations? *Coppoletta, Michelle and Courtney J. Rowe*. USDA Forest Service, Plumas National Forest, Quincy, CA. *cjrowe@fs.fed.us*

Over the past 20 years, managers of public lands in the western United States have witnessed an explosive spread of the highly invasive annual grass medusahead (*Elymus caput-medusae*). Most traditional control methods (e.g. manual, chemical, biological control) are either impractical or ineffective, leaving land managers few large-scale control options.

Based upon studies conducted on the Plumas National Forest that indicated flaming with propane torches can be effective in controlling medusahead on a small scale (< 1 acre), we hypothesized that high intensity fire prior to seed set may be an effective control method on a larger scale. To test this hypothesis, we utilized prescribed fire treatments following mastication on a 45-acre medusahead infestation that was part of a larger fuels reduction project. We hypothesized that the abundance of medusahead would decrease in response to treatment. We were also interested in whether medusahead abundance was associated with reduced shrub and tree cover, higher fuel loadings, and burn severity.

Although analysis of post-treatment data is not complete (anticipated August 2012), initial results suggest that mastication resulted in relatively low fuel loading and subsequent prescribed burning did not produce a high intensity burn; combined, these effects may actually increase medusahead abundance. Prior to treatment, plots with high shrub cover had significantly less medusahead cover, but following mastication, cover and frequency of medusahead did not change significantly, even though treatment significantly reduced shrub cover. High ground and surface fuel loads may suppress medusahead germination or inhibit its dispersal, while removal of shrub cover and lower than anticipated burn severity may encourage dispersal of medusahead into newly disturbed areas.

The California firewood task force: A multi-agency response to forest health threats posed by movement of firewood. *Bokach, Matthew[1]; Lisa Fischer[1;] Don Owen[2]; Janice Alexander[3]; Katie Palmieri[4]; and Susan Frankel[5]*. [1]U.S. Forest Service, Pacific Southwest Region, Forest Health Monitoring; [2]CalFIRE, Pest Management; [3]Univ. of CA Cooperative Extension; [4]University of CA Berkeley; [5]U.S. Forest Service, Pacific Southwest Research Station. *sfrankel@fs.fed.us; 510-559-6472*

A growing list of invasive forest pests have become established in the United States, resulting in significant environmental and economic losses. Recognizing that many of these pests and pathogens can be spread by long-distance movement of firewood, the California Forest Pest Council established the California Firewood Task Force. This multi-agency group works collaboratively to protect native and urban forests from the threat of invasive forest insects and diseases that are moved on firewood - through education and outreach to wood consumers, wood cutters, firewood dealers, outdoor recreationists and industries, the media, and the general public.

The Task Force implemented a "Buy It Where You Burn It" educational outreach campaign with campground posters, frequently-asked-question sheets, playing cards with photos of invasive forest pests and diseases, and Frisbees. These materials were distributed to state, federal, and local campgrounds and other visitor facilities statewide. Outdoor recreationists were surveyed in two key locations and 85% of initial respondents said they found the campaign effective in educating them about the risks to forest of firewood movement.

Searching for a silver bullet: Reducing the invasive Sahara mustard while preserving native wildflowers. *McDonald, Chris, UC Cooperative Extension, Riverside, cjmcdonald@ucanr.edu*

Sahara mustard (*Brassica tournefortii*) is invading deserts and semi-arid landscapes across the southwest United

States and northern Mexico. This species is becoming the dominant herbaceous vegetation in many areas that were formerly dominated by annual spring wildflowers. This invasion also threatens the ecotourism of several communities that are located in landscapes with abundant wildflowers. In addition, research on diverse control methods for Sahara mustard is lacking. Hand pulling can be effective, but because it is labor-intense large areas cannot be treated, which reduces wildflowers and potentially ecotourism. The goal of this research is to determine the most effective means of reducing Sahara mustard over large-scales, while preserving native wildflower populations. We tested the efficacy of four different herbicides (glyphosate, triclopyr, chlorsulfuron and pelargonic acid) each at two application rates (high and low). We measured the effectiveness of these herbicides against hand-weeded plots. Sites in Borrego Springs and Palm Desert, California were chosen as these sites formerly had significant wildflower populations and now have high densities of Sahara mustard. We found that all four herbicides were very effective at reducing Sahara mustard populations, especially at high application rates. In addition, while two herbicides (triclopyr and chlorsulfuron) reduced the population of Sahara mustard they also reduced the population of native wildflowers. The low rate of pelargonic acid was not effective at reducing Sahara mustard. Glyphosate was the most successful treatment as it reduced the abundance of Sahara mustard and invasive annual grasses, while preserving the most native wildflowers.

Setting regional strategies for invasive plant management using CalWeedMapper. *Morawitz, Dana*, Elizabeth Brusati, and Doug Johnson. California Invasive Plant Council, Berkeley, CA *dfmorawitz@cal-ipc.org*

Cal-IPC is working with partners in several regions of California to develop consensus strategies based on CalWeedMapper, our online mapping tool that incorporates expert knowledge and occurrence data on >200 invasive plants statewide. We're charting a strategic course to help regions be shovel-ready to apply for funding for high priority newly or barely detected species. We are actively supporting several types of regions, including national and state parks, national forests, wildlife refuges, counties, WMAs, watersheds and ecoregions. Regions in progress include a five-county central Sierra region, a three-county central coast region, the Cache Creek Watershed Forum in Yolo and Lake counties, the Shasta-Trinity National Forest, and Santa Cruz district State Parks.

CalWeedMapper produces a Management Opportunity Report of surveillance, eradication and containment opportunities in a selected region based on the current distribution of those species. This report is used in conjunction with local knowledge and information on that species' resiliency to climate change to deduce a strategy for surveillance and eradication targets in a region. This statewide approach allows regions, typically groups of WMAs, across the state to agree on chief concerns and to facilitate adjacent region's concerns.

In each region, Cal-IPC staff facilitates several meetings with local stakeholders to evaluate the priorities suggested through CalWeedMapper and scope top priority actions. We focus on regionwide priorities for eradication and surveillance while recognizing that local priorities and containment efforts can exist separately from this. The goal is to provide each region with a list of species for surveillance and a regional work plan (with budget) for addressing top priority eradication targets. Over the next year we plan to complete a total of 6 regions. Two regions with a strategic plan have already used this plan for on-the-ground management funds to implement priority eradications.

Is imazapyr an effective alternative to glyphosate for the control of jubatagrass? *Don Thomas. San Francisco Public Utilities Commission. dethomas@sfwater.org*

Jubatagrass is one of the most invasive plants in coastal Northern California. Though the herbicide glyphosate is commonly used to treat it, it has some limitations. It has been found to provide only partial control, and follow-up treatments are often required to control plants that recover or escape treatment. Therefore alternative herbicides have been sought that would give more complete control. This study is an evaluation of the efficacy of herbicide imazapyr for the management of jubatagrass. Applications of imazapyr were made to jubatagrass by itself and in combination with glyphosate. In initial tests, foliar sprays of this herbicide caused

severe stunting, chlorosis and inhibition of flowering but did not kill jubatagrass plants. Foliar applications of glyphosate provided much better control, and the combination of glyphosate and imazapyr was indistinguishable in its effect from that of glyphosate alone. However, a cut-stem treatment of concentrated imazapyr produced results comparable to or superior to that of a cut-stem treatment of glyphosate, and later tests of foliar applications of imazapyr appeared to provide good control of jubatagrass. This suggests that the lack of efficacy may be due to the failure of jubatagrass plants to absorb imazapyr into the foliage or to translocate it to the root system. Additional research should be performed to determine the reasons for the inconsistent response of jubatagrass to imazapyr. Once the causes of this variability in response have been determined and more consistent control is achieved, imazapyr should prove to be an effective alternative to glyphosate for the management of jubatagrass.

Differential terrestrial pulmonate gastropod species composition inside and outside eucalyptus forests. *Walgren, Michael* and Lisa Andreano. California Department of Parks and Recreation, Morro Bay State Park, 1 Lower State Park Rd., Morro Bay, CA, 93452. mwalg@parks.ca.gov*

In central coastal California, forests of introduced eucalyptus were planted on a large scale in Montana de Oro State Park, San Luis Obispo County. Eucalyptus forests currently occupy 61 hectares of Baywood fine sand soil in maritime chaparral and coastal dune scrub. These forests are believed to exclude numerous sensitive species, including the federally listed Morro shoulderband snail (MSS) (*Helminthoglypta walkeriana*). We used mapping layers of soil types, known occupied snail habitat, and predicted historic vegetation composition, to locate eucalyptus within predicted suitable MSS habitat. We then tested the hypothesis that eucalyptus alters the species composition of the terrestrial pulmonate gastropods. Transects were established in suitable MSS habitat that extended from native coastal scrub into eucalyptus forests. We then identified all snail species encountered along transects, with a focus on the occurrence of MSS. Thirty-seven MSS were found outside the eucalyptus canopy and one was found inside the eucalyptus canopy. When comparing forest areas with native vegetation areas we found that the species composition was altered and the abundance of each of the four snail species encountered was significantly different when comparing eucalyptus forest areas with native vegetation areas. Study results showed that MSS are excluded from eucalyptus forests located in otherwise suitable habitat within the occupied range, without correlation to specific eucalyptus species. Three other snail species increased in number within the eucalyptus forests, likely due to increased moisture and appropriate food. This research documents that the presence of eucalyptus forests at Montana de Oro State Park is correlated with loss of suitable habitat for the MSS, alteration of the terrestrial pulmonate mollusk community composition, and increased abundance of three other snail species. Snails that increased in number within the eucalyptus forests included two predatory species, one of which is introduced, that may prey upon MSS.

Preventing the introduction and spread of invasive weeds: engaging the construction, aggregate, utility industries and land managers. *West, Wendy, University of California Cooperative Extension – Central Sierra, wkwest@ucdavis.edu*

Preventing the introduction and spread of invasive weeds is the most important, and cost effective, line of defense in protecting public lands, private lands and working landscapes in California. Invasive plant parts and seeds are often spread to new sites and along roadways on equipment, in gravel or in erosion control materials used in construction, landscaping and revegetation projects. An overview of current statewide efforts will be provided, including: the weed-free forage and straw supplier list; educational materials for gravel suppliers; aggregate materials inspection programs and best management practice guidelines for transportation and utility corridor workers and land managers.