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*Protecting California's environment and
economy from invasive plants*

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Cal-IPC Dispatch

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FROM THE DIRECTOR'S DESK

COP 15 in Montreal

By Executive Director Doug Johnson

As I write this, countries from across the globe are sending representatives to Montreal to discuss the future of life on planet Earth. The representatives at COP 15, the 15th “convening of the parties” to discuss the UN’s Convention on Biological Diversity, will work to establish ambitious yet doable targets for saving as much of the life on Earth as possible. Stressors that need to be addressed include destruction of habitat, overharvesting, pollution, and, yes, invasive species.

The product of the meeting will be an updated roadmap with targeted goals. Target 6 of the draft roadmap is the key element for addressing invasive species. Earlier in the process, the text in this section included quantitative, time-specific goals for both (1) managing existing populations of high-priority invasive species and (2) reducing introductions of new invasive species. Before they were edited out, both goals were set at “50% by 2030.”

While these figures are arbitrary (and ambitious), I favor having such goals. In

California, such goals could be leveraged to drive much-needed investment and action. Other places may be less able to mobilize, but this could be mitigated through the flexibility in how each country defines which invasive species are considered “high-priority.”

Great work is already being done in California, such as efforts to control nutria, quagga/zebra mussels, water weeds like hydrilla, and tree pests like shot hole borers. But more needs to be done to address invasive species already impacting the state and to stop introductions of new invasive species. California’s 30x30 initiative would benefit from increased, more coordinated attention to invasive species. If the roadmap from COP 15 does not set quantitative goals, we in California may want to set our own goals. Perhaps we work with partners to commit to a 30% reduction in high-priority invasive species populations and new introductions by 2030 to form our own part of the state’s 30x30 initiative.

Constance Taylor joins the team!

Cal-IPC is excited to grow our team with the hiring of a new Conservation Specialist, Constance Taylor (she/they). Previously at the East Bay Regional Park District, Constance has an extensive background in interpretation and will be a big help as we strive to increase our workforce development efforts through training for conservation corps members. She will also help support several current projects compiling best practices for the use of herbicides in restoration work and add to our Symposium team. Constance has hit the ground running with grant proposals and partner coordination (not to mention sparking karaoke at our board retreat). She is committed to incorporating principles of justice,



Constance Taylor leads a Cal-IPC training. Photo: Claire F. Meyler.

equity, diversity, and inclusion into conservation and will add energy and ideas to our efforts. Join us in welcoming Constance!

Wildland Weed News

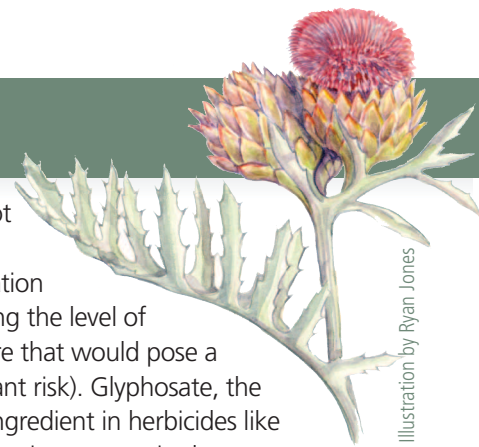


Illustration by Ryan Jones

CAL-IPC UPDATES

Symposium 2022 – Thanks to the 700+ participants who made our Nov. 1-3 online Symposium a memorable event! See details on page 9.

Oregon and CNPS presentations – Cal-IPC staff presented at the Oregon Noxious & Invasive Weed Symposium in December and the California Native Plant Society conference in October.

Trainings – Cal-IPC conducted 14 trainings for conservation corps in the San Francisco Bay Area in 2022, with wide-ranging content covering Plant ID, weed control, and other conservation topics.

WMA funding – We successfully advocated for \$10 million in renewed state funding to California Dept. of Food & Agriculture for grants to county Weed Management Areas. We are now pushing for a first round of grants to come out early in 2023 and rebuilding the program's infrastructure and oversight committee. This would allow WMAs to produce strategic plans and begin high-priority weed control projects this spring.

PlantRight and desert knapweed – Cal-IPC successfully advocated for \$10 million in state funds for the interagency Invasive Species Council of California (a.k.a. the ISCC, codified by a Cal-IPC-sponsored bill in 2018). On Nov. 29, the ISCC met, co-chaired by Secretary Karen Ross of CDFA and Wade Crowfoot of the California Natural Resources Agency. They approved funding priorities recommended by the 19-member California Invasive Species Advisory Committee, representing a range of stakeholder communities (including four Cal-IPC board members). Among the efforts funded are the Plant-Right project, coordinated by Plant Califor-

YOUR MEMBERSHIP

Thank you for keeping your membership current. Note that your expiration date is shown on the mailing label of this newsletter. Cal-IPC's success in meeting its mission depends on your vital support.

nia Alliance, and desert knapweed (*Voluntaria tubuliflora*) control in Borrego Springs, coordinated by the San Diego County Agricultural Commissioner's office. Other weed related efforts include continued control of *Caulerpa prolifera*, an aquatic alga in Newport Bay, and a statewide survey for aquatic invasive species.

OTHER NEWS

Calflora plant ranges – California's online database of plants has produced potential range maps for all 8,500 plants known to occur in the state, using existing locations to model conditions under which each plant grows.

Nature based solutions – The Biden-Harris Administration released a Nature Based Solutions Roadmap with five strategic areas for action, complemented by a national system of natural capital accounts, which will "place nature on the nation's balance sheet." This allows tracking of the economic benefits provided by investments in nature-based solutions.

Debunking – *The Debunking Handbook 2020*, written by a team of 22 prominent scholars of misinformation, represents the current consensus on the science of debunking for engaged individuals, policymakers, journalists, and other practitioners.

Collaborative Capacity – The California Landscape Stewardship Network has produced a thought-provoking report on "Increasing Collaborative Capacity and Infrastructure for Landscape Stewardship" available under resources at calandscapestewardshipnetwork.org.

Aquatics in commerce – A new effort is underway, funded by the US Dept. of the Interior, to address aquatic invasive species that are available through commerce. Find the action plan and toolkits for addressing the issue at aisincommerce.org.

Prop. 65 and glyphosate – California's Prop. 65 mandates that products found by the International Agency for Research on Cancer to have the ability to cause cancer must be labeled with a warning (but it

does not include information regarding the level of exposure that would pose a significant risk). Glyphosate, the active ingredient in herbicides like Roundup, is now required to carry a warning label in California. However, the US Environmental Protection Agency requires that label to include the following language: "US EPA has determined that glyphosate is not likely to be carcinogenic to humans; other authorities have made similar determinations."

Weeds and fire – The Northwest Fire Science Center and the Great Basin Fire Science Exchange have created an excellent flyer on "Weeds, Fire Risk, and Resilient Forest Landscapes" with information on ecological impacts and fire impacts of weeds, and ways to tackle the problem.

ON THE COVER

After extensive testing and regulatory approval, a new biological control agent has been introduced to California to help reduce populations of yellow starthistle: the rosette weevil (*Ceratapion basicorne*). In the cover photo, taken in March 2022, a scientist releases the rosette weevil in Monterey County. Learn more about this project on page 4. Photo credit: Lincoln Smith, USDA-ARS.



Newly released weevils will target yellow starthistle (*Centaurea solstitialis*) rosettes. Photo: Joseph DiTomaso

Releasing a new biological control agent for yellow starthistle

Lincoln Smith, USDA Agricultural Research Service, Albany, CA

A new biological control agent has been introduced to California to help reduce populations of yellow starthistle. After undergoing extensive testing and obtaining regulatory approval, the rosette weevil (*Ceratapion basicorne*), was imported from Greece and multiplied in a laboratory colony at the US Department of Agriculture laboratory in Albany, CA. It has now been released at three sites in California (in Solano, Monterey, and El Dorado counties), and scientists are monitoring how well it multiplies and spreads. It is hoped that the weevil, which develops inside the root of the immature rosette stage of the plant, will complement the previously released insect biological control agents, all of which attack the flower heads, and reduce yellow starthistle over wide areas.

Yellow starthistle (YST, *Centaurea solstitialis*, Asteraceae) is an annual forb that has invaded extensive areas of rangeland in the Pacific West since its unintentional introduction in the mid-1800s. The long spines on the flower heads deter grazing by most livestock, and the plants are toxic to horses. Yellow starthistle originates from the Mediterranean region, where it generally occurs in low densities and appears to be under natural control. Research to discover, evaluate and introduce classical biological control agents began in the 1960s. Prior to the rosette weevil, six species of insects and one rust fungus were evaluated, permitted and introduced. Of these, five insects became established, all of which attack flower heads and help reduce seed production. An accidentally introduced fly, the false peacock fly (*Chaetorellia succinea*), has also become established. Although the insects may attack as much as 90% of the flower heads in some years at some sites, the



Adult rosette weevil (*Ceratapion basicorne*). Credit: Lincoln Smith, USDA-ARS.

combined effect of these natural enemies does not appear to have significantly reduced YST over most of its range. Comparative life history studies of the plant in California and Turkey suggest that natural enemies that damage the rosettes may be most effective for reducing YST populations. The rosette weevil will hopefully fill this role.

The rosette weevil has one generation per year. Adults feed on rosette leaves

and lay eggs in the leaves in early spring. Larvae tunnel down the leaf midribs and petioles to the upper root where they do most of their feeding. Pupation occurs inside the host plant, and adults emerge in June, when plants are bolting. Newly emerged adults feed and mate, but females are in reproductive diapause and will not lay eggs until the following spring. It is not known where the adults overwinter, although specimens have



No-choice test of host plant specificity of rosette weevil. Credit: Lincoln Smith, USDA-ARS.

been collected on the bark of apricot and peach trees in late summer in eastern Turkey. It occurs from Spain to Armenia, and as far north as Germany (between 37° and 55° N latitude), so we expect it to become established throughout the range of yellow starthistle in the USA.

How safe is it?

In the field in Eurasia, the rosette weevil is known to develop only on yellow starthistle, bachelor's button/cornflower (*Centaurea cyanus*) and blessed thistle (*C. benedicta* [= *Cnicus benedictus*]). It has never been reported to be a pest of safflower, which is indigenous to the Mediterranean Region. Laboratory testing included no-choice experiments to eliminate nontarget plants that cannot possibly support the insect, followed up with choice tests to determine if the insect will voluntarily attack the plants that were attacked under no-choice conditions. We tested 51 nontarget plant species in no-choice laboratory trials, which indicated that there is no risk to plants outside the tribe *Cardueae* (thistles). Laboratory choice experiments indicated no risk to native North American thistles (*Cirsium* spp.), American saw-wort or American basket-flower. Field experiments conducted in eastern Turkey, France and Italy showed that the rosette weevil did not attack safflower. Bachelor's button, Malta starthistle and blessed thistle, which are all native to Eurasia, are the only nontarget species likely to be attacked by this weevil. While bachelor's button is a commercial ornamental, it is also considered to be invasive in some states.

A petition, which reviews everything known about the weevil and its potential impacts on humans and the environment, was submitted to USDA-APHIS and was favorably reviewed by the Technical Advisory Group (TAG) in 2006. The USFWS concurred with the Biological Assessment (BA), and an Environmental Assessment was published in the Federal Register in 2009 for public comment. APHIS signed a FONSI (finding of no significant impact) in August 2019. A permit to release in California was issued in November 2019, and the first release was made in March 2020 in Solano County.

How much impact will it have?

It is difficult to predict the efficacy of new biological control agents because it depends on many factors, such as the densities of insects (which depends on



Damage to a yellow starthistle root caused by rosette weevil larvae. Credit: Lincoln Smith, USDA-ARS.

suitability of the environment for the insects to multiply and survive, and negative effects of other predators and parasites that may attack the agent), the interaction of competing plants, and levels of precipitation and soil fertility. In greenhouse experiments using well-watered, fertilized potted plants, weevil infestation reduced plant size by 23%. The impact depends on the number of weevil larvae and plant size, and up to

seven larvae per root have been observed in Turkey. During initial experiments to develop a mass-rearing method, we unintentionally killed most of our plants by over-infesting them. So this might well occur in the field if the weevil population explodes. In a field study in Turkey, seed from plants naturally infested by the rosette weevil had 15% lower germination rate. Thus, we expect the weevil to reduce plant size and survival of immature plants, and possibly seed fertility. There should be no interference with other biological control agents that attack the flower heads. Scientists are currently monitoring the three initial release sites to see what happens.

We have been developing methods to rear the weevil and have provided weevils and training to scientists at California Dept. of Food and Agriculture, Colorado Dept. of Agriculture, the Nez Perce Biocontrol Center, and the University of Idaho so that they can multiply and distribute the weevil.

Protecting access to the full IPM toolbox

Doug Johnson, Executive Director, Cal-IPC

Cal-IPC works to support natural resource managers by providing training resources on integrated pest management (IPM). Recently, we have also been called upon to advocate for continued access to all tools in the IPM toolbox — in particular, herbicides.

The issue started a year ago, when the California Wildlife Conservation Board (WCB), one of the state's primary grantmaking entities for restoration projects, added newly appointed public members to its governing board. Some new board members have little experience with restoration practices. One has expressed their preference that WCB not fund any projects that use herbicides, especially glyphosate, which they believe is "today's DDT."



Ackerson Meadow, located in Yosemite National Park and the Stanislaus National Forest, is threatened by invasive velvet grass. Photo courtesy of Yosemite National Park.

At the board's regular quarterly meeting in August 2022, these concerns resulted in two restoration projects being pulled from the funding docket because they used herbicides. One was a 230-acre restoration project at Ackerson Meadow

(Continued on page 13)

Weed Alerts 2022

Jutta Burger, Cal-IPC, and Robert Price, CDFA



Clockwise from top left: *Phytolacca heterotepala* (Mike Perlmutter), *Phytolacca icosandra* (Ron Vanderhoff), *Osteospermum calendulaceum* (Ron Vanderhoff), *Impatiens glandulifera* (Andreas Rockstein via CC BY-SA 2.0), *Nymphoides peltata* (T. Fuller, CDFA), *Hypericum androsaemum* (Zoya Akulova).

Cal-IPC Weed Alerts are presented annually at our Symposium in partnership with the California Department of Food and Agriculture (CDFA). The series highlights species that have either been newly discovered in California or have been rapidly expanding. It spreads the word about new potential threats for land managers to note and prioritizes species for future evaluation from Cal-IPC and CDFA. This year, we are highlighting six species. One is a new North American record, three are species that are easily confused with look-alikes and therefore likely under-reported, and the rest have been in California for a while but appear to be increasing their range.

Weed Alerts for 2022:

(1) Mexican pokeweed (*Phytolacca*

heterotepala) is a large, tap-rooted perennial herb that is native to Mexico and similar to two other weedy, non-native pokeweeds that occur in California: tropical pokeweed (*P. icosandra*) and the more widely distributed American pokeweed (*Phytolacca americana*). Mexican pokeweed was nominated by Nancy Poss, San Mateo County Agricultural Commissioner's Office, who confirmed the identity of this first county record with CDFA. The species was first reported in San Francisco County in 1955 and Santa Barbara County in 1959. It has since spread to multiple counties in coastal, central, and southern California. Both Mexican and tropical pokeweeds have been cultivated as ornamentals in California, and the species have sometimes been confused. Mexican pokeweed can be distinguished by perianth parts

(petaloid "tepals") of two widths, with the narrow ones only half as wide as the broader ones, as well as by flower stalks (pedicels) that are significantly longer than those of tropical pokeweed. All pokeweed species are very fast-growing, can outcompete other vegetation, contain alkaloids, glycosides, and mitogens that are known to be toxic to mammals, and have fruits that are eaten and dispersed widely by birds. Mexican pokeweed has been given an "A" rating by CDFA and is pending evaluation by Cal-IPC.

(2) Tropical pokeweed (*P. icosandra*) is very similar in habit and appearance to Mexican pokeweed and is native from Mexico to South America. This species was nominated by Eric Wrubel, National Park Service (NPS) botanist. This species

was first reported in San Diego County in 1994 and has been observed this year escaping from a flower field onto NPS lands in San Mateo County at a site where it was initially misidentified as Mexican pokeweed. Tropical pokeweed has been recorded from seven counties to date, but may be under-reported due to misidentification. It has tepals that are all similarly sized and, in contrast to the other pokeweeds discussed here, has very short (≤ 2 mm) pedicels that give its inflorescences a spikelike appearance. Tropical pokeweed has provisionally been "Q" rated by CDFA and is pending evaluation by Cal-IPC.

(3) Stinking Roger (*Osteospermum calendulaceum*) is a low-growing, yellow-flowered annual herb in the sunflower family. It is native to the Cape region of South Africa and naturalized in parts of Australia and Hawaii in seasonally dry, open habitats. The first mainland U.S. record of this species was found by Ron Vanderhoff in Laguna Canyon, Orange County, in spring 2022. Plants can spread to about 0.6 m in diameter; leaves are narrow and entire, and both leaves and stems are sticky from glandular hairs and strongly aromatic. Flower heads are small and solitary, each containing 6-12 ray florets and a small number of disk florets. Plants in Orange County appear to be able to produce up to several hundred single-seeded achene fruits per plant. The fruits are of two forms: either long, thin, and unornamented, or thick-walled and conical with a cup-like tip, pitted, and ridged. Interestingly, plants from the Orange County population do not have winged extensions on the conical fruits that are typical of the fruits in their native range and where they are introduced in Australia. Although this species is listed as an environmental weed in Australia, its potential impacts in California are still largely unknown. Thanks to this early detection and the capacity of land managers to act on it, stinking Roger is now under active management by Laguna Canyon Foundation. It was recently "A" listed by CDFA and has

been added to Cal-IPC's priority list to evaluate.

(4) Himalayan balsam, or ornamental jewelweed (*Impatiens glandulifera*) is a fast-growing annual that grows in riparian habitats and is native to central Asia. It has been grown as an ornamental but has expanded explosively across Europe in many of the same habitats invaded by Japanese knotweed. In California, Himalayan balsam was first reported in Marin County in 1970 and still has a fairly limited distribution. However, iNaturalist observers over the last two years have recorded several new locations for the species, including first records for Del Norte and Humboldt County. Himalayan balsam is easy to identify by its showy, pendulous pink- to white flowers, its pink-stems and petioles, and large, lanceolate leaves. Its foliage also has a strong, unpleasant odor. Although Himalayan balsam is an annual, it can grow up to 10 ft in a single season and overtop most other understory vegetation. Its seeds are dispersed explosively when seed capsules open. Himalayan balsam has been added as a species pending evaluation by both Cal-IPC and CDFA.

(5) Yellow floatingheart (*Nymphoides peltata*) is a yellow-flowered aquatic plant that is native to Eurasia and was first recorded in California in 1958 from Santa Clara County, where it was growing in an experimental garden. It has since naturalized and appears to be spreading, with records in El Dorado, Nevada, and Monterey counties. In 2021, a new population was discovered in a Monterey County pond, where it had been previously reported from a pond in the Santa Lucia Mountains in 1999. Yellow floatingheart leaves are up to 12 cm in diameter and, true to their species name, heart-shaped. Flowers are each 3-4 cm in diameter, bright yellow, and have five fused, lightly fringed petals. Seeds are flattened with a fringe of small hooks; they float and are easily moved by birds and with water. Based on reports from other regions, this species can

create dense mats, block light, and stagnate water. Yellow floatingheart is "A" listed by CDFA and state listed by Washington, Oregon, and Idaho. It is pending Cal-IPC evaluation.

(6) Sweet amber (*Hypericum androsaemum*) is a perennial shrub with a weeping, decumbent habit, showy yellow flowers, and attractive brown/black berries. It and another close relative (large-leaved *Hypericum*; *H. grandifolium*) that has also naturalized in California are both sold as landscape ornamentals. Sweet amber was first recorded from Santa Cruz County in 1881 and has records across 26 counties, however it may still be under-reported due to its similarity to large-leaved *Hypericum*. This species was nominated by Jennifer Mo, Santa Clara Water District, who found the first county record for Santa Clara this spring. Sweet amber can be differentiated from large-leaved *Hypericum* when it is in flower and fruit: its flower styles are much shorter than its ovary and its fruits are fleshy rather than dry when mature. Its distribution may be under-represented by iNaturalist and Calflora because of misidentification as *H. grandifolium*. Both species can outcompete and overtop other understory vegetation, are rhizomatous, and have seeds that float and can be easily dispersed. Currently *H. grandifolium* is listed as a Cal-IPC "Watch" species and *H. androsaemum* has been added as a species pending evaluation. Neither species is listed by CDFA.

As you work or play outside, please stay on the look-out for Weed Alerts and other under-reported species. Document where you find them on Calflora or iNaturalist. Thanks to both services, who serve as invaluable resources for location records of species. Thanks also to the many plant observers who record their observations on these platforms. Please contact Cal-IPC (jburger@cal-ipc.org) or CDFA (Robert.price@cdfa.gov) with any reports of new non-native species in your area that might be future Weed Alert candidates.

2022 Cal-IPC Northern California Mini-Symposium in photos

As COVID rates ebbed and flowed over 2022, we opted for a mixed approach to our annual Symposium. Over the summer, we hosted two smaller in-person events, and, in the fall, we hosted a three-day gathering online. Our last issue contained highlights from the June gathering in Cal Poly Pomona. Here are some highlights from the July Mini-Symposium at CSU East Bay in Concord, where 96 attendees gathered to share information on protecting and enhancing habitats in Northern California. Thank you to the many sponsors, partners, and presenters who made these events a rousing success! All photos: Claire F. Meyler



Naturalist Martha Cerda (standing, left), from the Golden Gate National Parks Conservancy, co-facilitated a discussion on community stewardship and engagement.



Tanya Meyer (center left, blue striped shirt), Senior Program Manager at the Yolo County Resource Conservation District, co-led a workshop on weed control in native and restored grasslands. The in-depth discussion covered many different weed control methods, including grazing, fire, mechanical, and herbicide.



Attendees practiced measuring their steps to estimate an acre during the EDRR Program Jumpstart Workshop, led by Rachel Kesel of One Tam. Participants walked away with training resources, checklists, and cheat sheets to begin their own Early Detection Rapid Response program.



Colleagues enjoyed an opportunity to reconnect during breaks.



Cal-IPC Executive Director Doug Johnson shared how our organization worked with Weed Management Areas in the nine counties of the San Francisco Bay Area to determine a set of 15 invasive plant species as region-wide EDRR targets. Species include Russian knapweed, stinknet, and Paspalum.

2022 Cal-IPC Symposium Highlights

Congratulations to the 2022 Cal-IPC Award Winners!

The Ken Moore Wildlands Restoration Award, also known as the Golden Weed Wrench, was awarded to Jean-Philippe “JP” Marié, as the Riparian Reserve Steward for Putah Creek at UC Davis.



JP has been working in restoration for more than 25 years, with a focus in grasslands and riparian areas. As a tireless leader of the California Native Grasslands Association (CNGA), he’s been a major force in educating students and practitioners on many techniques, including leading discussion

groups and training sessions for Cal-IPC Symposia. When accepting the award, JP passed on this advice from Ken Moore on weed management: “Start wherever you are and keep moving forward. Find tools that are adapted to the type of work or build your own tools to make your job easier. Persevere. Keep moving forward. It might take you a year, ten years, or a lifetime. But whatever you do is going to make the life of your successor easier.”

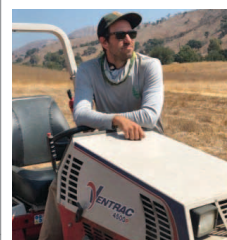
The Jake Sigg Award for Vision and Dedicated Service was presented to Dr. Cheryl Wilen, an emerita extension agent for UC Cooperative Extension. After earning a PhD in botany from UC Riverside with a dissertation in invasive kikuyu grass, she worked in San Diego, Orange, Los Angeles, and Riverside counties for 25



years. She worked on invasive plant issues in many settings — urban, agricultural, and

(Continued on page 14)

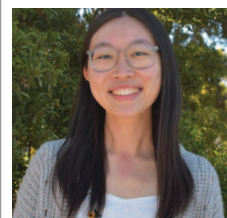
Congratulations to our student winners!



Full Length Talks First Place Winner: Matthew Wells, CSU Domingo Hills, “Timed mowing of invasive grasslands in Santa Monica Mountains National Recreation Area.”



Lightning Talks First Place Winner: Clarissa Rodriguez, UC Riverside, “Assessing the impacts of herbicide management options on the soil seed bank.”



Poster First Place Winner: Lily Lav, San Jose State University, “Succession of soil microbial communities in a managed conifer-encroached grassland.”

Other student winners: Full Length Talks Second Place Winner: Robert Fitch, UC Santa Barbara, “Replacing non-native grasses with herbaceous native plants to reduce ignition potential of fuel breaks and roadsides.” Lightning Talks Second Place Winner: Stuart Schwab, UC Riverside, “Incomplete burning during prescribed fire may form stinknet (*Oncosiphon piluliferum*) refugia.” Lightning Talks Third Place Winner: Charlie Startin, USC, “Assessing woody plant encroachment in Marin County, California, 1952-2018.”

All photos this page courtesy of award winners.

Laguna Canyon Foundation Field Techs

This past November, seven Field Technicians from the Laguna Canyon Foundation were able to attend the 2022 Cal-IPC Symposium, thanks to the free rate option available to conservation corps members, field technicians, and early career professionals.



Laguna Canyon Foundation crew members love their plants! Photo courtesy Laguna Canyon Foundation.

Our primary work as Field Technicians is to restore habitat by removing invasive plant species and installing natives. Attending the symposium was a great experience and promoted team-bonding. We chose three sessions to attend that we thought were most relatable to our work: “Herbicide Hot Topics,” “Protecting Nature in the City,” and the “Building a Shared Language for Conservation

Work” discussion group. We got together as a team after each session and discussed what we had learned. For the rest of the symposium, we encouraged the crew to listen while working. Since our work is mainly outdoors, having access to the symposium

on an app was very convenient. For many of our technicians, this is their first job in the environmental field. This symposium was eye-opening for them to see how professionals work and learn from their own and each other’s experiences.

We would like to thank Cal-IPC for having us and giving our Field Technicians an opportunity to learn more about the field of invasive plants.

Persistence: Marin Audubon's work to keep invasive sea lavender from invading Marin County tidal wetlands

Jude Stalker, Marin Audubon

Over the past fifteen to twenty years, two species of non-native perennial invasive sea lavender (*Limonium*) have colonized portions of the shoreline in Marin County and elsewhere in San Francisco Bay. European sea lavender (*Limonium duriusculum*-LIDU) was discovered in 2007 at Strawberry Marsh on Seminary Drive in Marin County. The same year, Algerian sea lavender (*Limonium ramossimum* subsp. *provinciale*-LIRA) was discovered in marshes along the western shoreline of the central San Francisco Bay. This species was also found growing in relatively small patches at a few Marin County shoreline locations. In both locations, there was a significant number of plants, indicating that they had been growing there for some time. The assumption has been that both species were horticultural plants that spread to tidal marsh locations.

The discovery of these species raised alarm for the health of the San Francisco Bay salt marshes. Although the small purple flowers of these perennial plants are quite attractive, each plant is able to produce hundreds of seeds each year that eventually carpet the surrounding area with new seedlings. Left unmanaged, they render vast areas of the upper tidal marsh zone inhospitable to native plant species, including the native sea lavender (*Limonium californicum*), salt grass (*Distichlis spicata*), alkali heath (*Frankenia salina*), and others. The seeds of these invasive plants also travel with the tides to colonize new shoreline areas. This was a perfect example of a relatively early detection, and a rapid response was needed.

Cal-IPC and the Bay Area Early Detection Network (BAEDN) were quick to add these newly discovered *Limonium* species to their lists of priority invasives. But, while plans were being made and funding pursued for a Bay-wide effort to remove the plants, the infestations of



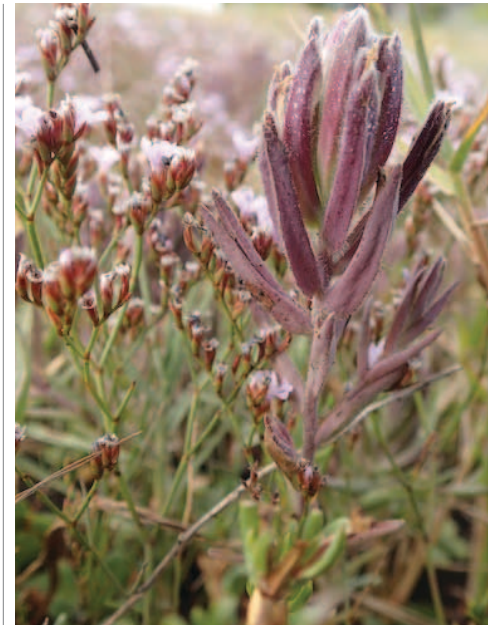
Volunteer Suzie Sutphin (blue hat) joins former Cal-IPC staff member Dana Morawitz (cream hat) on a LIRA volunteer day. Photo: Jude Stalker.

these invasives expanded quickly — primarily LIRA in the central and south bay.

At Marin Audubon, we knew that if we did not act quickly to manage the invasive *Limonium* species in the few Marin County locations where it was known to be growing, that it would expand and potentially move into our tidal wetland restoration and preservation properties.

Early on, we performed surveys along the Marin shorelines and upper edges of the tidal wetlands to locate the invasive *Limonium* infestations. We searched parcel maps to identify the owners of the infested properties and contacted the owners to ask for permission to remove the plants. After we set up agreements with the property owners, we launched a volunteer recruitment and coordination program and got to work removing plants. This work has continued annually since 2011.

From 2011-2013, BAEDN partnered with Marin Audubon to support volunteer invasive sea lavender removal days at a few of the Marin County locations. Marin



Invasive Algerian sea lavender (left) grows alongside the rare native plant Point Reyes bird's beak (right). Photo: Jude Stalker.

Audubon also coordinated with Marin County Parks to determine property boundaries and coordinate work plans.

In 2016, Cal-IPC secured funding from the National Fish & Wildlife Foundation (NFWF) to implement the initial phase of a Bay-wide effort to remove this highly invasive plant. This effort primarily focused on controlling the large infestations in the central and south bay as well as manual removal at two of the most heavily infested locations in Marin County.

Additional NFWF funding in subsequent years, as well as funding from the Marin County Department of Agriculture, has allowed Cal-IPC contractors to remove LIRA and LIDU from additional locations in Marin each year. Some Cal-IPC staff members (and their family and friends) have provided dedicated volunteer hours to help Marin Audubon remove invasive *Limonium* from several locations.

This countywide effort also requires the hard work and collaboration of several agencies and landowners. Marin County

Parks and OneTam successfully remove the invasive sea lavender plants from their shoreline properties annually by using hand removal and flaming methods. Caltrans, with Conservation Corps North Bay crews, works with Marin Audubon each year to remove invasive *Limonium* from their tidally influenced right-of-way along Highway 101 and at the Manzanita Park and Ride area in southern Mill Valley. In some years, classes from San Francisco State University have held invasive sea lavender removal workdays at Strawberry Marsh and have encouraged students to volunteer their time. Together, we have been able keep the Marin County infestations managed (although not completely eliminated) without the use of herbicides.

Although rewarding, this work is not without challenges. In several Marin County marshes, the perennial invasive *Limonium* species grow together with the rare native plant Point Reyes bird's beak (*Chloropyron maritimum* ssp. *palustre*), which is a hemiparasitic annual. We make extra efforts to remove the invasive



Volunteer Debbie Ablin and Marin Audubon Society board member Bob Hinz devote their time to remove sea lavender. Photo: Jude Stalker.

Limonium early in the season to avoid damaging the *Chloropyron* before it emerges. When they are growing together later in the season, we take extra precautions to protect the *Chloropyron* while removing the *Limonium*. Because the *Chloropyron* is potentially using the *Limonium* as a host plant by attaching at the root, we sometimes leave the *Limonium* plant intact and clip off the flower or

seed heads, hoping to remove the invasive plants earlier the following season.

Another challenge has been convincing landowners to allow us to remove plants from their property. While most landowners and managers are amenable, some do not understand the importance of removing invasives and need more convincing. It has required a combination of education, patience, and persistence and usually, eventually, they cooperate.

To date, the LIRA and LIDU in Marin County are found in fragmented patches from the central Sausalito shoreline north into the upper edges of Bothin Marsh, patches along the Strawberry and Tiburon Shoreline from Seminary Drive to Blackie's Pasture, including Strawberry Marsh, the Seminary Drive shoreline, Aramburu Island and the adjacent islands and shoreline. It is also found in a few areas of the Corte Madera Marsh State Ecological Reserve in Greenbrae and last year a small patch was identified and removed from the Loch Lomond Marina breakwater in San Rafael. Additionally, the County staff identified LIRA on Kent Island in the Bolinas Lagoon several years ago and have been keeping it managed there.

With the collaborative efforts of Marin Audubon, Marin County Parks/OneTam, Cal-IPC and Caltrans, and with the ongoing volunteer support from several local community groups and many individuals, we have pulled LIRA/LIDU at all of these known locations. In most locations where we have been consistent with removal each year, we see a reduction in plant numbers.

Due to time and budget constraints, we have not managed all locations in every year which has caused some plants to spread seed into the soil to become new seedlings, and into the water to be carried elsewhere by the tides.

As we increase our efforts, we are getting closer to our goal of removing all known infestations of the invasive sea lavender in Marin County while contributing to the Bay-wide effort to remove invasive sea lavender. We hope to reach that goal in the coming years. We look forward to a day when invasive sea lavender is only present in our memories.

Greens at Work LIRA Project

Greens at Work volunteers began manually removing Algerian sea lavender (*Limonium ramosissimum* aka LIRA) in August 2019 at sites around Point Isabel, Richmond, after learning that a contractor was spraying herbicides in a sensitive habitat. The chart below identifies the sites and the number of plants removed.

	August-December 2019	2020	2021	January-October 2022	Site Totals
South Shore Point Isabel	120,000	36,500	3,610	1,590	161,700
Hoffman Marsh	62,500	67,270	14,950	2,510	147,230
East Stege	0	10,350	1,900	830	13,080
West Stege	47,500	26,385	6,030	2,730	82,645
Marina Bay	40,000	123,905	15,680	3,200	182,785
Riprap Jetty	0	0	213,600	64,630	278,230
Meeker Slough	0	0	0	2,035	2,035
Annual and Grand Totals	270,000	264,410	255,770	77,525	867,705

From August 2019 to October 2022, we have also removed 1,236 huge garbage bags of Russian thistle (*Salsola soda*) and 407 fifty-gallon garbage bags of trash. We have also removed several thousand pounds of driftwood (plywood, telephone poles, broken hulls of boats) which cover rich habitat areas and prevent the growth of bay edge plants.

As can be seen from the diminishing number of plants each year, regular follow up helps to reduce a renewal of the seed bank and keep the overall numbers low.

It's relatively easy work, as LIRA grows in moist soils, and is an activity that can attract young adult and older volunteers. We find this work meditative and a distraction from the stresses of modern life. —Jane and Tom Kelly, Greens at Work

Fulfilling NEPA for Lassen National Forest invasive plant treatment

Nikki Valentine, Conservation Specialist, Cal-IPC

A landscape-scale disturbance such as a wildfire has a massive ripple effect on land management agencies as they restore and safeguard an area's resources. Federal agencies, before implementing a project, must employ the National Environmental Policy Act (NEPA) process to evaluate whether planned actions would significantly affect the environment in a negative way. Our recent work with the Lassen National Forest in the wake of the Storrie Fire serves as an example of this process.

The Storrie Fire burned 27,800 acres across the Lassen National Forest (LNF) in 2000. The fire caused considerable ground disturbance near high-traffic areas that were heavily infested with invasive plants. This created ideal conditions for invasive plants to spread into the burned area. After the fire, the highest concentration of invasive plants in the LNF Storrie footprint was along Butt and Yellow Creeks. Invasive plants had also been introduced to the nearby Butte and Colby Creeks.

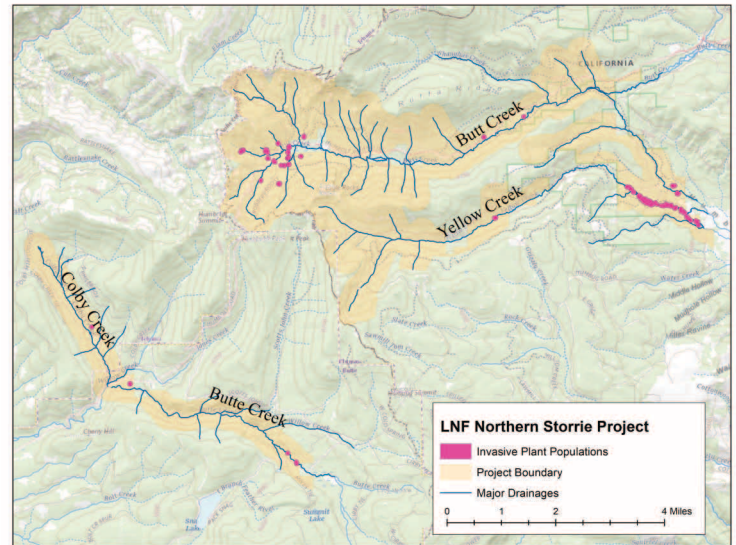
Introduced invasives to the Storrie Fire footprint included Canada thistle (*Cirsium arvense*), Klamathweed (*Hypericum perforatum* spp. *perforatum*), ox-eye daisy (*Leucanthemum vulgare*), and houndstongue (*Cynoglossum officinale*). Manual treatment had been the only option allowed for removing invasives species from this area, which was largely ineffective as most of these species are rhizomatous. Other management options were needed to better contain these infestations and prevent them from spreading along riparian corridors.

Land managers at LNF wanted to create an invasive plant management strategy that would allow them to remove invasive species in the project site using manual, herbicide, and prescribed burn control methods. Creating a strategy which included herbicide treatment options required NEPA documentation, which

would assess whether the proposed actions to limit the infestations would significantly affect the environment in a negative way. LNF staff partnered with Cal-IPC to complete the NEPA process, forming an interdisciplinary team to address resource concerns.

The project area is a diverse site encompassing important cultural, recreational, and natural resources. Each of these assets was investigated by experts from the interdisciplinary team to determine whether resources would be affected by the proposed action. The team also developed and incorporated integrated design features (IDFs) into the proposed action. IDFs specify how the proposed action is carried out to ensure resources are safeguarded from potential concerns. Often, the IDFs pertain to specific conditions. For example, herbicide is prohibited when the wind speed is more than five miles per hour when working within 200 feet of rare plant occurrence.

Herbicide application effects were the largest factor of concern. The team evaluated these concerns with herbicide risk assessments, which are derived from published EPA data. These assessments determine potential effects from the maximum acute and chronic exposure possible with the proposed action. Risk assessments were used to evaluate whether humans, terrestrial wildlife, aquatic wildlife, plants, soils, and water quality could be significantly affected.



Map of the Northern Storrie project boundary and invasive plant populations. The most concentrated invasive plant populations are along Butt and Yellow Creeks, with lesser populations in Butte and Colby Creeks.

Public involvement is another important step in the NEPA process. There were two comment periods during which the public was encouraged to submit their concerns and opinions about the project.



Staff from the Great Basin Institute treated Canada thistle (*Cirsium arvense*) in Yellow Creek in Fall 2021 following the Dixie Fire. In the two months since burning, Canada thistle had already sprouted and was one of the few green plants in the charred landscape, making it easier to spot. Photo: Nikki Valentine.

The one and only comment for this project was voiced by the Maidu Consortium, regarding health and safety concerns during herbicide application. A summary of the herbicide risk assessments, soil report, and hydrology report was provided to the Maidu Consortium. LNF staff also met with the Maidu Consortium to hear their perspective. As a result of this discussion, the project implemented a larger buffer when applying herbicide near water features (increased from 10 ft. to a 20 ft. buffer), and a human health risk assessment was completed to address their concerns.



Canada thistle is the most prevalent invasive plant in the project site. Staff from the Great Basin Institute treated the infested Yellow Creek site again in Fall 2022. Photo: Nikki Valentine.

The main NEPA document, the environmental assessment (at a total of 40 pages, with appendices), was finalized in 2021 and found that there were no significant impacts from the proposed action. However, the 2021 Dixie Fire engulfed the LNF, affecting staff resources, and delaying the signing of the final NEPA documents until late September.

Not only did the Dixie Fire affect the NEPA process timeline, but it also impacted the implementation timeline. Invasive plant treatments had been scheduled for the project site, but the Dixie Fire burned several portions of the project area, making it inaccessible. This pushed the treatment window further back until October when the Yellow

Creek area became accessible again. Because the fire delayed treatment, there was only time for 1.5 days of treatment between phenology windows and scheduling availabilities.

Despite these limitations, Cal-IPC contracted with Great Basin Institute to implement the first treatment in October 2021. The Great Basin Institute was able to treat the most dense Canada thistle infestation along Yellow Creek during the first year. The site was treated again in September 2022.

LNF has additional funding for this project and has since received Burned Area Emergency Response (BAER) funding from the Dixie Fire that will continue to support future treatments. Having the NEPA documentation in place also enables a rapid response to new infestations. Lassen National Forest can now opportunistically treat other invasive species that may have been introduced to the area during the Dixie Fire.

Protecting access to the full IPM toolbox

(Continued from page 5)

proposed by American Rivers, in partnership with the Stanislaus National Forest and Yosemite National Park. The project would restore hydrologic function to the meadow, which has been damaged from a century of grazing, ditch construction, road building, and hay production. As a relatively small part of the work at Ackerson, herbicide was selected as the best tool for controlling velvet grass so that it did not invade disturbed areas during the regrading of the meadow.

The second project was proposed by Audubon California and River Partners, to create strips of riparian habitat between agricultural fields and a rural road that would connect wetlands at Roosevelt Ranch and the Sacramento River. Herbicides were among the tools selected for removing invasive plants in order to create the habitat.

To address this issue directly, WCB scheduled a special board meeting in September. Cal-IPC provided comments at

the meeting about the importance of a science-based approach to IPM, with access to all tools in the toolbox, including herbicides. Cal-IPC also helped coordinate comments from many conservation partners, including The Nature Conservancy, Audubon California, River Partners, California Native Plant Society, California Association of Resource Conservation Districts, Midpeninsula Regional Open Space District, Santa Clara Valley Open Space Authority, and others.

In response to a stunning question from a WCB board member as to whether WCB even needed to fund restoration work in addition to acquisition, Dr. Jen Norris, Deputy Secretary for Biodiversity and Habitat for the California Natural Resources Agency, assured the board that restoration is critical for meeting the state's 30x30 goals.



Creating riparian habitat between agricultural fields and a rural road would connect wetlands at Roosevelt Ranch. Photo courtesy of Audubon California.

WCB had solicited input on a special questionnaire that they require grant applicants to fill out if their project involved herbicide use. Cal-IPC and other organizations submitted comments suggesting that the questionnaire focus on a project's overall IPM approach and why the proposed methods were the best choice for the situation.

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2022 Cal-IPC Symposium

(Continued from page 9)

wildland areas — and produced numerous outreach and technical publications. In recent years, she’s served in leadership roles for the UC Integrated Pest Management (UC IPM) program, including helping the UC make policy decisions on glyphosate use and helping municipalities integrate the most effective non-chemical techniques into their integrated pest management (IPM) programs. Cheryl makes herself available for on-the-ground advice or IPM training for practitioners, schools, agencies, and government offices. She has been instrumental in supporting Cal-IPC’s work compiling best practices for the WeedCUT online tool. Cheryl thanked the audience and acknowledged leadership from Jutta Burger (Cal-IPC) and Tunyalee Martin (UC IPM) on the WeedCUT project, saying, “It’s been amazing to work with so many of you and see the future of our work. It’s a worthwhile endeavor, and it takes a team to make this innovative work possible.” Find presentations and recordings at cal-ipc.org/symposium

Protecting access to the full IPM toolbox

(Continued from page 13)

The two projects that had been held over from the previous meeting were revisited. Applicants described alternative weed control approaches that were evaluated (and incorporated where appropriate) and why glyphosate was needed for particular aspects. The board voted to approve both projects, though one board member dissented over concern about the use of glyphosate.

WCB’s next regular quarterly meeting was held in November. They invited PhD toxicologist Krista Hoffmann, who serves as IPM Coordinator for the California Department of Fish and Wildlife, to provide background on herbicidal modes of action, with specific attention to glyphosate and its current regulatory status. Her presentation was highly informative. It was a welcome step toward education of board members, and more speakers may be invited to future meetings.

Cal-IPC and partners will continue to support the board’s work as they learn about the role of IPM in restoration projects that control invasive plants.

Congratulations to our 2022 Photo Contest winners!

“High five: This picture features five Cal-IPC high rated invasive plants. Can you find them all?” (Limnobium laevigatum, Alternanthera philoxeroides, Ludwigia sp., Myriophyllum aquaticum, and Sesbania punicea) Robin Carter-Ervin, CA Dept. of Water Resources, Oroville Field Division [First place winner]



“WHIP tackling ‘Putin’s thistle’ (Russian thistle or tumbleweed; Salsola tragus) at Harmon Canyon! Ventura Land Trust’s all volunteer Wildlife Habitat Improvement Program.” Teresa Burgess, Ventura Land Trust, WHIP [Second place winner]



“No weeds on Plastic Island.” Work crews pause to pose by graffiti before they treat Arundo donax along Pleasants Creek. David Vigil, Solano RCD [Third place winner]

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California Weed Science Society
January 18-20, Monterey, CA
cwss.org

National Invasives Species Awareness Week (NISAW)
February 20-26
nisaw.org

Public Lands Alliance
February 26 – March 2, Portland, OR
publiclandsalliance.org

Western Society of Weed Science
February 27 – March 3, Boise, ID
wsweedscience.org

California Association of Resource Conservation Districts
March, Online
carcd.org

SERCAL
April 13-15, Davis, CA
sercal.org

Cal-IPC Symposium
October
cal-ipc.org/symposium

California Islands Symposium
November 6-10, Ventura Beach, CA
californiaislands.net

“These human forces are transforming complex ecosystems into something more akin to biological strip malls, where everyplace starts to look more like anyplace else. A 2019 United Nations report identifies biotic homogenization among the major trends reshaping ecosystems since 1970.”

— Ashley Braun, from “Biological Strip Malls’ Have Taken Over the Planet,”
The Atlantic, Dec. 10, 2022