



# Cal-IPC News

*Protecting California's Natural Areas from Wildland Weeds*

Quarterly Newsletter of the California Invasive Plant Council

**Going  
to great  
lengths  
to remove  
invasive  
plants**



*Sal Torres, Fitzgerald Construction, working under US Forest Service contract, removes Scotch broom (Cytisus scoparius) from this 80-foot tall rock face along Highway 299 in Trinity County where Scotch broom is a widespread problem.*

*... continued page 11*

*Photo: John Dobson, Caltrans District 2*

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A California 501(c)3 nonprofit organization

Protecting California's lands and waters from ecologically-damaging invasive plants through science, educations, and policy.

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## Cal-IPC News

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Editors: Doug Johnson, Elizabeth Brusati, Heather Brady

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## From the Director's Desk

# Rebooting restoration

Land managers working to restore functional habitat are doing important work, but we know that we need to increase our effectiveness if we are to truly turn the tide on invasive species. We do what we can for now in the hope that we will be able to do much more in the future. We need Restoration 2.0.

There are hopeful signs. As attendees at the Symposium in Ventura discussed, a suite of regional and statewide mapping efforts aim to provide maps that help weed workers hone their strategies. On the policy front, the state has now drafted a comprehensive list of invasive species that potentially threaten the state (some 1,700 organisms) as well as a strategic framework for strengthening our collective approach to addressing the invasive species challenge.

But we know how quickly a site cleared of an invasive plant can become re-infested with another weed. Or how one restored property can be re-infested from an untreated neighboring property. There are lots of ways in which our restoration efforts may not have the intended effect.



*"No cubicle space for me" Photo: Jose Gomez, USFS, 2010 Photo Contest*

We will always be looking for more funding and better science to show us what works. At the same time we need to find ways to work smarter. To revamp restoration, we need to get back to basics by improving efforts in exclusion, spread prevention, early detection/rapid response, and ongoing management. These are not rocket science.

Cal-IPC is working on all of these. We work with national environmental nonprofits and the USDA on revising import regulations to keep new weeds out, and with the PlantRight partnership to provide nurseries with risk assessment tools and incentives to make sure new introductions are safe.

Preventing spread requires Best Management Practices for a range of activities, from recreational boating to firefighting to road and utility maintenance. Cal-IPC's training program is developing a BMP manual and workshops for new audiences in order to shut down accidental vectors of spread for wildland weeds.

Successfully detecting and eradicating new populations of a wildland weed requires a keen sense for what plants might be found in a given area. Scientific risk assessment and mapping can support targeted surveillance and control activities that efficiently keep new weeds out (see page 4).

Ongoing management can be strategically focused on containment zones or high-priority conservation sites, supported by risk assessment and mapping. Effective management action on-the-ground relies on skilled natural resource managers, who can further their professional training through Cal-IPC field courses. Coordination among management entities is essential, from the local level where we support county WMAs, to the state level where we support the Invasive Species Advisory Committee.

All of the above require public support. Cal-IPC produces materials, attends outreach events, and communicates with media to make the in well-known. Restoration workers have faith that the future will bring ever stronger efforts. We are working to bring that future into being.



# Wildland Weed News

At Point Reyes National Seashore, mice are benefiting from invasive beachgrass to the detriment of a rare plant. Researchers from Washington University in St. Louis found that deer mice use European beachgrass (*Ammophila arenaria*) as cover from predatory birds, allowing them to snip off pieces of endangered Tidestrom's lupine (*Lupinus tidestromii*). This indirect interaction is reducing the lupine's populations even further. *Ecology* (August 2010).

How should countries balance concerns about invasive species entering the country with the need to protect trade? A recent study by economists at Southern Methodist University concluded that allowing some entry of pests may be reasonable when damages are low, the

pests' growth rate is low and the discount rate (the relative weight placed on present costs and benefits compared to those in the future) is high. On the other hand, managing trade to prevent further entry is warranted when the current population of the species is likely to increase sharply or if the cost of controlling an established invasion is high. [www.smuresearch.com](http://www.smuresearch.com)

The Western Governors' Association recognized the issue of invasive species by passing a policy resolution that supports "coordinated, multistate management and eradication actions to limit or eliminate intentional and unintentional introductions and improve control of invasive species". Particular areas of importance they list are developing scientifically based and coordinated species lists among states;

developing efficient coordination mechanisms; establishing consistent procedures to prevent transport and sale of invasive species; and increasing support for public education programs. [www.westgov.org](http://www.westgov.org)

Five US states have sued the federal government and Chicago's water authority seeking action to stop Asian carp from invading the Great Lakes. The states are asking the US Army Corps of Engineers to use nets to stop the carp from entering Lake Michigan. The lawsuit also asks for a study to be conducted on whether the Great Lakes can be separated from the Mississippi River system and seeks to close Chicago shipping gates and locks. [www.epa.gov/greatlakes/invasive/asiancarp](http://www.epa.gov/greatlakes/invasive/asiancarp)

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## Cal-IPC Updates

### New staff!

We have now fully staffed up for our ARRA-funded projects. [www.cal-ipc.org/about/staff.php](http://www.cal-ipc.org/about/staff.php)



Falk Schuetzenmeister is our new Mapping and Modeling Specialist and Suzanne Harmon is our Field Mapping Coordinator.

### Recent grants

Thank you to the Richard and Rhoda Goldman Fund, the Jiji Foundation and the California Dept. of Fish and Game for supporting our policy work and to the True North Foundation for general operating support.



Meet Training Program Specialist Arpita Sinha and Agustín Luna, our Business Manager.

### Board elections results

Welcome new board members Edmund Duarte (Alameda Co. Dept. of Agriculture), Kim Hayes (Elkhorn Slough Foundation), Sue Hubbard (professional land manager, Monterey Co.), Deb Jensen (El Dorado Arts Council), Shawn Kelly (Southern California Wetlands Recovery Project), and Andrea Williams (Marin Municipal Water District), who begin their terms in January. Current board members Edith Allen and Jason Casanova were elected to two-year terms, and officers Jason Giessow, John Knapp, Julie Horenstein, and Doug Gibson were re-elected.

### Student liasons

The board has added two student chapter liasons who will serve one-year terms, one representing northern California, the other representing southern California. For the 2010-11 academic year, they will be Annabelle Kleist from UC Davis and Lynn Sweet from UC Riverside.

### Field course video online

Video from last fall's field course on Chemical Control Methods is now available on our website! Thank you to the National Park Service for producing this resource. [www.cal-ipc.org/fieldcourses](http://www.cal-ipc.org/fieldcourses)

### Cal-IPC Student Chapter Newsletter

The student chapter has begun publishing a quarterly newsletter to keep members up to date with issues specific to students. So far the newsletter has information about WMAs, upcoming grants, and how graduate students and land managers can collaborate for better results. [www.calipsc.org/newsletter.php](http://www.calipsc.org/newsletter.php)

# Mapping the Spread

## An update from Cal-IPC's Science and Mapping Programs

Cal-IPC statewide risk mapping: We're at it again but with finer resolution and better modeling data! By showing landscape-level patterns of spread, our risk mapping aims to help land managers set priorities, design goal-based plans, and demonstrate the need for their projects to funders.

We are working on three interrelated efforts. First, we are meeting with local experts across the state to map each plant's distribution, spread, and management status at a coarse level. Second, we are collecting existing GIS datasets to help model the potential range in California for each species. And finally, we are working with other organizations to coordinate weed mapping efforts and make data more universally available through a centralized website. This article provides an update on the first task, which is our current focus. Future articles will describe other program aspects as we move forward.

In 2006-2009 we worked with local invasive plant experts around the state to map current distribution of all 200 species on the Cal-IPC Inventory by Jepson floristic region and county. For some of the species, we then overlaid this information with projections of suitable range derived from modeling based on climate to help identify places where each invasive plant species is most likely to spread. The resulting maps were posted on our website.

This project provided the proof-of-concept for launching us into our current American Recovery and Reinvestment Act-funded effort for 2010-2012. For this effort we are developing an interactive online tool to provide landscape-level strategic analysis based on the new data.

This new phase of statewide risk mapping will once again build on the expert knowledge of local land managers.

ARRA funding is also enabling the Bay Area Early Detection Network ([www.baedn.org](http://www.baedn.org)) to move forward with treating high-priority invasive plant populations in the nine-county region. Dan

Gluesenkamp,  
Director of  
Restoration at

Audubon Canyon Ranch in Marin County and a BAEDN co-founder, is promoting the concept of a statewide network as California EDN ([www.californiaedn.org](http://www.californiaedn.org)), and an energetic lunchtime meeting at the Symposium discussed ideas for how to build such a network. Cal-IPC is coordinating with these efforts, and with the online database Calflora, weed mapping specialists at the Sonoma Ecology Center, and numerous agencies and organizations to develop unified approaches for collecting, using and sharing spatial data on invasive plants. We recognize that

local managers are getting more and more requests for spatial data sharing, and we want to make sure these requests are not redundant and that they lead to tools that will be useful.

### Big push to map distribution

Our mapping team is currently roaming the state to meet with wildland weed experts in each county to map distribution at the scale of each USGS quadrangle. This is of course too coarse a scale to plan the details of discrete on-the-ground projects, but it can provide an excellent landscape-level picture of spatial opportunities such as leading edge containment zones and outlier populations ripe for eradication.

In the past three months, our team have worked to refine our data collection methods in order to capture "expert knowledge" quickly and effectively. We contact experts with a regional knowledge of invasive plant distribution and solid botanical skills to identify the weeds present in their region. We then gather this group of experts for a meeting (we buy lunch!) and map about 50 species on the Cal-IPC list, noting the abundance, spread rate, and treatment status for each species within each quad.

This initial set of species focuses on plants of special concern to the Sierra, since we have grant support to assess spread risks in that region, including the potential impacts of climate change. To date we have visited over half of the state's counties. The meetings have been a lot of fun, and experts have expressed their excitement about getting the information into a statewide system. After our meeting with the El Dorado County WMA and the Lake Tahoe Noxious Weed Coordinating Group, Wendy West said, "That was great! It really feels like we are contributing to an important project."



**Cal-IPC Expert Opinion  
Data Gathering Meetings**

- Have Participated
- Meetings planned for 2010
- Meetings in the works
- Meetings to be scheduled

## Connections being made

As we talk to experts and gather data, the need for broader mapping is made abundantly clear by some of the spatial patterns that emerge. Fred Rinder of the Fresno County Dept. of Agriculture sounded a warning to Tulare County to be on the watch for early detections. “We have been surveying and treating rush skeletonweed (*Chondrilla juncea*) in the southeast corner of the county. This species was confined to the downtown and west Fresno quads, but we lost funding for two years and now populations are found east of Fresno and are continuing to spread.” Since the predominant winds are out of the northwest, he says Tulare will need to be vigilant in looking for it and controlling it since he is finding occurrences just upwind of them. A situation like this also helps us see how we can strengthen the design of our online analytic tool to include mechanisms for spread such as wind.

Expert knowledge mapping can also demonstrate leading edges. In an update to the US Forest Service, Eddy Greynolds of Kern County Dept. of Agriculture wrote that they have been treating Scotch thistle (*Onopordum acanthium*) in areas adjacent to Sierra National Forest boundaries. To date they have prevented it from spreading to forested lands, but are concerned about the potential for this spread. Our quad mapping will show the presence of the plant species next to the uninvaded territory, and indicate that it is under treatment. This information would help the USFS prioritize surveys for that species and encourage eradication efforts if Scotch thistle is found on their land.

Absence data is a key aspect of the information we are collecting, and will allow future occurrence reports to be flagged as early detection. Say a “citizen scientist” submits a point occurrence online (or via a smart phone app!) to Calflora, and our statewide distribution map shows that experts think the plant does not occur in that area. This occurrence could then be flagged as an early detection observation and prioritized for rapid response.

Simply getting experts together in a room to put information that exists only

## What will the online tool do?

**Our online tool (in development at [www.calweedmapper.org](http://www.calweedmapper.org)) will combine current distribution and spread data with range modeling results to answer questions like:**

- **What’s here? Which invasive plant species are currently found in a particular region?**
- **What’s spreading? Which species are spreading, and to where? Which are decreasing due to management efforts?**
- **What’s coming? Which invasive plants are most likely to spread into this region next? From where?**
- **Where to focus surveillance? Where are key areas to regularly survey to look for particular species?**
- **Where to focus eradication? Which invasive plant populations are outliers and a high priority for eradication?**
- **Where to focus containment? Where are strategic opportunities for stopping spread along a leading-edge?**

**In the future, we hope to add to the tool GIS layers that map conservation values and pathways of spread. It would also be powerful to integrate algorithms (such as WHIPPET, developed by Gina Darin) that are designed to set priorities among many populations of multiple species.**

in their head onto a map has been quite rewarding. Not only are these mapping exercises a great opportunity to compile knowledge that has, in many instances, accumulated over an entire career, but the sharing among local experts at the meeting is itself valuable. Newer workers learn which weeds are being watched where and what species are being treated.

Fred Rinder quipped about feeling his own mortality with this mapping exercise. Indeed, during his session with us he shared a career’s worth of observations, which this mapping effort will in turn make available to other invasive

plant management professionals. (He also chuckled and commented on how nice it was to get a jump on his autobiography. So the next time you see Fred, pester him for some of the saucier travails that have also been a part of his career. We couldn’t capture those on the map!)

Stay tuned for more updates in future issues of the newsletter. As always, your participation is vital. Folks like you across the state are the intended end-users of the system as well as the source of on-the-ground data for your area. Thank you again for your continued work to “Map the Spread!”

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- *National Fish & Wildlife Foundation*
- *Resources Legacy Fund*
- *Richard and Rhoda Goldman Fund*

*Cal-IPC is an equal opportunity institution.*

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## ...News from page 3

Sen. Blanche Lincoln (D-AR) introduced SB 3735 to exempt pesticides already approved under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) from further permitting under the National Pollutant Discharge Elimination System (NPDES). Court decisions in recent years have required that entities who want to use a pesticide must apply for an NPDES permit even if the type of application has been approved by US EPA through FIFRA registration. Supporters of the bill believe it is needed to reduce regulatory burden on those wanting to use a pesticide. Opponents believe that the particular factors of each potential application must be examined through application for an NPDES permit to avoid cumulative impacts. <http://thomas.loc.gov>



# 2010 Cal-IPC Symposium in Ventura!



**Weedzilla!** Martin Hutten from Yosemite National Park receives the 2010 National Park Service award for land manager of the year from Bobbi Simpson, Exotic Plant Management Team liaison for CA parks.



**At the social hour,** Chelsea Carey of UC Merced, James Law of the Santa Ana Watershed Association, and Mike Bell and Kai Palenscar of UC Riverside.



**Karen Flagg,** Growing Solutions, discusses restoration at the Foothill Open Space, a former landfill.



**Bertha McKinley** staffing the Cal-IPC sales table.



**At the poster session,** Meg Marriott, USFWS.

**Find Symposium papers, posters and presentations at [www.cal-ipc.org](http://www.cal-ipc.org)...**

# Congratulations to our 2010 Award Winners!

## **Jake Sigg Award for Vision and Dedicated Service:**

David Chang, of the Santa Barbara County Agricultural Commissioner's Office, for his quiet persistence, effective fundraising, and steady collaborative approach in leading the Santa Barbara WMA.

## **Golden Weed Wrench Award for Land Manager of the Year:**

Sandra DeSimone, for her exemplary work directing research, management and education programs at Audubon California's Starr Ranch Sanctuary over the past 13 years.

## **Ryan Jones Catalyst Award:**

Jo Kitz of the Mountains Restoration Trust for organizing restoration volunteers in the Santa Monica Mountains for over 30 years.



Jo Kitz

## **Policy and Media Award:**

The Los Angeles Times for increasing public awareness about invasive plants and setting a great example for media everywhere.

## **Organization of the Year:**

Los Angeles Conservation Corps for reaching over 17,000 young people each year to ensure the next generation's readiness to address the challenge of invasive plants.

## **Student Contest:**

**Best Paper, Heather McGray, UC Irvine:** "Resident community species diversity and invader genetic diversity do not affect the establishment of an annual exotic grass."  
2<sup>nd</sup> Place: Annabelle Kleist, UC Davis. 3<sup>rd</sup> Place: Lynn Sweet, UC Riverside.

**Best Poster, Denise Knapp, UC Santa Barbara:** "Contrasting effects of *Capobrotus edulis* on arthropods in a coastal dune ecosystem."  
2<sup>nd</sup> Place: Tadj Schreck, UC Irvine. 3<sup>rd</sup> Place: Kai Palenscar, UC Riverside.



David Chang and Sandra DeSimone



**Photo Contest Winners:** "Moving hose like a sailor" by Martin Hutten of Yosemite National Park, and "Beach landing" by Darren McCormick, submitted by Charlie de la Rosa, Catalina Island Conservancy.



# Thank You Symposium Sponsors!

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*The state office and these chapters: Channel Islands, Dorothy King Young, East Bay, Los Angeles/ Santa Monica Mountains, Marin County, Milo Baker, Monterey Bay, Orange County, Redbud, Riverside/San Bernardino, Sacramento Valley, Sanhedrin, Santa Clara Valley, Santa Cruz County, Sierra Foothills, and Yerba Buena*

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Herbicide ballistic technology (HBT) being tested by Don Thomas, San Francisco PUC, under the watchful eye of developer James Leary, University of Hawaii. *Photo: Bob Case*



Cris Sandoval, Director at UCSB's Coal Oil Point Reserve, discusses dune habitat restoration. *Photo: John Ekhooff*



Paula Power, Channel Islands National Park, presents background on historic island uses and upcoming restoration plans.



# Call for capeweed specimens (*Arctotheca* spp.)

Got capeweed? Help researchers clarify the invasive potential of these species.

by Robert J. McKenzie, Department of Botany, Rhodes University, South Africa  
and Alison M. Mahoney, Biological Sciences Faculty, Minnesota State University, Mankato

*Arctotheca* is a genus of five species native to southern Africa (Karis *et al.* 2009). Plants naturalized in California have previously been treated as *A. calendula* (L.) Levyns, commonly known as 'capeweed.' This pastoral and agricultural weed has become established in a number of countries with Mediterranean climates and is declared invasive in Australia (Groves *et al.* 2003). Fertile and sterile forms of *A. calendula* are distinguished in the California Invasive Plant Inventory. Re-examination of herbarium vouchers of *Arctotheca* for the upcoming revision of the Jepson Manual (Baldwin *et al.* in prep.) revealed that the plants belong to two distinct species: *A. calendula* and *A. prostrata* (Salisb.) Britten (prostrate capeweed).

## *Arctotheca calendula*

*A. calendula* is an annual, initially rosette-forming herb that develops stems with age. Its ray florets are uniformly pale yellow above or with a darker yellow basal band, and steely blue below. Its disk florets are yellow with green to black tips. *A. calendula* is recorded from a few coastal and disturbed urban habitats in the North Coast, Central Coast, and Outer South Coast Ranges floristic province



*Arctotheca calendula*, growing in the Northern Cape, South Africa

subregions. This species is fertile and has received 'Alert' status from Cal-IPC, indicating it has significant potential to invade new ecosystems.

## *Arctotheca prostrata*

*A. prostrata* is a perennial rosette-forming herb with prostrate creeping stems that root at the nodes to produce new rosettes. Its ray florets are uniformly yellow above and reddish purple below. Its disk florets are yellow throughout. The species is recorded from disturbed sites in the North Coast, South Coast, Central West, and Western Transverse Ranges subregions. Reports indicate that *A. prostrata* is sterile and examination of herbarium material supports this. However, anecdotal reports paint *A. prostrata* as a fertile and aggressive invader that is difficult to eradicate once well established. Cal-IPC gives it a moderate invasiveness score. It has naturalized in many of the same countries where *A. calendula* occurs.



*Arctotheca prostrata*, growing in the Eastern Cape, South Africa.

## How you can help

Clarifying the invasive potential of *A. calendula* and *A. prostrata* in California, and determining whether *A. prostrata* is sterile or partially to fully fertile, is a matter of importance. We would be immensely grateful if Cal-IPC members would

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## Regulatory update on *Arctotheca* species

by Dean Kelch, Senior Plant Taxonomist, CDEFA Herbarium

In the Federal Register Volume 74, Number 110 (dated June 10, 2009), capeweed, *Arctotheca calendula*, was proposed to be added to the list of federal noxious weeds. Plants labeled *A. calendula* are commonly sold in nurseries as a vegetatively propagated groundcover. The California Department of Food and Agriculture (CDEFA) has treated this horticultural plant as the "sterile form" of *A. calendula*; it lists the "fertile form" as a state noxious weed.

As mentioned in the the accompanying article, the sterile plant of horticulture is now recognized as a different species, creeping capeweed (*A. prostrata*). This plant is a vigorous groundcover (read garden thug) that spreads aggressively via rooting stems and rhizomes, but has, so far, been found only where it was planted. It isn't fertile in California. Some other sterile plants are noxious weeds, such as giant reed (*Arundo donax*) and Bermuda buttercup (*Oxalis pes-caprae*), but current collections do not demonstrate that creeping capeweed is easily dispersed via plant parts.

Correctly labeled *A. prostrata* would not be regulated in interstate commerce if the federal listing of *A. calendula* becomes final. At the CDEFA herbarium we have collections of true *A. calendula* from Humboldt, Marin, San Mateo, Merced and Stanislaus Counties. These populations are undergoing control, but eradication has proven difficult. Agricultural Biologists for CDEFA recently have seen promising control results from use of the herbicide Milestone. [dkelch@cdfa.ca.gov](mailto:dkelch@cdfa.ca.gov)

# Perennial pepperweed control in riparian areas

by Carl Bell, Regional Advisor, Invasive Plants, UC Cooperative Extension

Perennial pepperweed (*Lepidium latifolium*) is the priority invasive plant for the San Diego Weed Management Area (WMA). The largest infestation of this weed is in the San Pasqual Valley along the San Dieguito River. Adjoining the river are several organic farms, all of which have some land infested with perennial pepperweed. WMA partners recognized that trying to eradicate pepperweed along the river without addressing the adjacent sources of infestation would be a problem in the long term. Because these are certified organic farms, however, using herbicides on their properties is not feasible.

The California Dept. of Food and Agriculture's Statewide Weed Management Area program provided funding that supported four field studies on perennial pepperweed; two studies compared herbicide alternatives to chlorsulfuron (Telar) and two tested mulch treatments.

The rationale for this research was that although chlorsulfuron was the most effective herbicide for pepperweed control, it could not be used in close proximity to water. Since pepperweed can grow down to the water's edge, there was a need to evaluate herbicides that could be used close to water as alternative treatments. Alternative herbicides included imazapyr, glyphosate, imazamox, and triclopyr. The mulch research was initiated locally due to the proximity of organic farms to the river. We decided to try mulches as an alternative to herbicides.

## Alternative pepperweed herbicides

These projects, one initiated on April 24, 2008 and the other on June 12, 2009, were established in

the San Dieguito River Park near the San Dieguito River. Each experiment utilized an existing monoculture infestation of perennial pepperweed in the flood plain of the river, but situated far enough from the river channel to avoid potential contamination from the herbicides. Both experiments utilized a Randomized Complete Block (RCB) design with four replicates. Herbicides were applied with a CO<sub>2</sub> pressurized backpack sprayer through a boom covering a six foot swath. Treatments were visually evaluated for perennial pepperweed control. Biomass data was collected in the year following treatment, June 2009 and April 2010.

## Herbicide results

Treatments and results are shown in the table below. Early results from the 2008 study indicated very good control of pepperweed by all of the treatments, but these results did not last into the following year. Although herbicide treatments reduced pepperweed biomass compared to the untreated control, most were not

effective enough to be useful for control of this weed.

Effective treatments are chlorsulfuron at 2 oz/acre and imazapyr at 64 oz/acre. The addition of glyphosate or triclopyr did not improve control. Glyphosate and imazamox were not effective at the rates tested. Imazamox is a close relative of imazapyr but with a much shorter soil residual. It was included in these experiments at the request of the manufacturer (BASF Corp.) as a possible alternative to imazapyr, but it is not currently registered for wildland use in California.

In previous field research we observed that although chlorsulfuron initially appears to be very effective at controlling pepperweed, new shoots start emerging from the soil two years after treatment. A visit to the 2008 experimental site was made in April 2010; recovery from all treatments appeared to be complete. This is further evidence that one herbicide treatment with either chlorsulfuron or imazapyr is not sufficient to kill this weed.

Treatments	Rate	2008 Study (treated April '08)			2009 Study (treated June '09)	
		% control		biomass <sup>b</sup>	% control	biomass <sup>b</sup>
		Oct. '08	June '09	June '09	April '10	April '10
chlorsulfuron	2 oz/A	100	97	288	90	488
imazapyr	64 oz/A	99	85	300	95	188
glyphosate	128 oz/A	99	68	538	38	1163
imazamox	32 oz/A	99	18	850	31	1213
imazamox	64 oz/A	99	85	738	58	625
imazapyr + glyphosate	32 + 64 oz/A	100	98	575	69	563
imazapyr + glyphosate	64 + 64 oz/A	99	99	63	97	130
imazapyr + triclopyr	32 + 32 oz/A	98	53	1300	73	650
imazapyr + triclopyr	64 + 32 oz/A	99	85	275	95	300
imazamox + glyphosate	64 + 64 oz/A	99	92	288	50	863
Untreated control		0	0	2725	0	2775

<sup>a</sup> All data is the mean of four replicates

<sup>b</sup> Biomass is fresh weight (grams/square meter) of pepperweed shoots cut at 8 cm from ground.





Mulch experiment for perennial pepperweed control (left to right: paper tarp, clear plastic tarp, black plastic tarp).

### Mulch as an alternative to herbicide

In 2008, we compared three mulch treatments; black plastic tarp, clear plastic tarp, and a paper tarp. Black plastic can kill weeds by excluding light from the soil, preventing seed germination and encouraging root and rhizome degradation. Clear plastic kills weeds through solar heating (solarization) when placed over soil during the summer. The paper tarp was tested as a biodegradable alternative to black plastic. Each treatment was applied four times in a RCB design. Prior to each mulch treatment the perennial pepperweed was mowed with a brush cutter to a height of 6 inches. In addition, each treatment was started as a spring (April/May) treatment and as a summer (July) treatment. All mulches were left in place through the summer and removed in October 2008.

A visual evaluation in March 2009 indicated that none of the treatments appeared to be different than the untreated control plots. We were not surprised; we did not expect the clear plastic solarization to work well in this coastal area with few sunny days in the summer. The paper mulch was hard to lay and did not hold up long enough. The black plastic mulch has some potential, but it would have to

stay in place for much longer to be effective, maybe through two summers.

A year later, we gave this method one more chance in a site adjacent to the 2009 herbicide study. In this case, we limited the treatments and the replications. For 2009, we had three treatments; a solarization treatment with one layer of 1 mm clear plastic, a double layer of the same plastic, and a black mulch layer. The double layer has layers separated by wooden stakes to create an air gap that insulates the plastic on the soil and increases heating.

This study had only one replicate of each treatment, but they were larger than in 2008. Early observations appeared encouraging, but by April 2010 all treatments had been punctured by pepperweed shoots and did not seem to provide any control of the weed.

### Conclusions

Although mulch treatments can effectively control certain invasive plant species, pepperweed does not appear to be controllable by mulch treatments. Even after brush cutting, the abundant carbohydrates stored by the large root mass of the pepperweed produced vigorously regenerating vegetation that easily

lifted the mulches. The results may have been more effective if the plants had been brush cut to ground level prior to the mulch application. These results are consistent with previous experiments attempting to control perennial pepperweed culturally and manually.

The herbicide treatments were more successful at slowing down the growth of the pepperweed; however second year monitoring indicates that full regrowth of pepperweed had occurred. Follow-up treatments are required on pepperweed to insure long term control. Future experimentation could incorporate utilizing herbicide and mulching treatments together.

### Acknowledgments

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Contact the author at [cebell@ucdavis.edu](mailto:cebell@ucdavis.edu) or learn more at <http://groups.ucanr.org/socalinvasives/>

*Editor's Note: This year's Symposium included a discussion group on management of perennial pepperweed, including a treatment decision tool developed by the San Francisco National Estuarine Research Reserve. Notes from the group are posted on our Symposium Archive page.*

### ...Scotch broom from page 1

Due to limited accessibility, utilizing a rock scaling crew is the most feasible treatment method. The largest plants had 6" diameter trunks, were cut with hand saws and rolled down the slope for loading. Under the direction of the USFS no herbicide was used to treat the cut stumps. The 7 person crew removed 1000 linear feet of 10 year old Scotch broom in two days. Effective control will require many years of follow-up treatment and monitoring.

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Special thanks to The Nature Conservancy for their assistance and generosity in making the Santa Cruz Island field trip possible.

## New Members

As a Cal-IPC Member, you join a powerful network of land managers, researchers, volunteers, and concerned citizens. Welcome!

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Former board members Wendy West and Bobbi Simpson enjoy the social hour with Gina Darin, one of Cal-IPC's stellar volunteers and raffle ticket sellers.



and Game, San Diego), **Adrienne Mages** (Santa Cruz), **John Malpas** (California Database, Sebastopol), **Rudy Martel** (Ventura Agricultural Commissioner's Office, Santa Paula), **Robert Mayberry** (DeAngelo Brothers, Inc., Ontario), **David Mazurkiewicz** (Montrose Settlements Restoration Program, NPS, Ventura), **Shaun McCoshum** (Catalina Island Conservancy, Avalon), **Kathryn McEachern** (USGS Channel Islands, Ventura), **Randall McInvale** (Dudek, Valencia), **Yvonne Menard** (Channel Island NP, Ventura), **Anna Mico-Quinn** (Australian Native Plants Nursery, Ventura), **Holden Mills, Scott Morrison** (The Nature Conservancy, San Francisco), **Elise Morrison** (Benicia), **David Moverly** (Auckland, Australia), **Michelle Murphy** (UC Riverside), **Debra Nelson** (Lytle Creek), **Gerry Nunez** (LAX, Los Angeles), **Joseph Oliver** (San Bernardino Co. Regional Parks, Redlands), **Bruce Orr** (Stillwater Sciences, Berkeley), **Devyn Orr** (Marine Reserach Institute, UC Santa Barbara), **Maeghan Owen** (Santa Barbara), **Aaron Peters** (Yosemite NP, El Portal), **Randy Philips** (Thousand Oaks), **Derek Poultney** (Ventura Hillside Conservancy), **Zachary Principe** (The Nature Conservancy, Fallbrook), **Howard Putnam** (Los Angeles World Airports), **Joyce Quinn** (Fresno), **Stephanie Ranes** (Santa Barbara), **Bryson Ribeiro** (UCCE, Tulare), **Noa Rische** (CA State Parks, Natural Resource Management, Long Beach), **Patrick Rizzo** (NPS, Sequoia NP, Point Reyes Station), **James Roberts** (Channel Islands NP, Ventura), **Aviva Rossi** (Bay Area Early Detection Network, San Anselmo), **Cris**

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Cal-IPC's first annual board-sponsored poker tournament fundraiser provided post-banquet entertainment.

Francisco), **David Varner** (San Diego), **Cedrick Villasenor** (Ojai), **Kimiora Ward** (Davis), **Anne Wells** (Goleta), **Christine Whitcraft** (CSU Long Beach), **Billy Williams** (Wildscape Restoration, Ventura), **Christina Williams** (Atascadero), **Christopher Wilson** (Santa Lucia Conservancy, Carmel), **Gloria Woehler** (Los Angeles), **Julie Wynia** (BLM, El Dorado Hills), **Christie Youngs, Jerry Zatorski** (Inyo Co. Water Dept., Independence)

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### 2011 Field Course Schedule

February - San Diego

- Mapping
- Control Methods

March - San Luis Obispo

- Biology and ID
- Control Methods

May - Redding

- Biology and ID
- Control Methods

June - San Francisco

- Strategic Approaches
- Control Methods



# Readings & Resources

Know of a resource that should be shared here? Send it to [edbrusati@cal-ipc.org](mailto:edbrusati@cal-ipc.org).

## Invasive Species in Mexico

The national invasive species strategy for Mexico is now available online. An English translation of the major sections is available on page 93; the full report will be available in English soon. [www.conabio.gob.mx/invasoras/index.php/Portada](http://www.conabio.gob.mx/invasoras/index.php/Portada)

## Phone in Your Weeds

The Bay Area Early Detection Network and Calflora have developed a smartphone application for entering invasive plant observations into Calflora's database. Currently designed for Android phones,

it will soon be available for iPhone. An instructional video shows how it works. (Search for "weed mapping" on YouTube.) [www.youtube.com/watch?v=il4QImnkRwg](http://www.youtube.com/watch?v=il4QImnkRwg)

## Climate Change and Management

The California Dept. of Fish and Game sponsored a workshop to bring together climate modelers and land managers to discuss management actions in the face of climate change. A recording of all presentations is available online. [www.dfg.ca.gov/climatechangel/downscaling-workshop/](http://www.dfg.ca.gov/climatechangel/downscaling-workshop/)

## Training Biologists

"Assessment of Botanical Capacity in the United States" from Botanical Gardens Conservation International provides a detailed and compelling account of the need to train plant scientists/botanists and other organismal biologists to ad-

dress the complex issues associated with climate change. It points out serious gaps in undergraduate and graduate training of professional and academic organismal biologists. [www.bgci.org/usa/bcap](http://www.bgci.org/usa/bcap)

## Climate Change and National Forests

The USDA Forest Service has released the "National Roadmap for Responding to Climate Change" and "A Performance Scorecard for Implementing the Forest Service Climate Change Strategy" in response to the USDA's 2010-2015 Strategic Plan that sets a goal of ensuring that our national forests are made more resilient to climate change. This includes targeted monitoring and continued management of insects, pathogens, and invasive species that threaten the health and resilience of ecosystems. [www.fs.fed.us/climatechange/pdf/roadmap.pdf](http://www.fs.fed.us/climatechange/pdf/roadmap.pdf)

# Legislature establishes California Native Plant Week

In September 2010, the California State Assembly and Senate approved Resolution ACR 173 (Evans) establishing an annual California Native Plant Week, beginning April 17-23, 2011. This resolution was sponsored by the California Native Plant Society, and garnered the support of conservation organizations and horticulturalists throughout the state. The following statements are excerpted from the resolution:

Whereas, California's over 6,000 native plant species, subspecies, and varieties, of which over 2,150 exist only in California, make California home to more diverse plant life than all other states combined; and

Whereas, California's native plants include some of the oldest, tallest, and most massive living things on Earth; and

Whereas, California currently contends with over 1,000 nonnative plants, some of which compete with native plant species, degrade soil, facilitate erosion and catastrophic wildfire, and alter the state's natural landscapes; and

Whereas, California's first Indian nations lived and thrived by their knowledge of native California plants, which provided them with food, clothing, shelter, dyes, tools, medicine, and fuel for centuries; and



Whereas, California's citizens have consistently supported efforts to protect our wild landscapes, spurring a conservation and environmental awareness that helps define California today; and

Whereas, Restoring California native plants provides natural links to wild land areas, while introducing people to their beauty and instilling a greater understanding and appreciation for California's natural heritage; now, therefore, be it

Resolved by the Assembly of the State of California, the Senate thereof concurring, That the Legislature recognizes the essential value and importance of California native plants to our history, economy, landscape and environment; and be it further

Resolved, That the California Legislature encourages community groups, schools and citizens to undertake appropriate activities to promote native plant conservation and a restoration, and to inform their neighbors and communities of the values of native plants in nature and in horticultural settings; and be it further

Resolved, That the California Legislature hereby declares the third week of April, each year, as California Native Plant Week. [www.cnps.org/cnps/conservation/nativeplantweek/](http://www.cnps.org/cnps/conservation/nativeplantweek/)



# THE WILDLAND WEED CALENDAR

## January & February

### 2011 USDA Interagency Research Forum on Invasive Species

January 11-14, 2011

Annapolis, MD

[www.nrs.fs.fed.us/disturbancel/invasive\\_species/interagency\\_forum/](http://www.nrs.fs.fed.us/disturbancel/invasive_species/interagency_forum/)

### 63<sup>rd</sup> California Weed Science Society Conf.

January 19-21, 2011

Monterey

[www.cwss.org](http://www.cwss.org)

### Weed Science Society of America Annual Meeting

February 7-10, 2011

Portland, OR

[www.wssa.net](http://www.wssa.net)

### 2011 Tamarisk Research Conference

February 16-17, 2011

Tuscon, AZ

[www.tamariskcoalition.org/2011ResearchConference.html](http://www.tamariskcoalition.org/2011ResearchConference.html)

## March & April

### National Invasive Species Awareness Week

February 28 - March 4, 2011

Washington, DC

[www.sercal.org](http://www.sercal.org)

### Western Society of Weed Science Meeting

March 7-10, 2011

Spokane, WA

[www.wsweedscience.org](http://www.wsweedscience.org)

### Invasive Spartina Forum

March 10-11, 2011

Oakland

[HybridForum@spartina.org](mailto:HybridForum@spartina.org)

### Invasive Weed Awareness Day at the Capitol

March 16, 2011

Sacramento

[www.cal-ipc.org](http://www.cal-ipc.org)

### Western Aquatic Plant Mgmt Society Mtg

March 28-31, 2011

Denver, CO

[www.wapms.org](http://www.wapms.org)

### Noxious Weed Short Course, WSWS

April 18-21, 2011

Loveland, CO

[www.wsweedscience.org](http://www.wsweedscience.org)

## May & beyond

### SERCAL's 18th Annual Conference

May 10-12

San Diego

[www.nisaw.org](http://www.nisaw.org)

### Ecological Society of America

August 7-12, 2011

Austin, TX

[www.esa.org/austin](http://www.esa.org/austin)

### SER Int'l Congress on Ecological Restoration

August 21-25, 2011

Merida, Yucatan, Mexico

[www.ser2011.org](http://www.ser2011.org)

### Cal-IPC's 20th Annual Symposium

October 4-7, 2011

Granlibakken, Tahoe City

[www.cal-ipc.org](http://www.cal-ipc.org)

## ...Capweeds from page 9

collect and press samples of naturalized capweeds for identification, and if possible note the vegetation type, frequency of individual plants, presence of seedlings and whether mature seeds are produced in the population. Accumulating data on the distribution, frequency, fertility, and ecology of naturalized capweeds will enable a revised assessment of their invasiveness by Cal-IPC.

For more information on where to look for capweeds and how to collect specimens, contact Robert McKenzie at [r.mckenzie@ru.ac.za](mailto:r.mckenzie@ru.ac.za) or Alison Mahoney at [alison.mahoney@mnsu.edu](mailto:alison.mahoney@mnsu.edu).

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## Quotable

**“The plant to inspire and sustain the southern culture’s love of race cars”**

~ discussing how Kudzu root can be used to produce ethanol fuel. Timothy Lee Scott, *Invasive Plant Medicine: The Ecological Benefits and Healing Abilities of Invasives*. (Healing Arts Press, 2010)

**“It’s a scary time to be a weed”**

~ describing the effectiveness of volunteer-lead invasive plant control projects throughout the country. Anne Marie Chaker, *The Wall Street Journal*, September 29, 2010



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