

Dispatch



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

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FROM THE DIRECTOR'S DESK

Mentorship and inclusion

By Executive Director Doug Johnson

All of us follow guidance from others in trying to shape our lives. If we are fortunate, we may encounter a person who cares about us and shares their experience with us, either explicitly as advice or implicitly by serving as an example. This mentorship is invaluable.

At our 2019 Symposium in Riverside, Fabián García of the Angeles National Forest received our Catalyst Award for his work helping to expose diverse communities to careers in conservation. In his acceptance speech, he credited important mentors who helped him find his path forward in a career he was not aware of at a younger age. He urged all of us to find ways to be mentors.

In this issue of *Dispatch*, Michelle Dineri tells a similar story, and shares some of the ways she has found to give back. It serves as a reminder to look for opportunities, big and small, to make a difference in someone's life. It's not always simple — we need to challenge ourselves to find the best way to make ourselves available as a resource. There

can be societal barriers to asking for guidance and offering guidance.

Given that we need everyone's talent, perspective, and support to tackle the Sisyphean task we have before us, this work is an essential part of being successful in meeting our mission. The individual rewards are magnified.

In putting together the agenda for the 2021 Symposium, our program committee is looking to include a breadth of voices and topics. Core sessions on invasive plant management may include speakers with traditional ecological knowledge about land stewardship. Discussion groups on management tools and techniques will be complemented by discussion groups on engaging diverse communities in land stewardship.

In continuing our work on inclusion, we need to remind ourselves that there are varying degrees of actively including someone. As someone once said to me in describing the inclusion they wanted, "Don't just invite us to the party — ask us to dance!"

IN THIS ISSUE

Large equipment, shown here mulching invasive gorse (*Ulex europaea*) in Caspar on the Mendocino County coast, is one of many non-chemical management described in a new set of Best Management Practices. See article on BMPs on page 10 and article on gorse removal on page 4. Photo courtesy of Jerry Beaty's Tree Surgery and Tractors.



ON THE COVER

A weed worker in San Diego County surveys chaparral before tackling a field of spotted knapweed (*Centaurea maculosa*). Photo by Emma Lostritto, San Diego County Department of Agriculture, Weights & Measures.

Wildland Weed News

CAL-IPC UPDATES

30th Anniversary

Symposium 2021 – Join us online, Oct. 26-29, with plenty of opportunity to hear talks, see posters, and interact in discussion groups! See page 9.

2020 Symposium

Video recordings of last year's event are posted on our website in the Symposium archive.

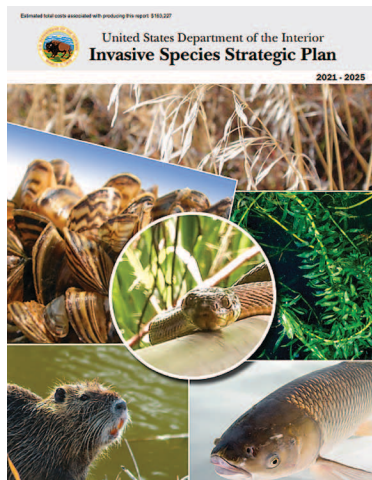
New assessment project – The Western IPM Center has awarded Cal-IPC a grant to work with partners in Arizona, Oregon, and Washington to conduct risk assessments of plants in horticulture potentially becoming invasive. We are coordinating with two complementary projects in other parts of the country.

Weeds and rare plants – A new grant from the California Wildlife Conservation Board's Climate Adaptation and Resiliency Program supports continued work on the central coast determining ways to reduce the impacts of invasive plants on rare native plants and their habitats.

WMA funding – Cal-IPC's annual advocacy day in early March generated interest from multiple legislators to support renewed funding for the Weed Management Area programs, in which CDFA makes grants to counties for high priority projects. A budget request has been submitted at our request.

Stinknet update – *Oncosiphon pilulifer*, which has spread rapidly in southern California in the last decade, now has a "High" rating in the Cal-IPC Inventory.

CalWeedMapper – To support our regional planning efforts, the online CalWeedMapper tool has been updated. Find it on the "Resources" tab of our website.



OTHER UPDATES

New plan – The US Dept. of the Interior released a new Invasive Species Strategic Plan covering 2021-2025.

Policy primer – The Oregon Invasive Species Council published a primer for policymakers on invasive species threats and opportunities. Available on their website.

Desert bill – Cal-IPC is supporting AB 1138 (Ramos) to create a Desert Conservation program at the California Wildlife Board. Such a program could help fund critical invasive plant projects in the desert, such as stopping the spread of desert knapweed (*Volutaria tubuliflora*).

Climate bonds – Bills are being worked on in the state legislature to put a bond measure on an upcoming ballot, providing funding for climate resiliency efforts. Cal-IPC has advocated to include \$20 million for an invasive species emergency fund.

Workforce development – Congress is drafting a 21st Century Civilian Conservation Corps Act to invests in job training and creation, rangeland and working lands conservation programs, and tree planting.

Invasives in Cuba – A recent paper explores how the island's revolutionary history has reduced its number of invasive species, and the threat posed by expanded tourism.

Seeding with natives – The US Forest Service's Rocky Mountain Research

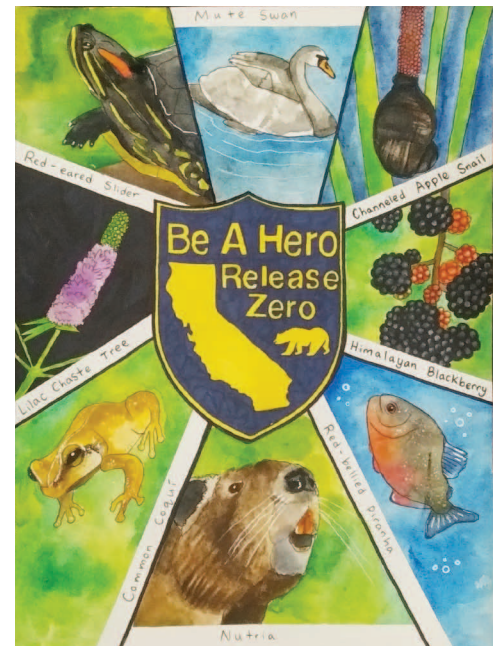
YOUR MEMBERSHIP

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.

Station shared research showing that post-fire native species seed mixes are most effective at keeping out cheatgrass in the Great Basin.

New book – The US Forest Service recently published an open-source book *Invasive Species in Forests and Rangelands of the United States* with chapters on a range of topics.

Career help – Parks California has launched a Natural Resources Stewardship Career Pathways grant program.



2020 Youth Art Contest entry by Ava McQuain.

California Invasive Species Action Week (CISAW), June 5-13

– The California Dept. of Fish and Wildlife organizes this week with local partners to increase public awareness of invasive species issues and promote public participation in the fight against California's invasive species. In 2021, we expect that many events will continue to be virtual or socially distanced. Is your group organizing an event, webinar, or live stream? Submit info or find programs at www.wildlife.ca.gov/cisaw.

Efforts at landscape-scale gorse control on the Mendocino Coast

Leah Gardner, Cal. State Parks, Natural Resources Division; Terra Fuller, State Parks, Sonoma-Mendocino Coast District; and Helene Chalfin, Jug Handle Creek Farm and Nature Center

California State Parks, local landowners, and concerned citizens have launched a regional effort to control gorse near the town of Caspar in Mendocino County. Gorse (*Ulex europaeus*) is a highly flammable, spiny shrub native to western Europe. It can form dense, impenetrable thickets up to five feet tall on a variety of soil types, partly due to its association with nitrogen-fixing bacteria. Once established, it completely dominates areas and excludes native plants.

Due to its range of negative impacts — outcompeting native flora, impeding wildlife movement, and altering ecosystem processes — Cal-IPC gives gorse a rating of “High” and CDFA rates it as a Category “B” Noxious Weed (“pest of known economic or environmental detriment... subject to eradication, containment, suppression, control, or other holding action”). Long-lived seeds, which can build up a large seed bank and remain viable in the soil for up to 30 years, makes control difficult without a long-term concerted effort.

Gorse has invaded all California coastal counties from Monterey northward, extending into Oregon, Washington, and British Columbia as a widespread invasive species. Additional populations can be found in the foothills of the northern Sierra Nevada. It has been known in Mendocino County for more than 100 years, where it has invaded coastal bluffs, coastal prairie, wetlands, and forested areas, including Bishop pine forests.

Historically, the earliest infestation became established in the Caspar area by the late 1800s along a creek near the Jughandle State Reserve (once a part of a larger ranch but now managed by the Sonoma-Mendocino Coast District of California State Parks). During this



A dense stand of gorse on the Mendocino coast before treatment, in 2014.

period, grazing, ranching, and farming operations likely controlled the infestation, while also increasing its spread into new locations (Springer 1985). By the 1930s, the infestation spread along roads and streams with the earliest control efforts occurring at this time through a Federal Weed Control Program (Springer 1985).

By the mid-1900s, the Caspar ranching and farming efforts ceased, with areas subdivided for development. With the removal of herbivores, the infestations increased (Springer 1985). Since Jughandle State Reserve became a State Park unit in 1976, State Parks has been managing gorse with various levels of funding and success. Treatments have included prescribed fire, hand removal, rotary mower, disking, masticating, herbicide application, and mechanical removal.

In 2016, State Parks initiated work using hand removal of stumps or stem

cutting as the primary treatment methods due to public opposition to herbicide use. Stump removal resulted in major soil disturbance favoring the non-native perennial grass *Holcus lanatus*. Both treatment methods resulting in root and seed sprouts. Due to quick regeneration of gorse after these initial treatments, State Parks decided to implement an integrated pest management approach using similar strategies as those used by Oregon State Parks.

Focusing on coastal bluff areas, State Parks implemented mechanical treatments, using a masticator on a large dense gorse patch, and continuing manual treatments with pile burning on smaller patches of gorse. State Parks then followed up with a broadleaf-specific herbicide on resprouts and seedlings. In the masticator-treated area, the mulch depth was six inches or greater and it took over a year for re-growth to require further treatment.



A field of gorse mid-treatment via mastication, in 2016. The excavator in the background has a flail mower mounted to its arm, which reduces the gorse to mulch.

Native plants have returned from the seed bank in treated areas.

Given the longevity of the gorse seed bank, funding for annual re-treatment is critical. Due to gorse's highly flammable properties which increase fire risk, we recently qualified for a Cal Fire Forest Health Grant for Greenhouse Gas Reductions (California Climate Investments) to expand treatment on an additional 38.6 acres.

In addition to State Parks' efforts, Jug Handle Creek Farm and Nature Center, working with Caspar Community Center board members and a group called "Gorse Out," is coordinating a large-scale gorse removal project in the town of Caspar (population 608) on both the east and west sides of Highway One. State Parks provided aerial photos and mapping to help establish project parameters.

These community efforts have primarily used mastication. In September and October 2020, contractors put in 380 hours to masticate 37 acres of gorse. Follow-up used goat grazing provided by Mendocino's "Holy Goats" and project planners are currently looking into the potential use of a pickup-mounted steaming unit as a more selective way to deal with seedlings without using herbicide.

The Mendocino County Dept. of Agriculture has provided \$33,000 from a noxious weed grant provided by the

California Dept. of Food and Agriculture. Caspar Community, a local nonprofit, contributed \$16,000 from their Firesafe Fund and served as a vendor for the county, funding and distributing payments to equipment operators. Individual community members contributed \$7,150 to remove gorse on their own properties, bringing the total invested to \$56,150. Securing Coastal Development Permits has taken a significant amount of time.

Landowners in Caspar are deeply concerned with gorse as a fire hazard. The town of Bandon, Oregon, has burned

down twice, largely due to dense gorse growth around the town perimeter. They have formed a dynamic Gorse Action Group to coordinate partners for landscape level control in the region and hold a creative Gorse Blossom Festival each year to share awareness of the history and fire danger of gorse, while celebrating the town's quirky spirit.

Combined with the ongoing efforts on adjacent State Parks land, landscape-scale gorse control may finally be achievable, allowing for restoration of native plant communities and enhancing fire safety for the entire community. Given the need for long-term control efforts and infestations on adjacent private properties, full eradication of gorse may not be possible. However, it can be reduced to low management levels. We will consider our efforts a success if we greatly reduce the current infestation; restore grasslands, wetlands, riparian, and rare plant communities; and increase accessibility to wildlife and visiting public on park lands.

All photos courtesy California State Parks.

References:

- Springer, D.J. 1985. Human influence on the distribution of gorse (*Ulex Europaeus* L.) along the Mendocino coast, California. Graduate Student Thesis, University of Montana.
- Broadfield, N. and M. T. McHenry. 2019. A world of gorse: Persistence of *Ulex europaeus* in managed landscapes. *Plants*.



Coastal bluff area three years after mastication and follow-up with herbicide to treat seedlings. Invasive velvetgrass (*Holcus lanatus*) often fills in, with native tufted hairgrass (*Deschampsia cespitosa*) and panicgrass (*Panicum acuminatum*) coming back in wetter areas. When the need for ongoing seedling treatment tapers off, efforts will focus on grassland management with mowing – and possibly prescribed grazing and burning – to support native forbs.

Insect apocalypse and non-native plants

Nikki Valentine, Cal-IPC

If you have noticed there are less insects splattering into windshields in recent years, you are not alone. This is known as the “windshield phenomenon,” which serves as anecdotal evidence of the “insect apocalypse.” This global insect decline started in the 1900s and has exponentially increased in the last twenty years (Marinelli 2020).

Numerous recent studies have established widespread insect declines: European and North American insect populations have declined 45% in the last 40 years; terrestrial insects have declined at a rate of 1% per year spanning the past 9-80 years; flying insect biomass has declined 76% over 27 years in protected areas in Germany; butterflies in the Netherlands have declined 85% since the 1800s; and, in the Midwest, mayfly numbers have declined by 50% since 2012 (Wagner et al. 2021, Marinelli 2020, Kolbert 2020). This sharp onset of decline is most well-known in the monarch butterfly, the poster child for insect decline. Western monarch numbers have dropped 99% since 1997, with the current population counted at 1,914 individuals (Marantos 2021).

Insect rates of decline are much greater compared to declines in the rest of the animal kingdom. Insects have historically had low extinction rates, indicating that this new pattern diverges from the millions-of-years-old pattern that withstood previous mass extinctions (Kolbert 2020).

The insect apocalypse has not been attributed to a single source. Instead, insects are experiencing a ‘death by a thousand cuts,’ including but not limited to: industrialized agriculture, increased insecticide use, climate change, habitat loss, pollution, and introduced species (Wagner et al. 2021). Although climate change, industrialized agriculture, and habitat loss are often highlighted as the

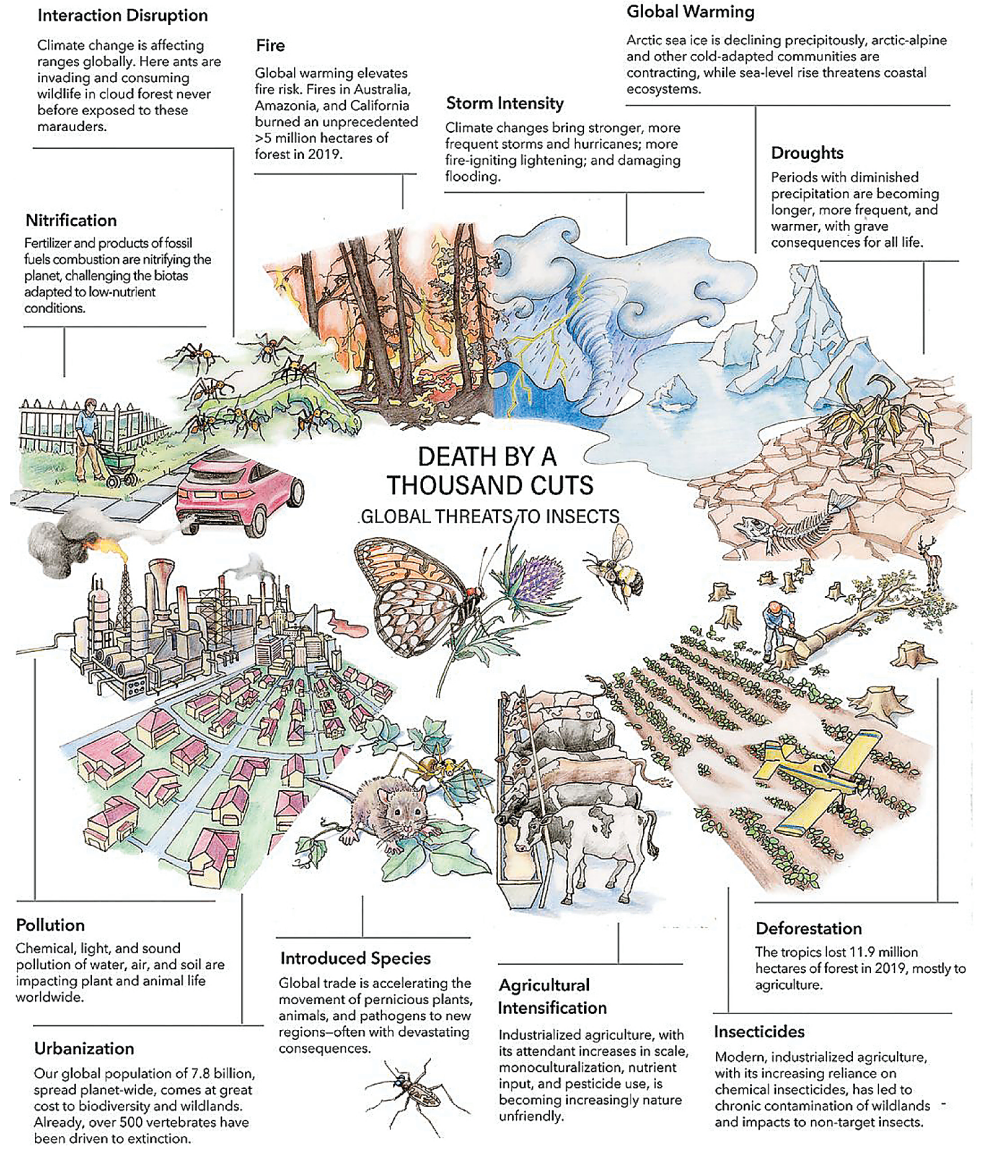


Image credit: Illustration by Virginia A. Wagner, from David L. Wagner et al. PNAS 2021; 118:2:e2023989118.

most significant factors in insect decline, research suggests the causes are complex and inter-related (Forister et al. 2021, Wagner et al. 2021).

The displacement of native plant species by non-native species has recently been recognized as a significant contributing factor to the insect apocalypse. Non-native plants are used abundantly in agriculture, agroforestry, and horticulture. These activities constitute a large portion of the world’s land. Worldwide, 44% of planted forests include non-native tree

species. In the lower 48 states of the U.S., 45% of land is devoted to production agriculture, not including rangeland (Marinelli 2020). Steadily increasing urban areas may account for 20% of the Earth’s habitable land by 2030 (Marinelli 2020). Many of these planted non-natives are escaping cultivation and actively displacing native ecosystems. Even if these non-native plants do not become invasive, there is still a major loss in the coverage of native plants.

Monocultures of non-native or invasive

plants across large swaths of land can act as 'biological deserts,' representing a loss of food sources and habitat for native insects. Most of the estimated 5 million insect species are plant-eating. The diet of plant-eating insects is often limited to a specific plant family and sometimes even genus. Since there are so many insects dependent on specific plants, invasive plants intrinsically disrupt insect food sources. In areas dominated by non-native plants, plant-eating insects have less biomass, abundance, and diversity (Marinelli 2020).

Additionally, 69% of caterpillar species develop on just one plant species, further emphasizing the irreplaceable role of native plants to insects. For example, the imperiled monarch butterfly relies on the milkweed genus (*Asclepias*) as a host plant, yet planting non-native milkweed species threatens monarchs. The presence of nonnative tropical milkweed (*Asclepias curassavica*) may cause monarchs to confuse breeding and migrating season (Wheeler 2018). Tropical milkweed also hosts higher levels of the *Ophryocystis elektroscirrha* parasite, which is associated with lower migration success when present in monarchs (Wheeler 2018). As a result, the Xerces Society prioritizes planting native milkweed and nectar plants in the appropriate zones to facilitate monarch recovery.

California butterflies are known for being able to utilize non-native plants, but only 34% of California butterflies utilize non-native plants (Marinelli 2020). Even in those instances when an insect

species can successfully utilize a non-native plant, this pales in comparison to the number of species a native plant can support. For example, native oaks are utilized by 557 species of caterpillars,

whereas non-native ginkgoes provide for only 5 species (LaPente 2018). Kudzu, an invasive plant in southern and eastern states, supports the native silver-spotted skipper. But this one positive case is

overshadowed by kudzu notoriously displacing native plant communities and their associated insect fauna. Moreover, non-native plants are typically visited more by non-native insects, increasing competition for the native insects that can utilize the non-native species as a food source. In some cases, non-native plants may host invasive insects. For instance, the invasive tree-of-heaven is a breeding ground for the invasive spotted lanternfly, which also poses a threat to native plants and to agriculture.

Insects play an indispensable role in ecology and our economy. There are an estimated ten quintillion individual insects in the world, accounting for 80% of all animal species (Kolbert 2020). In food webs, insects also account for most connections between producers and consumers (Wagner et al. 2021). Because of their integral role across trophic levels, the insect apocalypse is a sign of greater ecosystem failure. Insects serve as food sources, decomposers, pest control, soil engineers, and pollinators. In 2006, the various services provided by insects in the U.S. were appraised at \$57 billion (Kolbert 2020). As native insects associated with native plants decline, many ecological functions may be disrupted, perpetuating native plant displacement.

Non-native species are one

(Continued on page 14)



Monarch butterfly (*Danaus plexippus*) on showy milkweed (*Asclepias speciosa*). Photo: Tom Koerner/USFWS.



Western swallowtail butterfly (*Papilio rutulus*) on coyote mint (*Monardella villosa*). Photo: Constance Vadheim/CNPS.



Monarch butterfly caterpillar (*Danaus plexippus*) on showy milkweed (*Asclepias speciosa*). Photo: Tom Koerner/USFWS.

Mentorship makes a difference

Michelle Daneri, Laguna Canyon Foundation

Article written by Cal-IPC staff from an interview.

My career path to my current job at the Laguna Canyon Foundation took several turns. I grew up in the urban setting of East Los Angeles and did not have much exposure to careers in the outdoors. In college, I studied Native American History with a focus on Native people in California, so my initial interest working at Pio Pico State Historic Park (in Whittier, CA) was through that lens. Over time, I found that I enjoyed getting dirty, putting plants in the ground, and assisting on conservation projects. That was the start of what led me to working in restoration. I benefited from guidance along the way, and mentorship has been a vital way for me to give back, connecting to young people who are just getting passionate about the outdoors, and helping them see how they can make a career out of it.

In early 2020, I worked with the National Park Service Academy at Grand Teton National Park in Wyoming. The program is designed to engage more Black, Indigenous, and youth of color, and offer pathways to Park Service careers. We worked with 12-15 young people and connected them to experts in different areas of the park, including law enforcement, firefighting, climbing rangers, restoration, and more. Our mentored students were given next-step advice on how to get professional licensing and further opportunities.

It was a unique chance to provide support for these young people, to create a community of like-minded folks, and enjoy the outdoors together. As a person of color in this career field, it was important for me to pave the way for young people to see the pathways available. For so many folks, they may not even be aware of what's possible. It was great to meet enthusiastic young people and share this positive experience.



2020 Academy members at the Elk Refuge in Jackson, WY. Photo: Michelle Daneri.



Michelle Daneri conducting a nesting bird survey in Laguna Beach. Photo: Michelle Daneri.

One incredible moment during my time in the Grand Tetons was seeing a participant of Indigenous origin reconnect to the land in a way that had not been available to her. She had never been to the Grand Teton area, even though her people were originally from these lands. She was able to do interpretive work for the park and brought in her mother to reconnect to this sense of place and sense of history. It was very touching for me, and an

incredible honor to help facilitate that experience for park visitors.

For organizations interested in mentorship opportunities, I would say that building community is the key to success. Often, when we're working, we're going through the physical tasks, trying to reach our goal. We rarely have time to take a step back and connect. During my mentorship experience, there were built-in opportunities to explore what we have in common, to voice our frustration about facing skepticism from our parents, and to consider how to answer their concerns. We also found it rewarding to be immersed in a circle of diverse peoples, where none of us were the "only one like me."

Representation is crucial. Organizations like the National Park Service are working to diversify their staff, so that the public sees themselves represented and feels more welcome. However, it should be clear that bringing in more diverse staff or visitors is not charity. We're not just "extending opportunities to the marginalized." That kind of thinking can reinforce an unequal power dynamic. Instead, let's make sure we're seeing

(Continued on page 14)

Cal-IPC 30-Year Anniversary: Expanding Community to Protect Biodiversity

2021 Cal-IPC Symposium | Oct. 26-29 | Online

Photo credits, left to right: Shawn Thorin, Ian Torrence, Jessica Plance, Jose Gomez.

Join your land management colleagues to learn together and celebrate at Cal-IPC 30-Year Anniversary Symposium!

SYMPOSIUM FEATURES

Since the first gathering in 1992, the Cal-IPC Symposium has hosted more than 1,500 presentations, trainings, discussion groups, and field trips for thousands of participants. Last year was the largest meeting to date, with 650 attendees. Join us this fall to share the latest updates on effective tools, relevant research, and strategic management approaches while celebrating land management successes over the last three decades.

This year's theme highlights the interconnection between protecting biodiversity and broadening community engagement in stewardship. Presenters will be chosen to represent a variety of perspectives, and special talks will show how community involvement and biodiversity protection support each other.

Sessions focus on invasive plant ecology and management, but we fold in information on related topics of interest. Our program committee is exploring topics ranging from threats to rare plants to green jobs, from drone technology to invasive plant metrics for the 30x30

initiative to protect 30% of lands and waters by the year 2030. Many sessions provide DPR continuing education credits.

Our online platform is designed for easy interaction with your fellow attendees by participating in a discussion groups, talking to poster presenters, chatting with sponsors and exhibitors, and creating video meetups. Holding the conference online allows participation from farther afield than our traditional in-person conference. It also decreases the cost of Symposium registration, making attendance accessible to more people.

2021 STATEWIDE WMA MEETING

Join with participants from Weed Management Areas across the state to share information on funding, project design, new weeds, control techniques, early detection, mapping, and more.

SPECIAL SESSIONS:

- Invasive plant management to protect biodiversity in California and beyond
- Strengthening conservation by broadening community access

- Lessons learned from 30 years of invasive plant management
- New mapping tools to increase project effectiveness

SPONSORSHIP

Your organization can sponsor the Symposium! Help us keep registration affordable and support our work. Sponsoring organizations receive two or more free admissions, exhibitor space, recognition on Symposium materials, and membership benefits for 2022.

STUDENT CONTESTS & SCHOLARSHIPS

Student presenters who choose to participate in our student contests for talks and posters receive feedback from expert reviewers. Cash prizes are awarded to top presenters!

REGISTRATION

Visit cal-ipc.org/symposium to register, sponsor, submit an abstract, submit photos for the photo contest, and find the latest Symposium information.

New manual online: BMPs for Non-Chemical Control

Jutta Burger, Cal-IPC



Larger areas with invasive grasses can be managed with string trimmer crews that cut grasses before they set seed. Photo: Benjamin Dion.

Anyone who has spent time working on weeds has probably gotten into heated debates with friends, colleagues, and maybe even foes about how best to get rid of [fill in your invasive species nemesis] at a site. I know I have. Many of us have also at some point in our past seen a weed bounce back from what we thought was oblivion and had the rude awakening that the method we used failed because we applied it incorrectly, came in too early, too late, not often enough, or worked on a species that was resistant to whatever we were doing to it.

These problems are probably more commonly encountered with non-chemical methods than with herbicides because the tools used for non-chemical control typically don't come with instructions and generally require substantially more

investment and finesse to be effective. As a result, non-chemical techniques, critical components of integrated pest management (IPM), fail more often than they should because they are used in the wrong way, wrong time, wrong scale, or for the wrong species.

In order to fill this information void



Tarping is effective at killing some rhizomatous and deep-rooted species like bindweed and blackberry but may need to be left in place over several years in order to be effective. Photo: Friends of Five Creeks.

(and to put to paper the extensive knowledge practitioners have acquired across the state), Cal-IPC partnered with the University of California's IPM Program, led by Cheryl Wilen, to compile a rich, nearly 300-page manual, *Best Management Practices for Non-Chemical Weed Control*, available for free download from the Cal-IPC website library. The California Department of Pesticide Regulation (CDPR) funded the project through their Alliance Grant program and has been involved as a partner from the start. Many experienced practitioners contributed to the manual as primary authors, reviewers, and additional contributors to make it a relevant and robust resource for users across the state.

The manual consists of 21 chapters for non-chemical methods and an additional 18 chapters for biocontrol agents. In each section, readers will find: a description of a technique; how, when, and how often to apply it to control a weed effectively; the types of plants and site conditions in which it works well (and those in which it is not recommended); and hazards to both applicators and the environment. The manual builds on other excellent references, including Cal-IPC's *Weed*

Workers Handbook and the *Weed Control for Natural Areas in the Western United States* manual from the University of California Dept. of Agriculture and Natural Resources, both of which provide weed control guidance for specific species and are also available on the Cal-IPC website.

This manual, in contrast to the aforementioned books, is organized by technique rather than by species. As a result, the manual provides more comprehensive information about methods than it does for specific weeds. Techniques



Repeated cutting of above ground tissue of artichoke thistle with bladed tools will kill them over two years. Photo: Sandra DeSimone.

covered include (in no particular order): manual whole plant removal; severing subsurface structures; cutting with bladed hand tools; repeated cutting using clippers, loppers, and saws; string-trimming and brush-cutting; mowing with large equipment; grubbing with grub hoes; hoeing with scuffle hoes; flaming; steaming; tarping; solarizing; mulching; burning; grazing; chainsawing; whole plant removal with large equipment; grinding; girdling; mechanized tillage; competitive planting; and application of biocontrol agents active on 18 weed species (or groups of species) in California.

For simplicity — and by request of the CDPR — the manual is written for land managers who are using non-chemical techniques exclusively. All techniques described can also be complemented with select use of herbicides to improve their efficacy as part of an IPM approach. Chapters describe in detail where, at what scale, for which kinds of species, and when particular techniques will be effective and ineffective. If you are new to land stewardship, this manual will give you a much better feeling about knowing what you are doing the next time someone presses whatever their tool of choice is into your hand! You will also find out about new tools and modifications to old ones that make them more effective (like a modified digging bar for whole plant removal).

We hope that this manual will provide both practitioners and decision makers more clarity about where specific non-chemical techniques can be effective and

where they cannot. When restrictions are placed on the use of synthetic herbicides to fight weeds in natural areas, governing bodies usually implicitly assume that a similar level of weed control can be achieved with non-chemical alternatives and that labor resources are infinite. The manual describes where that assumption can fall short by estimating the level of persistence and labor investment necessary to achieve effective control using each technique. It also outlines each techniques' limitations at different spatial scales and levels of habitat sensitivity.

One sobering take-home for wildland stewards is that each technique has trade-offs, and often higher effectiveness comes at the price of increased distur-

bance or habitat impact. Lastly, though the techniques described may be effective at reducing cover of some species, they can only be successful at eliminating stands at small scales and may be ineffective or even counter-productive for some species — for instance, those that can propagate vegetatively.

The next phase of this project is building an online decision support tool using information from this BMP manual. The tool will help users compare efficacy of different non-chemical options for specific weed targets and situations.

Find the Best Management Practices for Non-Chemical Weed Control online at cal-ipc.org/BMPnon-chem

Environmental Protection Agency biological evaluation of glyphosate

Doug Johnson and Jutta Burger, Cal-IPC

Glyphosate, the active ingredient in Roundup and other herbicides, is the most studied herbicide in the world. Its widespread use has been a hot-button issue in the environmental community. The U.S. Environmental Protection Agency (EPA) recently released a draft Biological Evaluation (BE). The BE's purpose in part is to protect sensitive plant and wildlife species, which aligns with the goals of Cal-IPC and the natural lands stewardship community. We all need to be aware of what the best science says, and to incorporate that into management approaches.

However, the BE does not provide much useful information for those using glyphosate for invasive plant management in natural areas. We have submitted a comment letter on behalf of Cal-IPC, pointing out several concerns. In evaluating the impacts of glyphosate on sensitive plants and wildlife, the BE assumes that applications are the same as those on any other non-agricultural lands (such as roadsides and landscaping). By not also addressing the use case for natural areas, using real-world application rates and methodologies that are limited in duration

and area, we believe the BE significantly overestimates risk to sensitive plants and animals for this use case. Such an overestimate may result in more harm to sensitive species by removing an effective tool from the IPM toolbox.

In their assessments, the EPA appears to use an application rate of 40 lb a.e./acre while typical application rates in natural lands stewardship are in the 1-8 lb a.e./acre range (with the upper range usually only achieved by multiple applications). Often the effective rate per acre is substantially lower because the plants being treated are sparsely distributed across the landscape.

The BE is not always clear when describing impacts attributable to glyphosate itself versus impacts from formulations that include glyphosate as well as other ingredients. Surfactants and other ingredients in a formulation can have impacts if used in the wrong setting; some have been restricted to only terrestrial habitats away from waterways since their original release.

Some of the impacts, such as to insects dependent on vegetation, seem to be

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The California Landscape Stewardship Network: Policy initiatives

The California Landscape Stewardship Network formed in 2016 as a “network of networks.” Collaborative regional stewardship networks share resources with other similar regional networks. Their website currently lists 30 such regional networks across the state. As we know from invasive plant management, collaboration is essential to success at the landscape level.

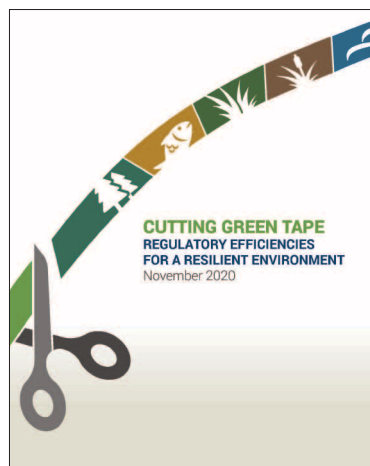
Along with peer-to-peer support for each other, the network is pursuing several policy initiatives. This article highlights three current initiatives.

Cutting Green Tape (CGT)

The CGT initiative pursues regulatory efficiency for a resilient environment. As many of us have experienced, environmental regulations can sometimes impede environmental projects (including invasive plant management).

The network organized workshops with experts and representatives of the California Natural Resources Agency. These meetings brought together the collective experience of 150 individuals from regulatory agencies, local governments, nonprofits, public and private landowners, tribes, and a range of other stakeholders. They developed a list of ways to support restoration activities by increasing permitting effectiveness, expediting project review and approval, and improving cross-jurisdictional collaboration.

The network recently published a report on their website featuring 14 key recommendations. Secretary Wade Crowfoot of the Resources Agency has released a memo detailing initial steps for implementing the recommendations.



Protecting biodiversity through Early Detection and Rapid Response (EDRR)

Last October, Cal-IPC and the network published a report describing the importance of early detection and rapid response for protecting California's biodiversity from invasive plants. The report makes a range of recommendations for state agencies, such as providing steady funding to county Weed Management Areas (WMAs).

For local entities, the recommendations can be simplified to:

1. Set strategy based on species mapping, at scales from local to regional (see calweedmapper.org).
2. Map species and share data in Calflora (see calflora.org).
3. Collaborate with partners through WMAs (see cal-ipc.org/wmas).
4. Use best management practices (see cal-ipc.org/bmps).

Cal-Rec Vision

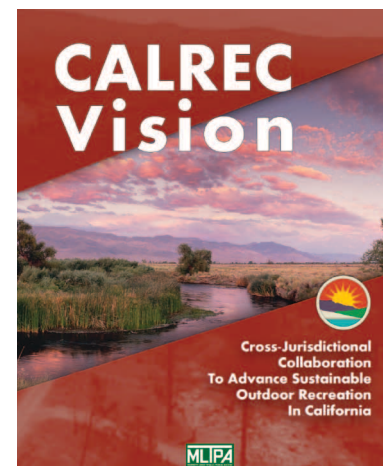
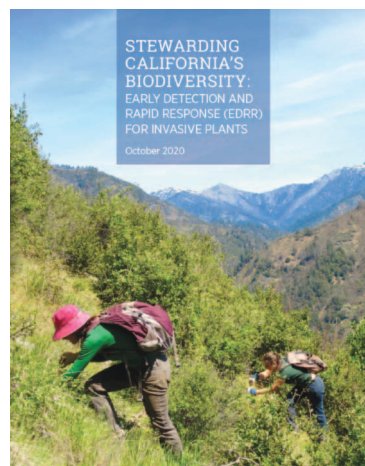
Outdoor recreation on California's public lands provides great societal health benefit as well as economic benefit, adding up to about 691,000 jobs and \$92 billion in economic impact. Challenges result when recreation management is not consistent and

well-coordinated. Without cross-jurisdictional collaboration among federal, state, regional, and local entities, institutional silos lead to operational inefficiencies and duplicate efforts among agencies working with stretched resources and budgets.

Conflicting public-access rules and fees for similar recreational experiences — sometimes on neighboring public lands — create tension, drive visitation patterns, and impact natural resources. Greater demand for equitable access to outdoor recreation for all Californians has highlighted systemic institutional and cultural barriers that have excluded underserved communities from the outdoors.

The network recently participated in development of the newly published Cal-Rec Vision, which aims to set a course for sustainable management of our landscapes that support outdoor recreation. Like the two other initiatives described here, the fundamental need is to “build collaborative capacity.” Working together is an easy concept, but difficult to implement within our complex organizational environment.

All publications described here can be found at calandscapestewardshipnetwork.org/resources-library



Volunteer spotlight: CNPS – Santa Clara Valley Chapter

Doug Johnson, Cal-IPC

The Santa Clara Valley Chapter of the California Native Plant Society (CNPS) organizes stewardship at numerous locations in municipal and regional parks. This article focuses on work at the City of San Jose's Alum Rock Park, the state's oldest municipal park. The park is a square mile in size, located in the foothills of the Diablo Range on the eastern edge of the city. Its trails are used by hikers, bikers, equestrians, and high school cross-country teams.

CNPS volunteers and work crews, led by Stephen Rosenthal, began working in the park in 2011. They started in the overlook area at Inspiration Point, which features grassland with Ithuriel's spear, fiesta flower, blue-eyed grass, soap lily, yarrow, and blue dicks and a woodland with coast live oak, valley oak, and blue oak. After a few years, they have significantly reduced the level of yellow



San Jose Conservation Corps crew members work on one of the Cape-ivy sites. Photo: Stephen Rosenthal.

EPA biological evaluation of glyphosate

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based simply on the removal of that vegetation, not any direct harm from the chemical itself. Removing plants with a hoe would have the same impact on insects that use those plants. Replacement of vegetation with native plants more beneficial to local fauna is not considered in the assessment.

While we appreciate the information compiled for the BE and certainly support the need to protect sensitive species and their habitats, we are concerned that the assessment as drafted could inadvertently hinder natural lands stewardship work that protects sensitive species and their habitat. This would be a counterproductive outcome. We encourage the EPA to look at the big picture and include in the next version of the BE an assessment of glyphosate risk in natural lands stewardship.



Stephen Rosenthal



Stephen Rosenthal

Before and after Cape-ivy removal at a Penitencia Creek site. Photo: Stephen Rosenthal.

starthistle (*Centaurea solstitialis*), Italian thistle (*Carduus pycnocephalus*), and milk thistle (*Silybum marianum*).

In "Fire Meadow," where wildfire had recently opened the canopy, crews planted 20 trees — including hollyleaf cherry, elderberry, and California buckeye. The new sprouts, donated by Central Coast Wilds, were placed within cages to protect them from deer browsing. Volunteers also propagated hundreds of native plants from seed gathered in the park. On sites that are relatively inaccessible from roads, weeds like poison hemlock (*Conium maculatum*) and black mustard (*Brassica nigra*) are piled on site.

In 2020, Steve trained his sights on removing numerous Cape-ivy (*Delairea odorata*) infestations from Penitencia

Creek, which flows out of Alum Rock Park and into Coyote Creek, emptying into the southern end of San Francisco Bay. By removing these incipient populations, the CNPS team is keeping the riparian weed from spreading further in the watershed.

Great talks online

The CNPS Santa Clara Valley Chapter maintains an excellent archive of video recordings on YouTube, chapter presentations, talks from Northern California Botanists' conferences, and CNPS Conservation conferences. Visit the channel at youtube.com/c/CNPSSantaClaraValley/ or find the chapter website at cnps-scv.org

Insect apocalypse and non-native plants

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of many threats to insects, but they are an issue the public can act on. Because landscaped urban areas may cover as much as 20% of the Earth’s habitable land by 2030, this issue centers in our own neighborhoods (Marinelli 2020). We can provide insect havens by removing invasive species and planting native species that support insects. We can also help the larger effort to understand native and non-native species distributions by using community science tools like Calflora and iNaturalist to record our observations. For insect monitoring in particular, iNaturalist is on its way to becoming the largest single source of species-level occurrence data, placing the public in the driver’s seat of insect monitoring (Wagner et al. 2021).

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Mentorship makes a difference

(Continued from page 8)

different perspectives as strengths. Let’s respect the skills and knowledge that other groups bring to the equation. As institutions, our intentions need to start from that perspective. Individuals already have a relationship with nature. Let’s honor that and strengthen it.

To that end, it’s vitally important to build bridges with groups already working to connect diverse audience to nature and partner with them. Don’t miss opportunities to incorporate local knowledge. There is a natural tie to join with those that have these interests already and form partnerships that build on their potential.

It’s also important that organizations like Cal-IPC, our National Park Service, and other land management agencies set aside the time and space to discuss how ongoing work for equity and diversity can be incorporated into everyday operations through mentorship and other means. These efforts may bring up difficult issues. But, as a person of color, it makes me feel valued. It makes me feel seen. It helps us to remember that national resource work is not just about the plants. Taking care of the land is about taking care of our people, too.

Find links to join the Justice, Equity, Diversity, and Inclusion (JEDI) mailing list, read Cal-IPC’s JEDI statement, or read more about JEDI in conservation at cal-ipc.org/JEDIconservation. Interested in joining the Cal-IPC JEDI Working Group? Email info@cal-ipc.org.



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June 5–13

[wildlife.ca.gov/conservation/invasives/
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CNGA's 14th Annual Field Day

June 11, Online
cnga.org/Events

Society for Ecological Restoration, World Conference

June 21–24, Online
ser2021.org/

SERCAL 2021

September 13-17, Online
sercal.org

NAISMA Annual Conference

September 27-30, Missoula, MO
and Online
naisma.org/conferences/

California Islands Symposium

October 18-22, Ventura, CA
californiaislands.net/symposium

Cal-IPC Symposium

October 26-29, Online
cal-ipc.org/symposium

Northern California Botanists Symposium

January 2022, Online
norcalbotanists.org

***"While climate change and
wildfires grab the headlines,
invasive species have so far
proved to be a far greater
threat to forest biodiversity in
the temperate world."***

— Gabriel Popkin, in *"Invasive Insects
and Diseases Are Killing Our Forests,"*
New York Times, Feb. 6, 2021.