



Cal-IPC News

Protecting California's Natural Areas from Wildland Weeds

Quarterly Newsletter of the California Invasive Plant Council



Planting a Native Understory

*In California's Central Valley, River Partners has been working to control invasive plants during restoration projects along the Sacramento River by establishing dense layers of native perennials, like the gumplant (*Grindelia camporum*) shown above. Learn more about their techniques on page 8.*

Photo: River Partners

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Cal-IPC

1442-A Walnut Street, #462
Berkeley, CA 94709
ph (510) 843-3902 fax (510) 217-3500
www.cal-ipc.org info@cal-ipc.org

A California 501 (c)3 nonprofit organization

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

STAFF

Doug Johnson, Executive Director
Elizabeth Brusati, Science Program Manager
Alice Chung, Training Program Specialist
Heather DeQuincy, Outreach Program Manager
Ginny King, Program Assistant
Agustin Luna, Business Manager
Bertha McKinley, Program Assistant
Dana Morawitz, Mapping Program Manager
Cynthia Powell, Mapping & Modeling Specialist
Falk Schuetzenmeister, Mapping & Modeling Specialist

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Dan Knapp
Los Angeles Conservation Corps
Chris McDonald
UC Cooperative Extension
Peter Schuyler
Ecological Consultant
Andrea Williams
Marin Municipal Water District

STUDENT LIAISONS

Chelsea Carey
UC Merced
Kai Palenscar
UC Riverside

Affiliations for identification purposes only.

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Editors: Doug Johnson, Elizabeth Brusati, Heather DeQuincy

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From the Director's Desk

Herbicides and butterflies

A recent article in *Science Daily* reported on a university study, concluding that “three commonly used herbicides can dramatically reduce butterfly populations.” An article in the *San Francisco Chronicle* ran under the headline “Weed killers may spell the end for butterfly” and claimed that herbicides “commonly used to control invasive plants in the Bay Area also kill off butterflies.”

This is important news. It relates directly to an issue we covered in our last issue, the protection of the endangered Lange's metalmark butterfly, endemic to Antioch Dunes Wildlife Refuge on the shore of San Francisco Bay. The butterfly's host plant is being crowded out by invasive plants like winter vetch.

The articles remind us that habitat restoration requires difficult tactical choices, each of which can have undesirable consequences. As the article on page 4 by the California Department of Fish and Game's Joel Trumbo points out, there are actions natural resource managers can take to reduce the risk of such consequences.

The *Chronicle* article also reminds us that journalistic interpretations of scientific studies commonly oversimplify the conclusions actually supported by the studies' findings. In this case, the researchers used herbicide formulations that are not likely to be selected for uses in sensitive butterfly habitat, and they applied herbicide directly to the larval butterflies and their host plant, which would be avoided in a well-planned restoration effort. Nor does the study distinguish whether impact to the butterflies resulted from herbicide contact with the larval butterflies, ingestion of the herbicide, or herbicide damage to the host plant.

Herbicides can be one of the best low-impact tools in the restoration toolbox. But they need to be used wisely. Those working to steward wildlife habitat by removing invasive plants are of course concerned about the potential wildlife impacts of any tools they use. Beyond following the legal requirements of herbicide labels, there may be additional practices that can be employed by natural resource managers to further reduce potential for herbicide impact on wildlife.

That is why we are undertaking a project that will identify innovative practices developed by longtime natural resource managers to reduce impact on wildlife. The project will also engage an expert toxicologist to review common restoration uses of herbicides to make recommendations for reducing potential wildlife impact. We intend to publish the results in a “best management practices” manual which will share the information widely within the restoration field. It continues to be our goal to ensure that the latest available science on herbicide impacts be integrated into on-the-ground management decisions in California wildlands.



Day at the Capitol attendees successfully visited all 120 legislators this year.

Wildland Weed News

Even Antarctica is not safe from invasive plants. A recent article in the Proceedings of the National Academy of Sciences says that ecotourists and scientists have accidentally transported seeds and other material from thousands of plant species to the bottom of the world. Warming temperatures increase the possibility that these plants will be able to establish populations. During the 2007-08 summer season, about 33,000 tourists and 7,000 scientists (including support personnel) landed in Antarctica, bringing an estimated 70,000 seeds on their clothing and other possessions. (*Los Angeles Times*, March 6, 2012), www.latimes.com/news/science/la-sci-antarctica-invasive-plants-20120306,0,4163406.story

Screening horticultural plants for their potential invasiveness may become even more important as climate change drives consumers towards purchasing more drought-tolerant species. A team of researchers believes that more horticultural species will be imported to the U.S. from warmer regions such as the Middle East and Africa. The researchers recommend that the USDA quickly adopt the nursery stock screening procedures that have already been proposed. (*Frontiers in Ecology and Environment* 10: 20–28) www.physorg.com/news/2012-01-ecologists-screening-imported-invasive-species.html

In a strange example of interspecies interactions, an invasive plant in Australia appears to protect lizards

from an invasive toad. Cane toads are an ecological nightmare in Australia, where they were introduced to control beetles. Instead, they poison native Australian species that eat toads, including the bluetongue lizard. Meanwhile, the invasive plant mother-of-millions, also eaten by bluetongues, produces a toxin similar to the toads'. Bluetongue populations in areas with mother-of-millions infestations have evolved to tolerate the toxin. These populations are not in the same areas as cane toads, but experiments showed that these lizards can also tolerate cane toad toxins. Researchers say it's a hopeful sign that bluetongues can adapt to the presence of cane toads. (*American Naturalist*, March 2012). www.eurekalert.org

Cal-IPC Updates

New BMP Manual released

Please see page 5 for a rundown on *Preventing the Spread of Invasive Plants: Best Management Practices for Transportation and Utility Corridors*.

Day at the Capitol

Forty natural resource managers visited Sacramento on March 14 to advocate for invasive plant management funding and legislation. AB 1251 will provide authority to control South American spongeplant in the Delta. Cal-IPC board members visited agency executives, and

proposed that a definition of invasive species be added to the Public Resources code to enable stronger programs within the Natural Resources Agency.

Staff changes

With the end of our ARRA grant, we bid farewell to Training Program Manager Jen Stern, Training Specialist Arpita Sinha and Mapping Specialist Tony Morosco. We appreciate all their contributions during their time at Cal-IPC, and wish them well in future endeavors!

Call for board nominations

Cal-IPC's Board of Directors is accepting nominations for new board members

through July 1. Terms are two years, beginning Jan. 1, 2013. The board meets four times each year throughout the state, and requires a commitment to fundraising, working on a committee, and organizing the Symposium. Direct nominations and questions to board@cal-ipc.org.

Call for student liaison nominations

The student chapter is accepting nominations for liaisons to the Cal-IPC board. Liaisons attend board meetings in their part of the state and help Cal-IPC serve students. Send nominations to students@cal-ipc.org.

Help Cal-IPC Find a New Kind of Board Member

Julie Horenstein

Board Development Committee

It probably comes as no shock that the Cal-IPC Board of Directors has not typically included people from the world of large-scale corporate management, finance, or public relations. But these people may be increasingly important for meeting Cal-IPC's goals.

Although Cal-IPC is quite successful at obtaining government and foundation grants, these grants typically only fund specific projects, and Cal-IPC struggles to cover administrative costs and activities such as advocacy to support funding for wildland weed management. Donations, however, are typically unrestricted and can be used to cover the gaps left by project-based grants. Cal-IPC needs to cultivate larger donors to effectively pursue its mission of protecting wildlands from the

negative effects of invasive plants.

This summer the board will be working with a consultant on our branding and outreach to potential donors. It will be helpful to consider representation from the corporate world on our board. If you know someone with background in corporate management, finance, law or public relations who might be interested in providing their perspective to the Cal-IPC board, please contact us at board@cal-ipc.org. Thank you!

The butterfly effect

by Joel Trumbo, Staff Environmental Scientist, Lands Program,
Wildlife Branch, California Dept. of Fish and Game

Two recently published articles provide a thought-provoking example of how an invasive weed management tool might be the best...or the worst... method for protecting an imperiled wildlife species. The Winter 2012 edition of *Cal-IPC News* includes an article on how invasive weeds are threatening the habitat of several species, including the endangered Lange's metalmark butterfly (*Apodemia mormo langei*). The imperiled butterfly is found almost entirely at the Antioch Dunes National Wildlife Refuge in California's East Bay region.

The article points out how uncontrolled invasions of winter vetch (*Vicia villosa*), yellow starthistle (*Centaurea solstitialis*), and ripgut brome (*Bromus diandrus*) have affected the butterfly by out-competing its preferred host, the naked stem buckwheat (*Eriogonum nudum psychicola*). The article mentions how refuge staff and volunteers have used an integrated approach, which includes herbicide applications, to control the weeds.

About the same time the Cal-IPC article came out, a study was published by John D. Stark of Washington State University, Puyallup, on the effects of three herbicide products: Garlon® 4 (triclopyr ester), Stalker® (imazapyr) and Poast® (sethoxydim) on Behr's metalmark butterfly (*Apodemia virgulti*). Stark used *A. virgulti* as a surrogate species for the endangered *A. mormo langei*. Stark's paper found a statistically significant decline in adult emergence after the larvae were directly exposed to herbicide sprays and to herbicide residues in their food.

Stark's study brings up several important points. First, we need to be cautious about assuming that the herbicides we use are safe for wildlife. While it's true that the scientific literature generally supports the idea that herbicides pose low risks to non-plant

species like mammals, birds and fish, the truth is there aren't many studies about herbicide toxicity to other groups like reptiles, amphibians and invertebrates. In fact, when it comes to invertebrates, the U.S. EPA requires only one toxicity study for registration, an acute contact honeybee test.

The lack of invertebrate toxicity data begs the question: are honeybees a suitable surrogate for assessing herbicide risks to other invertebrates? Put in the context of managing for Lange's metalmark butterfly, could the managers at Antioch Dunes assure themselves of the safety of their herbicide tools by taking a quick look at bee toxicity data? A review of the available data for the three herbicides is less than convincing. Two studies for sethoxydim, the active ingredient in Poast®, do not indicate any significant toxicological impact on bees. The U.S. EPA reported that its one honeybee study for triclopyr ester, the active ingredient in Garlon® 4, was similarly without impact. Finally, as for the third herbicide in Stark's study, imazapyr, data from the U.S. EPA suggests that the herbicide poses no significant toxicological risk to honeybees. In fact, the U.S. EPA goes on to suggest that, based on the numbers, honeybees may be no more sensitive to imazapyr than are vertebrates.

Would other species be appropriate surrogates to assess herbicide toxicity? The available mammal and bird data reveal that all three active ingredients are in the U.S. EPA's practically non-toxic to slightly toxic ranges. The vertebrate toxicity data for the formulated products appears similar to the risk posed by the active



The endangered Lange's metalmark butterfly

(*Apodemia mormo langei*) is threatened by invasive plants, but a recent study indicates that herbicides used to control the plants could also harm the butterfly. Potential impacts can be reduced by selecting the safest herbicide, avoiding application to the butterfly host plant, and planning application timing to avoid sensitive life stages. Photo: Eric Palm, USFWS

ingredients. This result occurs in spite of the presence of inert ingredients that are sometimes more toxic than the herbicides themselves.

The fish toxicity data, however, is a bit more interesting, especially if you look at the formulated products as opposed to the active ingredients alone. According to the available data, Garlon® 4, Poast® and Stalker® pose greater risks to fish than to other tested species, including honeybees. When it comes to fish toxicity, the U.S. EPA considers 96-h LC50 values lower than 1 part per million (ppm) to be highly toxic. Poast®'s fish toxicity is roughly between 1 and 3 ppm and Garlon® 4 is even more toxic with values between 0.25 and 1.5. While no fish data is available for Stalker, a 2009 study by the California Department of Fish and Game revealed the product to be "slightly toxic" to tadpoles (96-h LC50 ≈ 15 ppm). While not completely defensible scientifically, at least with these three formulated products, it appears fish toxicity could be useful as a surrogate predictor for impacts to butterflies.

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“An ounce of prevention”

“An ounce of prevention is worth a pound of cure.” This philosophy is as important in wildland stewardship as it is in health care. Preventing the introduction of invasive plants is more cost-effective than managing infestations already established.

Throughout the last year, Cal-IPC and partners have focused efforts on creating prevention resources to reduce the spread of invasive plants in California. This has resulted in a new BMP Prevention Manual, a list of weed-free forage and straw providers, and a guide to weed-free aggregate.

BMP Prevention Manual

Cal-IPC's newest publication, *Preventing the Spread of Invasive Plants: Best Management Practices for Transportation and Utility Corridors*, presents voluntary guidelines to help those managing transportation and utility corridors in California prevent the accidental introduction and spread of terrestrial invasive plants.

Cal-IPC developed this new prevention manual in partnership with a technical advisory team of transportation and utility corridor management experts from across the state. The manual provides essential guidelines for integrating prevention Best Management Practices (BMPs) into transportation and utility corridor planning, routine maintenance, project construction, revegetation and landscaping activities.

Transportation and utility corridors, strips of land upon which pipelines, roads, and power or communication lines are built and maintained, are high-risk sites for the introduction and spread of invasive plants. These corridors provide opportunities for the movement of invasive plants, as seeds and other propagules can be transported by vehicles throughout the corridors. Construction and maintenance activities can introduce or spread invasive plants through project materials and ground disturbance. The

corridors may even cross geographic barriers that previously limited the spread of invasive plants.

However, transportation and utility corridor managers can greatly reduce the introduction and spread of invasive plants by adopting prevention practices such as cleaning equipment and using weed-free materials. Prevention BMPs that minimize invasive plant spread in transportation and utility corridors can also:

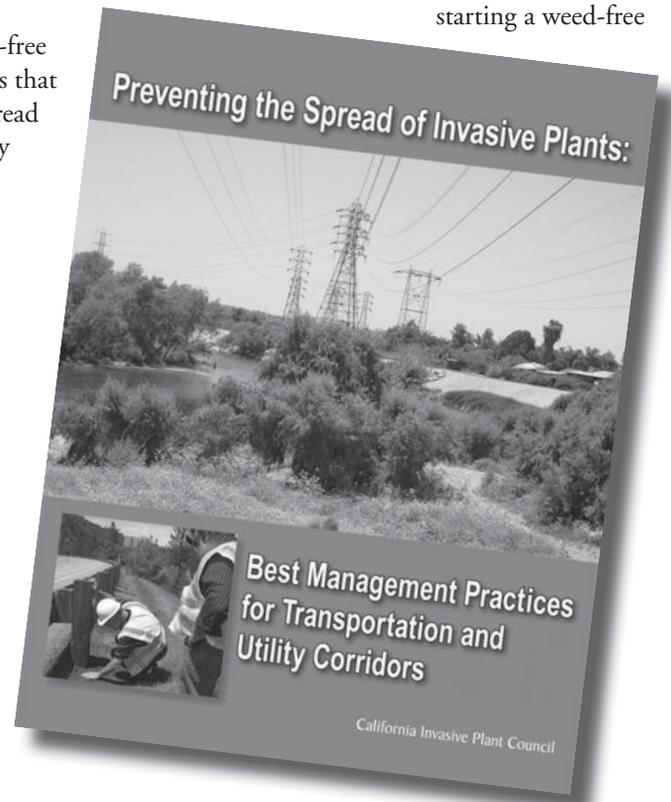
- Reduce future maintenance needs and cost
- Reduce fire hazards
- Reduce herbicide use
- Enhance visibility, access and safety
- Limit liability for the governing agency or lessee
- Maintain good public relations
- Protect wildlife habitat, native plant populations, and beneficial insects, as well as threatened and endangered species.

Weed-Free Forage Suppliers

UC Cooperative Extension, in conjunction with the California Department of Food and Agriculture (CDFA) and County Agriculture Commissioners throughout the state, has created a list of Certified Weed-Free Forage and Straw. Weed-Free Forage is defined as hay, feed, or straw mulch that has been inspected, and certified not to contain propagative plant parts or seeds of noxious weeds (as defined by CDFA, not Cal-IPC's Inventory). Available resources on Cal-IPC's website include: CDFA's weed-free forage inspection procedures, a contact list for County Agricultural Commissioners offering inspections, and the list of certified weed-free forage suppliers in California.

Weed-Free Aggregate

Aggregate, such as sand and gravel, can also be a vector for the spread of invasive plants. The National Park Service has just completed a new guide for aggregate users, *Weed Free Aggregate for Land Managers*, which provides guidance for starting a weed-free



aggregate inspection program. For example, Garrett Dickman, a biologist at Yosemite National Park, inspects local gravel pits and works to create and implement weed management plans at aggregate production facilities, with the goal of ensuring weed-free aggregate for their construction and road projects.

Cal-IPC's prevention webpage at www.cal-ipc.org/ip/prevention includes the new BMP Prevention Manual for Transportation and Utility Corridors and resources for weed-free materials.

The BMP Manual was funded through the American Recovery and Reinvestment Act, with funding provided by the USDA Forest Service, State and Private Forestry, through the California Department of Food and Agriculture.

“The torch has been passed”

An interview with Nelroy Jackson

by Gina Darin, California Department of Water Resources

With a background in agriculture, Nelroy Jackson dealt with weed control in sugarcane at GuySuCo, a sugar company in Guyana on the northern coast of South America, then in California crops while working for Monsanto® in product development. Living in California, Nelroy gained interest in habitat restoration, especially as it relates to forestry rangeland and wildfires. His introduction to environmental weeds came while using Roundup® to create mosaics of understory vegetation to reduce fire hazards.

Nelroy considers himself a hybrid. He had to learn “how to work for a chemical company and still be sensitive to environmental health.” Because of his interests, Nelroy was invited to give a talk on herbicides at the first CalEPPC symposium in Morro Bay. The event was unique in that it started a dialogue among people from different backgrounds - weed scientists and ecologists.

Hopes in starting CalEPPC

Nelroy hoped that CalEPPC would continue to encourage dialogue among weed scientists and ecologists. He aimed to take the conversation beyond absolutist positions for or against herbicides and biocontrol. He advocated for tolerance and respect for opinions. In those early meetings, everyone learned from each other. “We became a very congenial board. Meetings were long, but never acrimonious.” The weed scientists and ecologists ended up being friends.

Another goal Nelroy had was for CalEPPC to become an advocacy organization, which has been successful, especially considering most scientists are not trained in advocacy and many advocates are not trained in science.

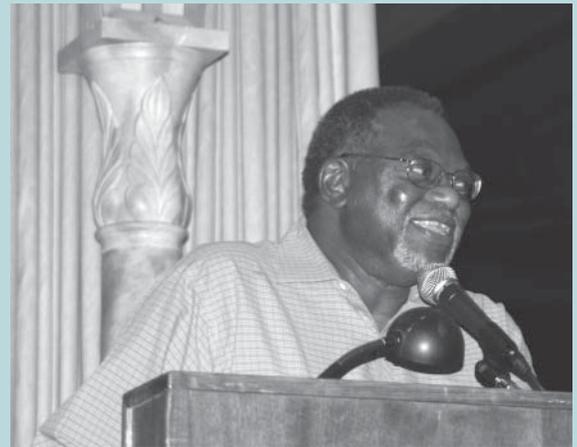
Advocacy

California Invasive Weeds Awareness Day at the Capitol started because of

the National Invasive Weeds Awareness Coalition (IWAC) and National Invasive Weeds Awareness Week (NIWAW). IWAC wanted to foster advocacy and activities at the state level, so California NGOs formed the California Invasive Weeds Awareness Coalition (CALIWAC) as an umbrella organization to bring individual groups together to focus on the state legislature. They decided to create what became “Day at the Capitol”. They had support from a range of groups, such as Farm Bureau, the Cattlemen’s Association, and the county Agricultural Commissioners.

Cal-IPC has also sent teams to National Invasive Weeds Awareness Week in Washington, D.C. In 2006, Nelroy accepted an award recognizing CALIWAC’s work in raising awareness and public education related to invasive plant management in the nation’s most populous state. Nelroy was also given the Lifetime Achievement Award, where it was declared that “getting people together is Nelroy’s specialty.”

California differs from other states in that the Agriculture Department enforces laws and regulations, while the Natural Resources Agency has land and



“Do the doable!” Nelroy Jackson receiving Cal-IPC’s award for vision and dedicated service at the 2007 Symposium. Photo: Bob Case.

regulations on water, and Caltrans has jurisdiction over roads. In other states, these departments are often in the same agency. Here NGOs like Cal-IPC need to work with all three agencies to get invasive plant management implemented. State employees can educate, but cannot lobby legislators.

Nelroy and Bob Pickard, Supervisor in Mariposa County, were the key CALIWAC members with advocacy experience in the beginning. The rest of the team, including Cal-IPC’s Executive Director Doug Johnson, learned on the job. The reason CALIWAC has been a successful advocacy group is because many individuals contribute from different perspectives. “Relationships and mutual respect make this team work.”

Nelroy got several Cal-IPC people interested in NIWAW – Doug Johnson, Bob Pickard, Jake Sigg (CNPS), John Randall (The Nature Conservancy).

Cal-IPC has had relatively large delegations to NIWAW for a number of years – “it was a good time to visit some of the key California representatives in an efficient manner, and we had some new folks like Elizabeth Brusati and Gina Darin who did excellent organizational work.” Team CALIWAC built relationships with staff for both Senators Feinstein and



Wendy West, Nelroy Jackson, and Jake Sigg represented California at the National Invasive Weeds Awareness Week in Washington D.C., 2003.

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Stinkwort: history, research, and management

by Rachel Brownsey, Guy Kyser, and Joseph DiTomaso, UC Davis Weed Science

Dittrichia graveolens (L.) Grueter (stinkwort) is an annual composite, native to the Mediterranean region, that has spread rapidly in California over the past two decades (Figure 1). A nondescript, foul smelling plant, stinkwort initially went unnoticed by all but the most discerning botanists and weed managers. An early article in *Madroño* helped raise awareness (Preston 1997), but stinkwort has continued to spread mostly undetected until recent years.

Seeds disperse effectively along transportation corridors and establish well in disturbed areas. This plant is now widespread in the San Francisco Bay Area and is expanding its range in all directions. Collections have been made in most Central Valley counties, along the coast north and south of the Bay Area, and in the Sierra Nevada foothills. There are also expanding populations in the San Diego area, thought to be from a separate introduction.

Stinkwort tolerates a range of soil conditions, temperatures, and precipitation regimes. Tolerance and

possible hyper accumulation of heavy metals, mercury, zinc, and copper, at abandoned mine sites in Europe (Higuera et al. 2003, Shallari et al. 1998) demonstrate a potential to invade areas with unique soils. Stinkwort flourishes both in areas with very dry conditions, and along the margin of wetlands. Presently, invaded areas include gravel mines, roadsides, heavily grazed rangeland, and vineyard edges. Plants have also been observed in both natural and constructed wetlands, and on riparian floodplains.

Potential environmental and economic impacts of expanding populations in the state are not well understood. Negative impacts documented in the scientific literature include livestock mortality due to puncturing of internal organs



Dittrichia graveolens rosettes on a roadside in Davis, CA.

and to the lack of published information on stinkwort.

Management of stinkwort populations has been challenging. If management activities do not take place before plants begin to produce seeds in the fall, there is a risk that these activities will help to disperse seeds rather than effectively controlling the population. Additionally, mowing on roadsides and other areas for fuels reduction in late spring potentially favors stinkwort by removing competing annuals while stinkwort is still small. A more thorough understanding of stinkwort biology and life cycle is needed to develop effective management strategies.

Recent research

Over the past year and a half, we have established several field, greenhouse, and laboratory experiments at UC Davis. Our goal is to investigate the environmental characteristics that facilitate or limit establishment, growth, and reproduction of stinkwort, and to characterize its life cycle and unique life history traits. What we learn about this plant will help us (1) to predict which ecosystems may be at risk of invasion, and (2) to develop effective management tools. A summary of the methods and early

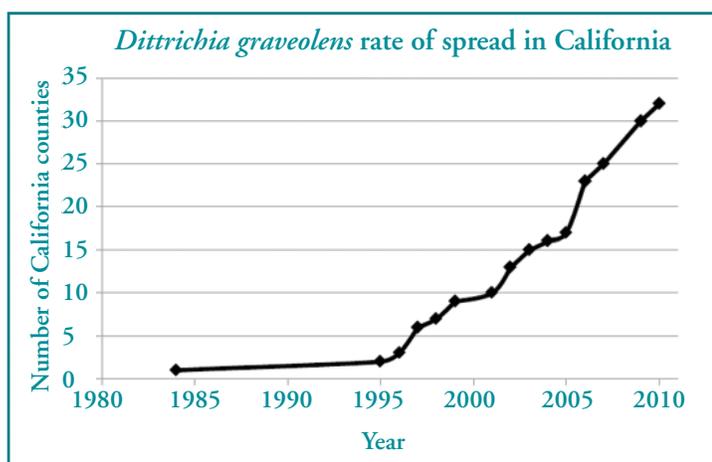


Figure 1. The approximate rate of spread represented by the number of California counties where plant collections have been made between 1984 and 2010 (California Consortium of Herbaria 2012).

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Native understory controls weeds

by Heyo Tjarks, River Partners, Chico, California

Due to the construction of dams and levees throughout the Central Valley for agriculture and urban development, current ecological conditions on most of its floodplains do not favor the establishment of native woody or herbaceous species. Dams and levees have altered the natural hydrology (e.g. flood frequency, duration and amplitude) and geomorphology (e.g. sediment transport, bank erosion, and river meander) to which native riparian vegetation is adapted and reliant upon for reproduction and successful establishment.

Because of these alterations, native vegetation is often outcompeted by aggressive weeds. Over the past few decades, restoration projects on the Sacramento River have established approximately 8,000 acres of riparian forests with native woody species. However the herbaceous understory is frequently dominated by annual grasses or other weeds including yellow starthistle (*Centaurea solstitialis*) or milk thistle (*Silybum marianum*).

Within the last decade, River Partners has strived to increase the overall biodiversity and habitat structure for the benefit of wildlife within our restorations. Our goal is to design native plant associations that will develop into sustainable communities through ecological succession under the current and projected future conditions. One of our major advances toward this goal has been achieved through an

aggressive approach of understory weed management and the establishment of an herbaceous layer consisting of native perennials.



Remnant vegetation and restoration sites at the San Joaquin River National Wildlife Refuge.

Through experimentation, River Partners has successfully germinated and established several native herbaceous species in the field, including mugwort (*Artemisia douglasiana*), gumplant (*Grindelia camporum*), telegraph weed (*Heterotheca grandiflora*), evening primrose (*Oenothera hookeri*), western goldenrod (*Euthamia occidentalis*), creeping wild rye (*Leymus triticoides*), and blue wild rye (*Elymus glaucus*), to name a few. We use an approach which combines modern agricultural equipment and techniques, up-to-date horticultural knowledge, and adaptive management practices. With this combination, we are able to; (1) design, plant, and establish large acreages (up to 800 acres at a time) with multiple native understory species, (2) effectively control non-native invasive weeds throughout

the project sites, and (3) create beneficial wildlife habitat.

Before creating a field design, River Partners biologists conduct an evaluation to assess the site conditions. These include soil types, topography, depth to water table, current vegetation, historical vegetation, and inundation intervals. Once these variables are understood, it is possible to select a suite of species which are capable of self-sustaining growth within those site conditions. In addition, species are chosen and arranged based on their benefits to wildlife as well as their ability to compete against non-native and invasive species. Once a suite of

species is chosen, River Partners collects and processes native seed from remnant vegetation within the project area or as close to the site as possible in order to ensure the genetic adaptation of the local ecotype.

Next, we design the field layout. Design considerations include matching species' growth requirements to the microsite conditions across the project area and arranging species within this framework to produce habitat structure and food sources required by local wildlife species. Finally, the project area can be prepared for planting using modern farming techniques including discing, ripping, floating, pulling planting berms, and installing irrigation. Typically, a project's life is three years, in which the

site can be prepared, planted, maintained, and established as a self-sustaining community.

For example, on the San Joaquin River National Wildlife Refuge (SJRNWR) we are installing woody trees and shrubs along the planting berms during the first year of the project, followed by aggressive weed control during the first two growing seasons. Our weed control approach involves flood irrigating the aisle-ways between planting berms in order to promote the germination and growth of non-native and invasive species in the seed bed. Then aisle-ways are disced or sprayed with herbicide in order to exterminate the weeds before they set seed.

Hand labor using backpack herbicide sprayers removes weeds along the planting rows where discing or broad herbicide application would damage the planted native woody species. This process is repeated multiple times throughout the first two growing seasons in order to exhaust the existing seedbed. Ultimately, this sterile seedbed approach reduces competition for native grasses and forbs that are broadcast or drill seeded at the end of the second growing season.

After seeding native grasses or forbs, the understory is actively managed during the third and final year via irrigation, mowing, and herbicide applications. Adaptive management strategies and



“Pulling” planting berms on a restoration project to prepare for the planting of woody trees and shrubs during the first year of the project.

timing are critical at this stage. For example, it may be necessary to mow the aisle-ways if significant weed pressure still exists. If so, it is important to mow before the weeds become so tall that mowing creates a large amount of mulch that will smother any smaller, native species. Additionally, it is equally important to cut the weeds low enough to reduce the competition for sunlight with the native species. Thus, choosing the optimal timing and blade-height is key to a successful mowing regime.

to add diversity and structure to the restoration, while also allowing the use of selective herbicides to combat weeds.

This approach has resulted in a dense cover of native herbs, with 65% and 71% absolute cover of native herbaceous species and less than 4% absolute cover of weeds on two fields surveyed in 2010. These results are typical of many of our projects in this region and more recent projects implemented on the Sacramento River.

This method of understory establishment has been employed by River Partners since 2004. Since then, we have restored approximately 1,700 acres of riparian habitat on the SJRNWR alone. This approach has not only been successful at combating non-native invasive weeds, but the planted understories have also been resilient to disturbances including fires and long-duration flood events. Lastly, the method has created beneficial wildlife habitat. Over the past decade, River Partners has documented several threatened and endangered species utilizing and breeding in our restoration projects, including least Bell’s vireo, western yellow billed cuckoo, valley elderberry longhorn beetle, and the riparian brush rabbit.

In order to facilitate the use of herbicides for weed control, River Partners separates the aisle-ways into native grass mixes and forb mixes. By planting an alternating pattern of forbs and grasses, it is possible

Heyo Tjarks can be contacted at htjarks@riverpartners.org.



An endangered Least Bell’s vireo nest in a San Joaquin River National Wildlife Refuge restoration site (2006).

Cal-IPC's 21st Annual Symposium

Bay to Basin: Coordinating Response to Invasive Plants across California

October 10 - 13, 2012

Wine Country Doubletree, Rohnert Park

Join us in Sonoma County, within easy reach of the bay, ocean, Central Valley (and, of course, great wine). Sonoma County is known for its rustic surroundings amidst the backdrop of stately redwoods, rolling oak savannah, and magnificent grasslands.

Join more than 300 natural resource managers, researchers, students, and restoration volunteers from throughout the state to learn about and discuss the latest in control techniques, research results, while networking and mingling during the awards banquet, social hour and raffle, field course and field trips.

Including these sessions:

- 🍷 Working across Landscapes
- 🍷 Working across Taxa
- 🍷 Working across Time

Presentations
Discussion Groups
Awards Banquet
Exhibitors
Posters
Photo Contest
Raffle & Auction



Discussion groups provide attendees the opportunity to interact with experts while learning about special topics.



During the poster session attendees can interact with enthusiastic researchers, students, and land managers presenting specific research.

Field Course
Wed. Oct 10th

Symposium
Thu. & Fri. Oct 11th & 12th

Field Trips
Sat. Oct 13th



Field Course:

Wednesday, October 10th we will host a field course which will include a hands on section, similar to our Habitat Restoration Workdays. Attendees will leave with both new information and innovative skills. Register with the Symposium and receive a discount!



2011 Golden Weed Wrench Award Winner Sue Donaldson at last year's Symposium.



The social hour is a great time to visit with colleagues, mentors, and new friends while bidding on great raffle and silent auction items.



Discussion Groups:

These groups allow attendees to talk with each other and experts on topics of particular interest. 2012 topics include funding, protecting pollinators, prevention, *Dittrichia graveolens* and careers.



Field Trips:

Saturday, October 13th half-day and full-day field trips provide attendees the opportunity to see weed management projects in the field. Locations include Mt. Tamalpais and the Centennial of Marin Municipal Water Districts, native grasslands and restoration and trip highlighting local projects. (This year we probably won't have to worry about snow!)



Networking:

Mingle and network throughout the symposium breaks, meals and social hour. The symposium is a great time to renew your enthusiasm for natural resource management.



Continuing Education Units:

Every year Cal-IPC applies for continuing education units (CEUs) from the California Department of Pesticide Regulation and the Nevada Department of Agriculture. We anticipate that we will be successful again this year and will post the available hours on our website once they are confirmed.

... See next page
More at www.cal-ipc.org

More on the Symposium. . .

Registration, Transportation, Lodging

Registration opens in June! Register online for faster processing and choose from several payment options. Registration includes meals, lodging, and 2013 Cal-IPC membership.

Rates: Regular: \$315 (\$345 after Sept. 7, \$385 on-site)
Student: \$100 (\$130 after Sept. 7, \$170 on-site)
Symposium Volunteer: \$210 (spaces fill early)
Restoration Volunteer: \$210 (before Sept. 7 only)
Field Course: \$155 (\$175 without Symposium)

Getting There: Rohnert Park is located in Sonoma County, one hour north of San Francisco and Oakland, two hours north of San Jose, and one hour forty-five minutes west of Sacramento. The Sonoma County Airport Express offers transportation from the San Francisco International Airport and the Oakland International Airport for \$34/person each way, no advance notice required. Information at www.cal-ipc.org/symposia/attendees.php

Lodging: The Wine Country Doubletree offers single or double occupancy rooms for a negotiated discounted rate of \$84/night. Attendees receive complimentary WiFi in every room and free parking. Reserve your room through our website by Sept. 7 to receive the discounted group rates.

Sponsorship Opportunities

Sponsoring the Symposium is a great way for your organization to reach California's natural resource managers while supporting the event. Five levels of sponsorship offer benefits including free registration, exhibit space, and recognition in Symposium materials. Information at www.cal-ipc.org/symposia/sponsorship.php



2011 field trip participants visit Grover Hot Springs State Park to discuss eradication projects.

Call for Papers & Posters: Due June 15

Abstracts are due Friday, June 15. Submit abstracts for oral papers (20 min.) or posters using the information at www.cal-ipc.org/symposia/presenters.php. We especially encourage submissions that address working across landscapes, taxa, and time, or that emphasize how your project can provide lessons to others. For more info contact Elizabeth Brusati, edbrusati@cal-ipc.org.

Student Contest

Students are invited to enter our fifth annual Student Paper and Poster Contest. First place in each category receives \$250. First, second, and third places will be recognized at the Symposium and in *Cal-IPC News*. www.cal-ipc.org.

Award Nominations: due July 9

The Symposium is an opportunity to honor individuals and organizations who have made exceptional contributions to invasive plant research or management. We welcome nominations for: the Jake Sigg Award for Vision and Service; the Golden Weed Wrench Award for Land Manager of the Year; the Ryan Jones Catalyst Award; the Invasive Plants Policy Award; and the Organization of the Year Award. Send nominations to awards@cal-ipc.org. See past honorees at www.cal-ipc.org/symposia/awards.php.

Photo Contest: Due September 7

Show off your photographic talents in the annual Cal-IPC Photo Contest! Photos will be displayed at the Symposium and attendees will choose Best in Show. Entries can include specimen photos of individual plants, landscape photos, or action photos of weed workers. We especially encourage photos that illustrate the impacts of weeds. Send entries to photos@cal-ipc.org.

Auction and Raffle

The Symposium is not just about learning the newest research results and management techniques; it's also about having fun with fellow weed workers! Our Wednesday night happy hour includes a raffle with a variety of great prizes: tools, trips, wine, books, artwork, clothing, and more. The banquet later in the evening features a live auction of a few special items. Come mingle with like-minded folks from around the state and recharge your batteries. Contact raffle@cal-ipc.org if you have a special item to contribute!

Jepson Manual 2nd ed. invasive plant name changes

by Elizabeth Brusati, Cal-IPC Science Program Manager

Botanists across California eagerly awaited the release of the revised *Jepson Manual: Higher Plants of California* in January. Thanks to new research on plant taxonomy, many familiar species have new names. Some are even in new families. Approximately 10% of the species in the Cal-IPC Inventory have new names, which we will be incorporating into our materials. Below is a description of the changes. First, however, is a refresher course on the Inventory itself.

The Inventory

The Cal-IPC Inventory is the basis for everything we do. The Cal-IPC Inventory uses a set of 13 questions to assess whether a plant should be listed as “invasive”. We define invasive plants as those that “1) are not native to, yet can spread into, wildland ecosystems, and that also 2) displace native species, hybridize with native species, alter biological communities, or alter ecosystem processes.” Several thousand naturalized plants grow in California but few have impacts that justify adding them to the inventory. The criteria system was developed in conjunction with the Southwestern Vegetation Management Association in Arizona and the University of Nevada Cooperative Extension. Our goal was to create a transparent system that clearly documents why a species is listed, and to develop a procedure that could be adapted to different states or geographic scales.

To add a species, Cal-IPC staff or a knowledgeable volunteer fills out a Plant Assessment Form that lists a score, description, and documentation for each question. A committee of invasive plant experts reviews species for their final scores, which then determine the rating of High, Moderate, or Limited. The Inventory adds an “Alert” designation for species with high or moderate impacts that so far have a limited distribution in

Name changes for the Cal-IPC Inventory from the new Jepson Manual		
Jepson Manual 1993	Common Name	Jepson Manual 2012
<i>Arctotheca calendula</i> (fertile)	fertile capeweed	<i>A. calendula</i>
<i>Arctotheca calendula</i> (infertile)	sterile capeweed	<i>A. prostrata</i>
<i>Cardaria chalepensis</i>	lens-podded white-top	<i>Lepidium chalepense</i>
<i>Cardaria draba</i>	hoary cress	<i>Lepidium draba</i>
<i>Cardaria pubescens</i>	hairy whitetop	<i>Lepidium appelianum</i>
<i>Centaurea debeauxii</i>	meadow knapweed	<i>C. jacea</i> notho subsp. <i>pratensis</i>
<i>Centaurea maculosa</i>	spotted knapweed	<i>C. stoebe</i> subsp. <i>micranthos</i>
<i>Chrysanthemum coronarium</i>	crown daisy	<i>Glebionis coronaria</i>
<i>Danthonia pilosa</i>	hairy oat grass	<i>Rytidosperma pencillatum</i>
<i>Erechtites minima</i>	Australian fireweed	<i>Senecio minimus</i>
<i>Erechtites glomerata</i>	cutleaf burnweed	<i>Senecio glomeratus</i>
<i>Euphorbia esula</i>	leafy spurge	<i>E. virgata</i>
<i>Linaria genistifolia</i> subsp. <i>dalmatica</i>	Dalmatian toadflax	<i>L. dalmatica</i> subsp. <i>dalmatica</i>
<i>Lolium multiflorum</i>	Italian ryegrass	<i>Festuca perennis</i>
<i>Nassella manicata</i>	tropical needlegrass	<i>Stipa manicata</i>
<i>Picris echioides</i>	bristly oxtongue	<i>Helminthotheca echioides</i>
<i>Piptatherum miliaceum</i>	smilgrass	<i>Stipa miliacea</i> var. <i>miliacea</i>
<i>Polygonum cuspidatum</i>	Japanese knotweed	<i>Fallopia japonica</i>
<i>Polygonum sachalinense</i>	giant knotweed	<i>Fallopia sachalinensis</i>
<i>Retama monosperma</i>	bridal broom	<i>Genista monosperma</i>
<i>Sapium sebiferum</i>	Chinese tallowtree	<i>Triadica sebifera</i>
<i>Taeniatherum caput-medusae</i>	medusahead	<i>Elymus caput-medusae</i>
<i>Vulpia myuros</i>	rattail fescue	<i>Festuca myuros</i>

California but the potential to spread widely. Earlier versions of the Inventory, published in 1994, 1996, and 1999, were less transparent because they did not use a criteria system and did not document why each species was listed.

Most of the current Inventory species date to the last major update in 2006. Additional species have been added since then, including eight in 2011 (*Cal-IPC News*, Fall 2011). Species are added when Cal-IPC members provide information that allow evaluation, but Cal-IPC does not currently have a dedicated funding source for the Inventory.

The Inventory does not cover plants that are just beginning to become invasive or species that are a problem in a very limited area. Last year, we created the Cal-IPC Watchlist (available at www.cal-ipc.org/ip/inventory/weedlist.php) to compile information on new plants of concern. If you have a species you are worried about, please send information to Elizabeth Brusati, edbrusati@cal-ipc.org. Another way to tell your fellow weed workers about a new plant or to find more information is the CalWeedTalk listserv. Anyone on the list can post to it; to join send a blank email to

...continued page 17

...Dittrichia from page 7

results of these studies can be found in the 2011 Cal-IPC Proceedings (www.cal-ipc.org/symposia/archive/index.php). In our second year of research, we have established additional experiments to investigate (1) the potential for stinkwort invasion in grasslands using a comparative study of root growth observed with a minirhizotron system (a specialized camera that is inserted into an underground transparent plastic tube at a 45° angle), and (2) an estimate of population growth rate.

Life cycle

The stinkwort life cycle is rather unusual, as all stages following germination occur much later in the season than from most annuals (Figure 2). Aside from tarweeds, there are few comparable species in the native California flora. However, weedy taxa such as *Salsola* spp. (saltwort), *Conyza* spp. (horseweed or fleabane), and to some degree *Centaurea solstitialis* (yellow starthistle) have similar life history strategies.

Seeds are capable of germination at nearly any time of year, but under natural conditions, they tend to germinate throughout winter and early spring following precipitation. In the Central Valley, germination is not limited by soil

majority of above-ground growth occurs between June and September, with the largest increase in canopy volume between August and September. Flowering and seed production occur continuously from September to December.

Discussion and management

Seed viability for mature, filled seeds is high during natural dispersal in the field, around 90% on average. Seed germination in the lab, under optimal conditions for temperature and moisture, is also around 90%, and this rate is observed for a wide range of constant temperatures from 12-34°C (54-93°F). These results indicate that primary dormancy is very unlikely. Additionally, the high germination rate combined with the small seed size suggests a short seed life. This has important consequences for management of stinkwort populations, because it implies that successful control efforts that prevent seed production for one to two years have potential to greatly reduce the population size.



Dittrichia graveolens (stinkwort) at UC Davis Weed Day 2011 with Rachel Brownsey.

establishing on riparian floodplains could potentially spread to adjacent riparian forest ecosystems. The results suggest that stinkwort, like yellow starthistle, will not be competitive in understory communities of woodland and forest ecosystems due to limited growth in reduced light conditions.

Life Stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Germination	Germination										Germination	
Growth			Rosette			Moderated Growth		Exponential canopy growth				
Reproduction									Flowering			
									Seed Production			
Dispersal									Dispersal			

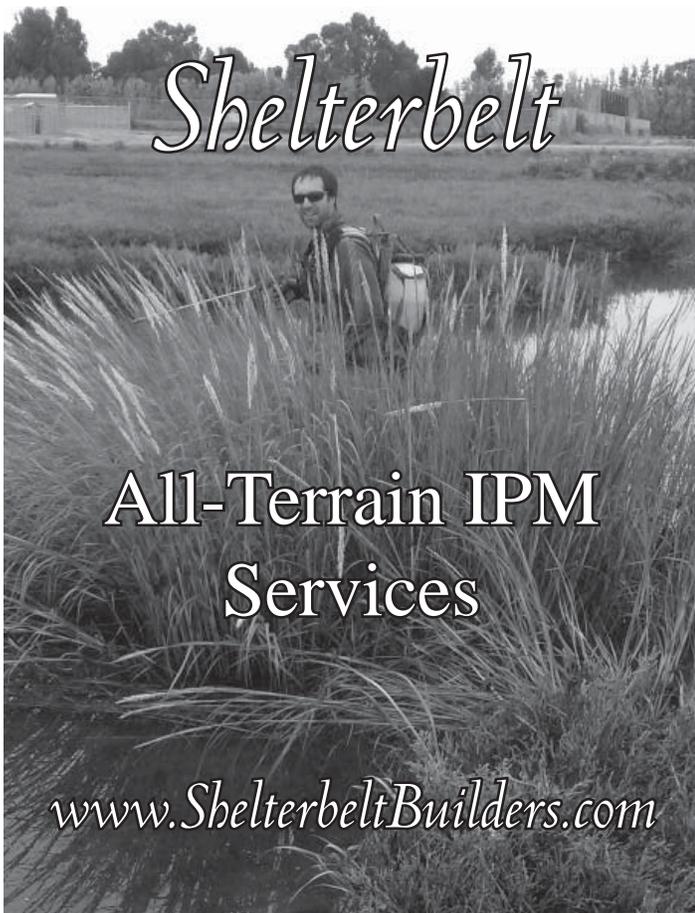
Figure 2. *Dittrichia graveolens* life cycle based on field experiments in Davis, California.

temperature or low light conditions but rather by soil moisture. This is also likely to be true in coastal California and other areas of the state with moderate winter temperatures. Following germination, plants remain as small rosettes until mid-May when they begin to bolt. The

In a shade study conducted in the greenhouse we observed significant reductions in above- and below-ground growth of stinkwort under increasingly shaded conditions (50%, 27%, and 9% of ambient light). This study was designed to address concerns that stinkwort plants

watering and moderate temperatures of 29°C (85°F) day and 18°C (65°F) night, while plants in the field received no supplemental water. All field and greenhouse plants initiated flowering during the first two weeks of September.

...continued page 17



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*Layia
chrysanthemoides*



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Cal-IPC's Habitat Restoration Workdays

Gain hands-on field experience controlling invasive plants at Cal-IPC's Habitat Restoration Workdays. Discuss the theory behind various invasive plant control techniques and practice these techniques under expert guidance. These are half-day events that are designed to be learning and volunteer opportunities.



Tarpping to control purple velvet grass (*Holcus lanatus*) during a Habitat Restoration Workday in the Presidio, San Francisco.

2012 Schedule

- Sat. June 2, Davis, Yolo County
Mechanical Control Tools for *Arundo donax* and *Tamarisk*
- Sat. July 14, Malibu, Los Angeles County
Residential Riparian and Upland Habitat Restoration
- Fri. August 24, Arcata, Humboldt County
Early Detection Mapping in Dunes Habitat
- Sat. September 29, Felton, Santa Cruz County
Woody Plant Control Tools at Old Quarry Site
- Sat. October 20, Chico, Butte County
Manual Invasive Tree Removal Methods
- Sat. October 27, Tiburon/Corte Madera, Marin County
Mapping Methods for New Invaders
- Sat. December 8, Big Sur, Monterey County
Control Methods for Cape Ivy and Periwinkle

Register and find more information at: cal-ipc.org/fieldcourses

...Nelroy Jackson from page 6

Boxer, as well as several representatives (including Speaker Pelosi).

Nelroy shared advice for how local weed workers can get elected officials more interested in invasive plants as an issue. "Foot work – write letters to the editor of local newspapers, visit the offices of elected officials and educate them." Nelroy recommended networking with local organizations like RCDs, Caltrans Supervisors and Landscape Architects, and working with established organizations like Cal-IPC, SERCAL, and CNGA on their advocacy efforts.

Cal-IPC's success shows other states that persons outside of NAWMA and state departments of agriculture or natural resources could be effective in seeking

funds and legislation. Cal-IPC's increased role in policy is a logical progression of the early board's previous work. For example, Doug's position on CISAC gives him a megaphone for his message to the Agriculture, Caltrans, and Natural Resources agencies. Nelroy believes that advocacy should remain an important part of Cal-IPC's agenda.

The Future

Nelroy would like to see Cal-IPC stay focused on the most important issues and products – training new people, maintaining the weed list, and fundraising. Nelroy advocates for doing the doable, and doing it now. "Studying invasive plants is good, but doing something about it is better." Habitat restoration is the goal, and we will succeed as we prevent new weed infestations

and continue to form interagency partnerships.

The original board members have moved on, and it's important to fill those shoes. "We need to cultivate young leaders." Nelroy remembers J.P. Marie attending the Invasive Plant School that he and Carl Bell put on in Lake County in early 2000s, and subsequently J.P. became a Cal-IPC Board member.

Nelroy told me how heartwarming it was to see so many young people at the last few symposia he attended – "we can't leave a better legacy than that." Ideas live on as the next generation is inspired, and Cal-IPC is a terrific model for a sustainable society. As he let out a chuckle, Nelroy said "I'm proud to be in an organization without too much grey hair!"

Thank You for Supporting our Work!

Recent Donors

Thank you! Your tax-deductible donations are extremely valuable in supporting our programs.

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Andrea Williams (Richmond)

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Doug Gibson (Encinitas)
Sue Hubbard (Salinas)
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New Members

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

Monica Arancibia (Cal. State Univ. San Marcos, Encinitas), **Rose Banks** (Bishop), **Ezekiel Bean** (City of Santa Cruz - Water Depart.), **Robert Berner** (Marin Agricultural Land Trust, Point Reyes Station), **Catherine Caldwell** (DWR - Delta Ecosystem Enhancement, Sacramento), **Adam Cline** (Yocha Dehe Farm & Ranch, Brooks), **Susan Cohen** (Martinez), **Robyn Coole** (Oceanside), **Ernestina Diaz** (Sweetwater Authority, Spring Valley), **Tiffany Edwards** (Duke University), **Jennifer Egawa** (Caltrans, Berkeley), **Scott Gallic** (RECON Environmental, San Diego), **Wayne Gilfillan** (East Bay Regional Park District, Castro Valley), **David Greenberger** (Santa Cruz Sentinel), **Mahala Guggino** (ESA, Lotus), **Nancy Hartwick** (Piedras

Blancas Lightstation, Morro Bay), **Chris Hoffman** (Carson City), **Sabrina Hopton** (McKinleyville), **Libby Ingalls** (San Francisco), **Shelley Lawrence** (ECO Club, CSUSM, Vista), **Glen Lewis** (Muir Heritage Land Trust, Martinez), **Monique Looney** (East Bay Regional Park District, Antioch), **Robinson Ngo** (Hercules), **Jonathan Pilch** (Watsonville Wetlands Watch), **Lawrence Ray** (Scotts Valley Band of Pomo Indians, Lakeport), **Daydre Roser** (Calif. Dept. of Fish and Game, Elk Grove), **Cathi Schrader** (County of Orange - OC Parks), **Cindy Sherwood** (Cazadero), **Thomas Smith** (Calif. Dept. of Forestry and Fire Protection, Sacramento), **Linda Stamer** (USFS Big Bear Ranger Station, Fawnskin), **Katrina Maria Steinhauer** (Sanger), **Joanne Taylor** (Orange County Parks), **Lauren Velasco** (UC Riverside), **Annie Walker** (Placerville), **Kim Wehinger** (City of San Diego), **John Willoughby** (Placerville), **Steve Windhager** (Santa Barbara Botanic Garden)

New Organizational Members

Organizational Members advance Cal-IPC's mission to protect California's wildlands from invasive plants.

Sweetwater Authority
The Santa Barbara Botanic Garden

...*Dittrichia* from page 14

We therefore concluded that photoperiod is the likely signal for initiation of reproductive growth, rather than drought stress or temperature changes. This is good news for planning management activities, as we can expect flowering to begin every year in early September under a range of weather conditions. This will allow managers to adjust their approach and control methods accordingly.

The ongoing research is building our understanding of the basic life cycle and biology of stinkwort, allowing us to make predictions of invasion potential that will help prioritize management activities. This information also lays a foundation

for future investigation of specific management methods. If we expect to stop or slow the spread of this plant in the state we need effective management tools and an informed management approach.

Resources

Consortium of California Herbaria. 2012. Specimen records for *Dittrichia graveolens*. Data provided by the participants of the Consortium of California Herbaria (ucjeps.berkeley.edu/consortium/).

Higuera, P., R. Oyarzun, H. Biester, J. Lillo, and S. Lorenzo. 2003. A first insight into mercury distribution and speciation in soils from the Almadén mining district, Spain. *Journal of Geochemical Exploration* 80: 95-104

Philbry, A.W., and A.G. Morton. 2000.

Pyogranulomatous enteritis in sheep due to penetrating seed heads of *Dittrichia graveolens*. *Australian Veterinary Journal* 28:858-860.

Preston, R. 1997. *Dittrichia graveolens* (Asteraceae), new to the California weed flora. *Madroño* 44:200-203

Shallari, S., C. Schwartz, A. Hasko, and J.L. More. 1998. Heavy metals in soils and plants of serpentine and industrial sites of Albania. *The Science of the Total Environment* 209: 133-142.

Thong, H.Y., M. Yokota, D. Kardassakis, and H.I. Mailbach. 2008. Allergic contact dermatitis from *Dittrichia graveolens* (L.) Greuter (stinkwort). *Contact Dermatitis* 58:51-53

Rachel Brownsey can be contacted at rnbrownsey@ucdavis.edu.

...Jepson from page 13

californiaweedtalk-subscribe@topica.com.

The Inventory format may undergo revisions in the future. We now have better distribution information from our mapping project of the past two years, shown in CalWeedMapper (calweedmapper.calflora.org). We also have modeled the projected suitable range for some species to predict where they might be able to spread.

Changing Names

Cal-IPC's Inventory generally follows *Jepson Manual* nomenclature. We will be integrating the new names into our printed and online materials while still referencing the older names. Cal-IPC's online Plant Profiles (www.cal-ipc.org/ip/management/plant_profiles) and CalWeedMapper now list both the new and previous *Jepson Manual* nomenclature. The online Inventory database (www.cal-ipc.org/ip/inventory/weedlist.php) still uses the old names for now but new additions will use new names.

We do not have space to provide a detailed description as to why scientific names change. However, in brief, plants, like other organisms, were originally classified based on shared physical characteristics (i.e. they looked similar). Some have now been reclassified based on

DNA evidence. *The Jepson Manual* uses taxonomy based on monophyletic groups. This means that the species in a particular genus must be more closely related to each other than to species in any other genus. Some species have been lumped and some have been split. For example, *Cardaria draba* (hoary cress) has moved into the genus *Lepidium* to become *Lepidium draba*. Many families have been split.

Some name changes occur because two taxonomists gave the same species different names at different times. To make them consistent, the oldest name (the first one published academically) takes priority and supersedes the newer name. This is why the infertile (non-seed producing) form of *Arctotheca calendula* in California has now been recognized as *Arctotheca prostrata*. Some name changes correct misidentifications. *Euphorbia esula* (leafy spurge) in California and elsewhere in North America apparently is really *Euphorbia virgata*.

Here is an example of how confusing it can be to keep up with the changes: One of the species added to the Inventory in 2011 is Japanese or dwarf eelgrass, *Zostera japonica*. A relatively new invader to California, it was not included in the 1993 *Jepson Manual*. In the Inventory we initially listed it as *Nanozostera japonica* based on a new name in the USDA PLANTS database (plants.usda.gov).

However, the new *Jepson Manual* keeps it as *Zostera*. According to Dean Kelch at the California Department of Food and Agriculture Herbarium, "*Nanozostera*" is not widely accepted. We have decided to use *Zostera japonica* to be consistent with the new *Jepson Manual*.

The article by David Magney, cited below, provides a good description of why names change. Additional information came from the workshop "Phylogeny, Taxonomy, and Name Changes in the California Flora" at the Jepson Herbarium at UC Berkeley.

Resources

Cockrell, C. 2012. California native-plant classic gets a 21st-century makeover. UC Berkeley News Center. newscenter.berkeley.edu/2012/01/30/california-native-plant-classic-jepson-manual-revision/ [Accessed April 4, 2012]

Jepson Flora Project. 2012 (v. 1.0). Jepson eFlora. ucjeps.berkeley.edu/IJM.html. - This online resource parallels the printed *Jepson Manual*. It also provides a conversion list for plant names from the first to the second edition.

Magney, D. 2010. Why do those plant names keep changing? Make up your minds taxonomists! Channel Islands Chapter of the California Native Plant Society. www.cnpsci.org/html/PlantInfo/WhyPlantNamesChange.htm [Accessed March 1, 2012]

Readings & Resources

Know of a resource that should be shared here? Send it to edbrusati@cal-ipc.org.

Aquatic Plant Resources

A new blog from the Aquatic Plant Management Society collects aquatic plant management news from around the country. It will be updated weekly with articles on aquatic plant projects and issues. apms-blog.blogspot.com

Eye on Invasives

The California Department of Fish and Game offers a quarterly electronic newsletter describing invasive species work around the state. The Winter/Spring 2012 issue focused on invasive plants. To subscribe, email invasives@dfg.ca.gov with 'subscribe' in the subject line. www.dfg.ca.gov/invasives

State of the Estuary

Presentations from last fall's State of the San Francisco Estuary Conference are now available, including videos from plenary presentations on "The State of the Bay: 2011" and "Doing More with Less: Moving Toward Long-term Sustainable Use of Delta and Bay Water". www.sfestuary.org/soe2011

Buy It Where You Burn It

"Buy It Where You Burn It" is a campaign to prevent the spread of invasive species, mostly insects and diseases, through firewood. The California Firewood Task Force describes the problem and provides posters and videos on its website. There's even a fun game on the kids' page! www.firewood.ca.gov

Prescribed Burning

The Northern California Prescribed Fire Council is a venue for practitioners, state and federal agencies, academic institutions, tribes, coalitions, and interested

individuals to work collaboratively to promote, protect, conserve, and expand the responsible use of prescribed fire in Northern California's fire-adapted landscapes. norcalrxfirecouncil.org

Weed Diagnostics

The Center for Invasive Plant Management at Montana State University hosts a new Invasive Plant Diagnostics Listserv as a service to experts in weed detection and identification nationwide. Participants can request assistance in the identification of unknown invasive plant species and notify others of their findings. Contact Elizabeth Galli-Noble, elizabeth.gallinoble@montana.edu

Weed's News

The Weed's News is a free weekly digest of invasive plant news delivered via email. The website also contains Weed Risk Assessment and job ads for those of you looking to move to Australia. invasivespecies.org.au/traction

...Butterfly from page 4

In the absence of species-specific toxicity data for organisms like butterflies, a practical approach might be this: avoid using herbicides that have toxicity "red flags" for non-plant species like fish when there are sensitive invertebrates involved. At least two of the herbicides in Stark's study could be replaced with less toxic products that are based on the same active ingredient or parent molecule without sacrificing weed control efficacy. Garlon® 4 can be replaced with its low fish toxicity cousin, the triclopyr amine Garlon® 3A; and Stalker®, an emulsifiable concentrate, can be swapped with one of the aqueous imazapyr products that are practically non-toxic to fish (i.e. Habitat® or Polaris®). As for Poast®, its aquatic toxicity seems to be related to the inert ingredient, naphthalene, which comprises about 80% of the formulation. Unfortunately, there is not a sethoxydim product that doesn't contain naphthalene, but perhaps another grass-specific herbicide with low fish toxicity could be used, like the clethodim-containing product Envoy®.

Besides reducing risk by selecting less toxic herbicides, it's also possible to reduce

risk by reducing exposure. The first way to do this is to avoid direct application or significant drift to sensitive invertebrate host plants. For example, Stark's study involves the direct application of the

When it comes to invertebrates, the U.S. EPA requires only one toxicity study for registration [of herbicides], an acute contact honeybee test.

herbicide to the caterpillars and their food. This approach is reasonable if your goal is to access risk using a worst-case exposure scenario. But in reality, most herbicide applications would not involve spraying the host plants directly, if at all. (While direct applications of the grass-specific herbicide Poast® would probably be harmless to naked stem buckwheat, direct applications of Garlon® 4 or Stalker® would surely be fatal.) While this type of exposure reduction doesn't completely eliminate risk, it would likely increase the margin of safety considerably.

Another way to reduce exposure is to make herbicide applications when the most sensitive invertebrate life stage is not present. While an argument certainly can be made whether or not the larval life stage is more herbicide-sensitive than other life stages, there's little doubt that the caterpillars are getting the greatest feeding exposure. When it comes to Lange's metalmark butterfly, this time period would probably be between the September-October mating flights and larval hatching that occurs during the winter/spring. Combining this timing strategy with avoiding direct applications to host plants will significantly reduce herbicide exposure to feeding caterpillars.

Resources

Fimrite, P. 2012. Weed killers threaten Lange's metalmark butterfly. *San Francisco Chronicle*. April 2, 2012. Pg. C-1 Available: www.sfgate.com

Stark, J.D., X.D. Chen, C.S. Johnson. 2012. Effects of herbicides on Behr's metalmark butterfly, a surrogate species for the endangered butterfly, Lange's metalmark. *Environmental Pollution*. 164: 24-27. <http://dx.doi.org/10.1016/j.envpol.2012.01.011>

Joel Trumbo can be contacted at jtrumbo@dfg.ca.gov.

THE WILDLAND WEED CALENDAR

May - July

Cal-IPC Field Courses

June 5-7
Idyllwild, Riverside County
www.cal-ipc.org

Invasive Plant Ecology Short Course

June 26-28
North Platte, Nebraska
ipscourse.unl.edu

CNGA Grassland Ecology, Id & Monitoring

June 30
Mt. Tamalpais, Marin County
www.cnga.org

N.A. Congress for Conservation Biology

July 15-18
Oakland
www.scbnacongress.org

UC Davis Annual Weed Day

July 19
Davis
wric.ucdavis.edu

Aquatic Plant Management Society

July 22-25
Salt Lake City, Utah
www.apms.org

August - December

Ecological Society of America Annual Mtg

Aug 5-10
Portland, Oregon
www.esa.org/portland

Rangeland & Livestock Management

Aug 20-31
Swanton Pacific Ranch, Davenport
rrutherford@calpoly.edu

UC Davis Aquatic Weed School

Sept 5-6
Davis
wric.ucdavis.edu

Natural Areas Conference

October 9-12
Norfolk, Virginia
www.naturalarea.org/12conference

Cal-IPC's 21st Annual Symposium

October 10-13
Rohnert Park, Sonoma County
www.cal-ipc.org

North American Weed Mgmt. Assoc. Conf.

October 29-November 1
Branson, Missouri
www.nawma.org

Russian River Watershed Symposium

November 2
Cloverdale
rrsymposium@yahoo.com

Central California Invasive Weed Symp.

November 8
Felton, Santa Cruz County
symposium@yahoo.com

2013

USDA Forum on Invasive Species

January 10-13, 2013
Annapolis, Maryland
www.nrs.fs.fed.us/disturbance/invasive_species/interagency_forum/

California Weeds Science Society Conf.

January 23-25, 2013
Sacramento
www.cwss.org

Weed Science Society of America Meeting

February 4-7, 2013
Baltimore, Maryland
www.wssa.net

Quotable

“Our study identifies climate change as a risk [of increasing the likelihood of invasiveness], which combined with other factors is likely to increase demand for imported heat- and drought-tolerant plants, but this emerging threat is one that policy can effectively address.”

~ Bethany Bradley, ecologist at the University of Massachusetts Amherst. She continues, “The USDA has tools to reduce import risk and we advocate that now is the time put them in place. Pre-import screening has been tested in Australia for about 10 years now and it’s not foolproof, but it seems to have done a good job of separating the really bad import ideas from more benign introductions.” In “Ecologists call for screening imported plants to prevent a new wave of invasive species” www.physorg.com/news/2012-01-ecologists-screening-imported-invasive-species.html, January 4, 2012.



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