Collaboration, Diversity, and Partnerships in Northern California Botany

THE THIRTEENTH SYMPOSIUM
PRESENTED BY

NORTHERN CALIFORNIA BOTANISTS
at California State University, Chico
13-15 January 2025

Collaboration, Diversity, and Partnerships in Northern California Botany

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Cover photo by Joshua Chenoweth, Yurok Tribe, provided by Pat Reynolds, River Partners, Heritage Growers. *Lupinus microcarpus* var. *densiflorus* established via broadcast seeding on the restored Klamath River following dam removal. The seed used to establish the lupines was produced by Heritage Growers who amplified source-identified stock seed provided by the Yurok Tribe under contract with RES. The restoration site is part of the largest dam removal project in the history of the United States. 20 May 2024.

WELCOME!

Northern California Botanists

welcomes you
to our thirteenth symposium

MISSION STATEMENT: Northern California Botanists (NCB) is an organization with the purpose of increasing knowledge about botanical issues concerning science, conservation, education, and professional development. Our primary objectives are to establish a communication forum via occasional meetings, scholarship funds for student research and special projects related to botanical problems and exploration in northern California, a job forum, and symposia that focus on the botany of northern California.

www.norcalbotanists.org

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Evaluation of 2025 Northern California Botanists Symposium

We'd love to hear your thoughts about this thirteenth NCB Symposium – we actively use ideas from these evaluations for planning future events!

Please fill out the online survey at Google Forms:

Or by going to:

https://forms.gle/BhPZSP46opLVZmFR7

PROGRAM OF PRESENTATIONS BY INVITED SPEAKERS

Bell Memorial Union Auditorium
California State University, Chico
(Abstracts of talks start on page 9; index to authors on page 37)

MONDAY, 13 JANUARY 2025

7:30 a.m. **Check-in for registered participants, late registration, and poster set-up**

ALL DAY **Posters on display** – Bell Memorial Union second floor Rooms 203 & 210
See also Session 6, Poster Session, Tuesday at 8:30 a.m.

Opening Remarks and Welcome

8:45 a.m.

1. Opening Remarks.
   Linnea Hanson *– President of Northern California Botanists*

8:50 a.m.

Welcome.
David Hassenzahl *– Dean, College of Natural Sciences, California State University, Chico*

Session 1: Collaboration and Partnership

9:00 – 10:20 a.m.

Session Chair: ***Kerry Byrne*** *– Cal Poly Humboldt*

2. Building Collaborations and Partnerships Along the North Coast.
   Crystal Kunz *– Bureau of Land Management, Arcata Field Office*
3. The Evolution of Public/Private Sector Partnerships for Building a Locally Sourced Seed Industry in California.
   Ed Kleiner *– Comstock Seeds*
4. Collaborative Conservation: Community Action to Transform Sausal Creek.
   Kate Berlin *–- Friends of Sausal Creek*
5. Ecological Restoration, Workforce Development, and Community Ctewardship at Heron's Head, San Francisco Bay.
   Patrick Marley Rump *– Literacy for Environmental Justice*

10:20 – 10:40 a.m. **Break**

Session 2: Coastal Botany: Plant Life, Restoration, and Management

10:40 a.m. – 12:00 p.m.

Session Chair: ***Karen Holl*** *– University of California, Santa Cruz*

6. Reintroduction of the Ben Lomond Wallflower (*Erysimum teretifolium*): Experimental Examination of the Roles of Soil Disturbance, Genetic Factors, and Habitat Conditions in Recovering an Endangered Plant Endemic to the Santa Cruz Sandhills.
   Jodi McGraw *– Jodi McGraw Consulting*
7. Restoring Coastal Grassland on Deeply Scraped Soils in Monterey County, California.
   Andrea Woolfolk *– Elkhorn Slough National Research Reserve*
8. Asilomar State Beach and Fort Ord Dunes State Park Restoration: Compare and Contrast the Past and Future.
   Amanda Preece *and* ***Nicole Leatherman*** *– Monterey District, California Department of Parks and Recreation*
9. Restoration of Native Coastal Salt Marsh and Dune Mat Communities at the Ocean Ranch Unit of the Eel River Wildlife Area, Humboldt County, California.
   Kelsey McDonald *– California Department of Fish and Wildlife*

12:00 – 1:20 p.m. **LUNCH**

12:15 – 1:00 p.m. **An informal discussion on collaboration, diversity, and partnership will be held in Colusa Hall.**

Session 3: Oak Restoration and Conservation

1:20 – 2:40 p.m.

Session Chair: ***Nicole Jurjavcic*** *– Stillwater Sciences*

10. Conifer Encroachment and Removal in Oak Woodlands: Influences on Ecosystem Physiology and Biodiversity.
    Lucy Kerhoulas *– Cal Poly Humboldt*
11. Novel Climate Change Adaptation Strategies for Conserving Drought-Adaptive Blue Oak Genotypes in California.
    Alissa Fogg *– Point Blue Conservation Science*
12. Mediterranean Oak Borer and Other Pests and Diseases of Oaks.
    Michael Jones *– U.C. Agriculture and Natural Resources, Cooperative Extension, Mendocino County*
13. North Coast Oak Woodland Restoration: Oregon White Oak and Black Oak Tree Response to Release from Douglas-fir Encroachment.
    Yana Valachovic *– U.C. Agriculture and Natural Resources, Cooperative Extension, Humboldt and Del Norte Counties*

2:40 – 3:00 p.m. **Break**

Session 4: New Discoveries

3:00 – 4:20 p.m.

Session Chair: ***Len Lindstrand III*** *– Sierra Pacific Industries*

14. Rediscoveries, Range Extensions, and Otherwise Notable Collections while Creating the Upcoming Flora of Nevada County.
Shane Hanofee

15. A New Subspecies of *Oenothera deltoides* from the Eastern Antioch Dunes Sand Sheet in the San Francisco Bay-Delta Region.
Molly Ferrell *– California Department of Water Resources*

16. Newly Described *Atriplex gypsophila* (Chenopodiaceae) and a Summary of the Annual *Atriplex* Species of California's Great Valley.
Rob Preston

17. A New *Carex* for California: *Carex holmgreniorum*.
Steve Matson

Session 5: Lightning Talks

4:20 – 5:00 p.m.

Session Chair: ***Kristen Kaczynski*** *– California State University, Chico*

18. Mysteries in the Mountains: the Flora of the McGee Creek Watershed, Mono County.
Matthew Yamamoto *– California Botanic Garden and Claremont Graduate University*

19. Maintaining Healthy Stands of *Stipa pulchra* Using Fire and Grazing.
Julia Michaels *– Hedgerow Farm*

20. Klamath Mountains Vegetation Mapping and Classification.
Annie Allen *– Cal Poly Humboldt*

21. Post-Fire Seed Predation in a Mixed Conifer Forest.
Victoria Mattsson *– University of California, Davis*

22. Visual Preferences of Stakeholders Along the Sacramento River.
Brook Constantz *– University of California, Santa Cruz*

23. The Davis Rewilding Society: Lessons Learned from a Native Plant Student Organization.
Kees Hood *– University of California, Davis*

24. High Elevation Jeffrey Pine in the Southern Sierra Nevada.
Hugh Safford *– University of California, Davis*

Evening Activities

5:15 – 6:15 p.m. **Reception** – Colusa Hall
No-host bar with complimentary hors d'oeuvres.

6:30 p.m. **Banquet** – Bell Memorial Union Auditorium
Dinner tickets required.

Keynote Speaker

7:30 p.m. Bell Memorial Union Auditorium – EVERYONE IS WELCOME

25. Production of Native Seed Ecotypes to Support Diverse Large-scale Conservation Efforts in California.
Patrick Reynolds *– Heritage Growers and River Partners*

TUESDAY, 14 JANUARY 2025

8:00 a.m. **Check-in for late arrivers**

ALL DAY **Posters on display** – Bell Memorial Union second floor Rooms 203 & 210
See also Session 6, Poster Session, Tuesday at 8:30 a.m.

Session 6: Poster Session

(Abstracts of posters start on page 23; index to authors on page 37)

8:30 – 10:00 a.m. Poster Session – Bell Memorial Union second floor Rooms 203 & 210

Session Chair: ***Cherilyn Burton*** *– California Department of Fish and Wildlife*

Poster presenters will be available to answer questions.

Coffee and light refreshments will be available, free to attendees.

Second Day Opening Remarks

10:00 – 10:10 a.m.

Second Day Opening Remarks – Bell Memorial Union Auditorium
Jane Van Susteren *– Vice-President of Northern California Botanists*

Session 7: Landscape Level Fire

10:10 – 11:30 a.m.

Session Chair: ***Jane Van Susteren*** *– California Board of Forestry*

26. Evaluation of Effects of the Dixie Forest Fire on the Ephemeral Geophytes, *Dicentra uniflora* and *Dicentra pauciflora* (Papaveraceae) at Three Long-Term Study Sites in Butte County, Northern California.
Halkard Mackey

27. Manzanita Shrubs and Specialist Gall Aphids on Sites Recovering from Wildfire at Big Chico Creek Preserve.
Don Miller *– California State University, Chico*

28. Fire and Vegetation Trends and Cycles in the Southern Mayacamas.
Arthur Dawson *– Baseline Consulting*

29. Pírish Stewardship: Informal Observations on the Effect of Repeated Fire for Plants Stewardship at a Karuk-Owned Site.
Heather Rickard *– Karuk Tribe, Department of Natural Resources*

11:30 a.m. – 1:00 p.m. **LUNCH**

Session 8: Pollinators and their Mutualism with Northern California Wildflowers

1:00 – 2:20 p.m.

Session Chair: ***Rebecca Nelson*** *– University of California, Davis*

30. Floral Associations Documented in the California Bumble Bee Atlas.
Dylan Winkler *– California Department of Fish and Wildlife*
31. Acquisition and Environmental Filtering of Introduced Floral Microbes in the Blue Orchard Bee, *Osmia lignaria*.
Alexia Martin *– University of California, Davis*
32. Cross-Ecosystem Effects of Plant Invasions on Serpentine Plant-Pollinator Networks.
Rebecca Nelson *– University of California, Davis*
33. Pesticide Contamination of Butterfly Host Plants in the Modified Landscapes of California's Central Valley
Angie Lenard *– University of Nevada, Reno*

2:20 – 2:40 p.m. **Raffle, Auction, and Awards**

2:40 – 3:00 p.m. **Break**

Session 9: Now the Good News

3:00 – 4:20 p.m.

Session Chair: ***Russell Huddleston*** *– U.S. Environmental Protection Agency*

34. Coastal Prairie Restoration and the Recovery of Endangered Western Lily (*Lilium occidentale*) at Table Bluff Ecological Reserve in Humboldt County, California.
Kelsey McDonald *– California Department of Fish and Wildlife*
35. Why the Calflora Database is Such Good News.
Cynthia Powell *– Calflora*
36. Mapping Individual Vernal Pools within the California Central Valley.
Regan Murray *– San Francisco Estuary Institute*
37. Conservation Seed Collection for Rare Species Impacted by the Caldor Fire: Retractile Roots and Community Science Among the Lava Caps of Eldorado National Forest.
Kristen Nelson *– California Native Plant Society*

Closing Remarks

4:20 – 4:30 p.m.

Closing Remarks.
Linnea Hanson *– President of Northern California Botanists*

5:00 p.m. **Optional – Tour of the Chico State Herbarium**

Meet Lawrence Janeway, Ahart Herbarium curator, outside of the Bell Memorial Union Auditorium to walk across campus to the herbarium

POST-SYMPOSIUM WORKSHOPS

WEDNESDAY, 15 JANUARY 2025

Workshop 1: Riparian and floodplain habitat restoration at Bidwell-Sacramento River State Park.

Time: 8:30 a.m. – 1:30 p.m.

Location: Meet at Pine Creek Access parking lot off of River Road or can carpool to the site from Chico Park n Ride (directions will be sent to participants prior to the date). Hiking boots or rubber/muck boots recommended. Will go rain or shine.

Leaders: **Michael Rogner**, Associate Science Direction, River Partners and **Ryan Martin**, Natural and Cultural Resources Manager, Northern Buttes District, California Department of Parks and Recreation

Join State Parks and River Partners on a tour of habitat restoration sites within the Bidwell-Sacramento State Park. The first stop will be the Brayton Unit, where 25-acres of former walnut orchards were restored (2021) to mixed riparian forest using over 30 native plant species. On a short hike through the restored forest, we will discuss the challenges in implementing and maintaining riparian habitat at a scale consistent with the State's ambitious 30x30 Conservation Plan. The group will then proceed a short distance downstream to the Indian Fisheries unit of the Park, where the project team is working with the Mechoopda and Yurok Tribes to increase frequency of floodplain inundation for the benefit of juvenile salmonids. This short hike through remnant habitat will focus on how diminished river processes resulting from a managed river system impact the native plant community, and what is being done to restore habitat resilience in a time when much of our native wildlife is in peril.

Workshop 2: How to develop a local flora. CANCELLED

Workshop 3: Employing climate resilient restoration tools for plant selection.

Time: 8:30 a.m. – 11:00 a.m.

Location: CSUC, Bell Memorial Union, Room TBD

Instructors: **Justin Luong**, Assistant Professor, Cal Poly Humboldt; **Ernesto Chavez-Velasco**, graduate student, Luong Lab, Cal Poly Humboldt; **Kerry Byrne**, Associate Professor, Cal Poly Humboldt; and **Erika Foster**, Director of Soil Research and Conservation, Point Blue Conservation Science

Grasslands provide a multi-faceted benefit to ecosystem functioning and services, but it may be unclear which species contribute most to different functional aspects of an ecosystem. To address these issues, The California Grassland Action, Science and Stewardship Network (GRASS-Net) worked to update an existing plant selection toolbox, originally developed by Point Blue Conservation Science. Join us for an interactive workshop as we provide a tutorial and Q&A session to discuss the newly updated GRASS-Net Plant Selection toolbox. The toolbox was developed from sourcing published information about the tolerances and ecosystem outputs for different native species and helps inform what mix of species will have best contributions to various ecosystem functions such as insectaries, drought tolerance, salinity tolerance and more. We will provide a step-by-step tutorial on how to use the toolbox and read its outputs to inform coastal grassland restoration projects with an easy R-Shiny interface. We will host Q&A periods throughout the tutorial and solicit feedback from participants at the end of the session to further tune our plant selection toolbox, and to inform the development of an additional selection tool that models which native plant species will perform best based on local climate and soil conditions.

ABSTRACTS OF TALKS

Abstracts are in chronological order; index to authors is on page 37.

1. **HANSON, L.**
2837 Mariposa Avenue, Chico, CA 95973. linneachanson@gmail.com

Welcome to oOur Thirteenth Northern California Botanists Symposium

I'd like to welcome all of you to our thirteenth symposium, *Collaboration, Diversity and Partnerships in Northern California Botany.* We hope you will enjoy the program that we have organized for you this year with great speakers and posters. Our keynote speaker, Patrick Reynolds, will address *Production of Native Seed Ecotypes to Support Diverse Large-Scale Conservation Efforts in California*. We plan to have seven lightning talks Monday afternoon before our reception. We again hope to provide botanists with a forum to listen to talks on a variety of subjects and to spend time socializing with each other. We have encouraged students to attend so please be sure to take time to meet them and for them to meet you. We will again have the poster session on Tuesday morning to provide ample time to view the many varied posters that have been submitted. Northern California Botanists is a cooperative association of Federal, State, Academic, Consulting and Other Botanists in the Northern California Region, with the purpose of increasing knowledge and communication about botanical issues concerning science, conservation, education and professional development. Have a great symposium.

2. **KUNZ, C.B.**
Bureau of Land Management, Arcata Field Office, 1695 Heindon Rd, Arcata, CA 95521.
cwelch@blm.gov

Building Collaborations and Partnerships Along the North Coast

BLM Arcata Field Office restoration efforts are supported through community partnerships between BLM, Cal Poly Humboldt, Mattole Restoration Council, California Conservation Corps, Tribal partnerships, Trinidad Coastal Land Trust, and Friend of the Dunes. Project development and implementation are done in coordination with these partners to accomplish high levels of success in relation to education and outreach, seed collection, native plant materials production, and habitat restoration activities for coastal prairies, dunes, and oak woodland projects funded by BLM. The management of local natural resources is dependent on sourcing local personnel from the ground up for these projects. BLM uses multiple funding mechanisms to support these partnerships including financial assistance agreements, interagency agreements, and contracts. Leveraging resources and partnerships allows BLM to create a network of knowledge and experience within the community that provides funding to support various small environmental non-profits bringing jobs into rural Humboldt County, CA.

3. **KLEINER, E.S.**
Comstock Seed, 917 Hwy 88, Gardnerville, NV 89460. Ed@comstockseed.com

The Evolution of Public/Private Sector Partnerships for Building a Locally Sourced Seed Industry in California

Comstock Seed has been collecting native seed for 40 years. In the early decades, individual seed lots were sold over a broad geographic region from the shortgrass prairie to the Sierra front, regardless of ecotypic variation. Most sales were dominated by generic non-native species such as Crested wheatgrass or drier pasture varieties. By the 1990's, we were beginning to see contract clauses requesting more localized seed sources and a few of our larger jobs included utility corridors that traveled through multiple ecotypes and seed blends were requested that reflected this variety. Provisional seed zones (PSZ's) were now being used in specifications for seed sources and by the early 2000's, advances in genomic tracking further delineated genetic variety within larger geographic areas that allowed us to define Seed transfer Zones. (STZ's) The use of these Seed zones has been brought to the seed markets, largely by the BLM regional seed buys that favored Source Identified (SI) certification. This presentation features the most progressive (and complicated) seed contract that our company has been awarded using PSZ's. We have

added a methodology to reflect the contract requirements that has helped us to organize and perform the acquisitions. Hopefully, this presentation will provide useful insights for others. The demand for local genetic varieties is currently overwhelming the seed industry and increasing amounts of Source Certified seed should be used for future growouts.

4. BERLIN, K.[1], GIORDANO, L.[2], MATSUDA, E.[3], and STENGER, E.[4]
[1]Friends of Sausal Creek, P.O. Box 2737, Oakland, CA 94602. kate@sausalcreek.org
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[3]Friends of Sausal Creek, P.O. Box 2737, Oakland, CA 94602. ella@sausalcreek.org
[4]Friends of Sausal Creek, P.O. Box 2737, Oakland, CA 94602. elena@sausalcreek.org

Collaborative Conservation: Community Action to Transform Sausal Creek

Friends of Sausal Creek (FOSC) presents two case studies supporting community engagement in ecological restoration planning projects in urban environments. Both projects were conducted in the lower Sausal Creek Watershed in Oakland, California, where urban development has led to a steady decline in access to and quality of natural resources. Following a feasibility study conducted by FOSC in 2022 to explore opportunities for ecological restoration and conservation within the lower watershed, we selected two sites identified in the study ("Barry Place" and "Wood Park") to further investigate and plan for their restoration and conservation. We developed a framework to engage local residents in collaborative project decision-making, including hands-on workshops, public meetings and digital feedback forums. The engagement framework was adjusted according to the preferences of the communities, including communication and meeting style preferences. In addition to these planning activities, we organized habitat restoration volunteer days, where community members directly participated in on-the-ground ecological restoration efforts, such as invasive species removal and native plantings. Water quality monitoring programs were also implemented, with local volunteers trained to collect and analyze water samples at designated monitoring sites. At the conclusion of both projects, over 100 local community members had participated in and contributed to the planning processes, volunteer days, and monitoring activities, demonstrating the framework's success in expanding community agency and integrating local residents in restoration planning and environmental stewardship.

5. RUMP, P.M.
Literacy for Environmental Justice, 1150 Carroll Ave., San Francisco, CA 94124
patrick.rump@lejyouth.org

Ecological Restoration, Workforce Development and Community Stewardship at Heron's Head Park, San Francisco Bay

Through collaborative efforts among multiple stakeholders, a former landfill in southeast San Francisco has been transformed into a thriving tidal wetland and shoreline park known as Heron's Head Park. Originally created in 1998, the park has recently undergone further transformative changes with the Baylands Climate and Living Shoreline Resiliency projects. These initiatives aim to preserve the urban wetland, mitigate the localized effects of climate change and sea level rise, and engage the community through nature-based solutions. A key focus of these projects is the intentional inclusion of BIPOC communities in the environmental field. This commitment seeks to build a diverse local workforce equipped to support emerging nature-based solutions within the region. To date, the project has successfully cleared several acres of invasive wetland and upland vegetation. Efforts are also underway to restore the degraded shoreline by cultivating and planting 65,000 native plants specific to the watershed. The project has yielded significant outcomes, including the creation of full-time jobs and paid internships, increased staffing and production at Literacy for Environmental Justice's (LEJ) native plant nursery, and enhanced tidal wetland functioning. Additional achievements include supporting the reintroduction of *Suaeda californica*, a federally endangered plant, to the San Francisco Bay, and converting nine acres of fire-prone, invasive landscapes into diverse, climate-stable perennial habitats., these efforts not only revitalize the local ecosystem but also foster a new generation of environmental workers and community stewards.

6. McGRAW, J.M.[1], WHITTALL, J.B.[2], JORDAN, Z.J.[1], KASTEEN, T.[3], WILSON, A.[4], and SANDEL, B.[4]
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[2]Santa Clara University, 500 El Camino Real, Santa Clara, CA 95053. jwhittall@scu.edu
[3]California Department of Fish and Wildlife, Bay Delta Region 3, 2825 Cordelia Road, Suite 100, Fairfield, CA 94534. tkasteen@dfg.ca.gov
[4]Santa Clara University, 500 El Camino Real, Santa Clara, CA 95053. bsandel@scu.edu

Reintroduction of the Ben Lomond Wallflower (*Erysimum teretifolium*): Experimental Examination of the Roles of Soil Disturbance, Genetic Factors, and Habitat Conditions in Recovering an Endangered Plant Endemic to the Santa Cruz Sandhills

Throughout California, species declines driven by anthropogenic factors necessitate efforts to re-establish extirpated populations and/or establish new populations to avert extinction. Successful (re-) introductions must address factors such as genetics, habitat conditions, and disturbance regimes, that will influence long-term population persistence. We explored these factors in an experimental reintroduction (2018-2020) of the state and federally endangered Ben Lomond wallflower (*Erysimum teretifolium* Brassicaceae) at the Bonny Doon Ecological Reserve (BDER), Santa Cruz County. We established wallflower through broadcast seeding, demonstrating the species' ability to complete its entire life cycle in the eight sites, and by outplanting seedlings, which experienced greater survivorship and reproduction than seeded plants due to their 'head start' in the greenhouse. There was no significant evidence of local adaptation, nor outbreeding depression in comparing the four genotypes of seedlings; however, hybrid crosses generally exhibited higher success, potentially reflecting heterosis: increased fitness from combining distinct genotypes. Among seeded plants, relative fitness was similar within the native-dominated silverleaf manzanita (*Arctostaphylos silvicola*) chaparral (sand chaparral) and maritime coast range ponderosa pine (*Pinus ponderosa*) forest (sand parkland), though the latter features more fertile soils that support dense exotic plants, which reduce wallflower growth and survivorship in the absence of habitat treatments. Soil disturbance ("tilling") increased wallflower growth, survivorship, and reproduction relative to raking alone, by loosening the soil and also reducing exotic plant competition. This research informed recent efforts to expand wallflower populations by seeding the rare plant into areas burned or bull dozed following a wildfire, to compare fire and soil disturbance as introduction treatments.

7. WOOLFOLK, A.M.[1], PAUL, M.[2], and FORTNER, B.[3]
[1]Elkhorn Slough National Estuarine Research Reserve, 1700 Elkhorn Road, Watsonville, CA 95076. amwoolfolk@gmail.com
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[3]Elkhorn Slough National Estuarine Research Reserve, 1700 Elkhorn Road, Watsonville, CA 95076. bill@elkhornslough.org

Restoring Coastal Grassland on Deeply Scraped Soils in Monterey County, CA.

Restoring California grasslands is often difficult, complicated by competition from exotic plants with persistent seedbanks and that are adapted to enriched soils. At the Elkhorn Slough Reserve, we had a unique opportunity to restore eight acres of grassland on former agricultural land. On this parcel, the top three feet of soil were removed from abandoned farm fields near the edge of the estuary and used to restore the adjacent subsided tidal wetland. Similar upland scraping was done on the property in the 1970s to create levees and reclaim marsh. The scraped areas created in the 1970s today host patches of native grasses and wildflowers uncommon in many other Reserve grasslands. We used these previously scraped patches and remnant prairie in the Elkhorn Slough area as reference sites, and propagated tens of thousands of native grasses and flowers, and increased a hundred pounds of native plant seeds to be planted on the scraped soils. The first five acres of scraped soils were planted and seeded in December 2018; the second three acres were planted and seeded in December 2021. We found that native plant success can be partly explained by soils – areas that retained topsoil are today dominated by exotic plants. Hand seeding worked better than tractor seeding; and with just a few exceptions, both hand seeding and planting nursery-grown plants resulted in a percent cover of native plants similar to reference sites. Exotic fescues are common in restoration plots, but do not appear to outcompete native species at our site.

8. LEATHERMAN, N.[1], and PREECE, A.[2]
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[2]Natural Resource Management, Monterey District, California Department of Parks and Recreation, 61 Reservation Road, Marina, CA 93933. Amanda.Preece@parks.ca.gov

Asilomar State Beach and Fort Ord Dunes State Park Restoration: Compare and Contrast the Past and Future

We present examples of historic dune restoration and how we use information from past projects to better inform current restoration efforts within the Monterey District of California State Parks. Located in Pacific Grove, California, the coastal dunes at Asilomar State Beach had been subject to unchecked trampling by livestock and visitors for many years before a restoration plan took shape in 1984. Using techniques like hydroseeding and out planting, Parks' staff restored the 25 acres of dune habitat, and it remains a regenerating system that provides habitat to over 60 species of native wildlife. It remains a thriving example of successful dune restoration. Since receiving Fort Ord Dunes State Park from the U.S. Army in 2009, Parks' staff have been working to restore native dune habitat and ecological function to the 979-acre park. Using methods first implemented with the restoration of Asilomar State Beach and additional methods to address Fort Ord's unique issues, Parks' staff are currently working to restore an 89-acre portion of the park funded by the creation of a new campground at Fort Ord Dunes State Park. These methods will then influence the techniques for restoration within the rest of the park. Though the sites have inherent differences in plant communities, scale, and historic site conditions, State Parks utilizes best-practices and local knowledge to restore the biodiversity and functional health of our coastal dune systems.

9. McDONALD, K.[1], RAY, J.[2], and VAN HATTEM, M.[3]
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[3]CDFW, Coastal Conservation, North Coast Region 1; 619 2nd Street, Eureka, CA, 95519. Michael.vanHattem@wildlife.ca.gov

Restoration of Native Coastal Salt Marsh and Dune Mat Communities at the Ocean Ranch Unit of the Eel River Wildlife Area, Humboldt County, California

The California Department of Fish and Wildlife (CDFW) is in the initial stages of restoring over 400 acres of coastal dunes and salt marsh at the Ocean Ranch Unit of the Eel River Wildlife Area with help from our many partners and funders. The Ocean Ranch Restoration Project includes the restoration of 219 acres of coastal dunes invaded by European beachgrass (*Ammophila arenaria*) and 193 acres of salt marsh invaded by dense-flowered cordgrass (*Spartina densiflora*). Ocean Ranch's native dune mat and salt marsh communities support many rare plant species that are threatened by the spread of these invasive grasses. The Ocean Ranch Restoration Project uses Integrated Pest Management, including the application of herbicide, prescribed fire, mechanical grinding, and manual pulling. Initial annual restoration monitoring results show progress and challenges in meeting restoration objectives, including reduction in the dominant invasive grasses, increasing native cover, increasing average native species richness, and maintaining or increasing federally threatened and state endangered beach layia (*Layia carnosa*). All treatments have immediately resulted in significant reduction in the dominant invasive species. Monitoring of this ongoing restoration project will be used to inform adaptive management.

10. KERHOULAS, L.P.[1], GOFF, G.S.[2], KERHOULAS, N.J.[3], BECKMANN, J.J.[4], KANE, J.M.[5], and SHERRIFF, R.L.[6]
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Conifer Encroachment and Removal in Oak Woodlands: Influences on Ecosystem Physiology and Biodiversity

Fire suppression in the western U.S. has altered species composition and disrupted traditional successional processes in many ecosystems. To investigate oak (*Quercus* spp.) woodland responses to conifer encroachment and removal, we measured oak water status (water potential), gas exchange (stomatal conductance), and water stable isotopes as well as plant, mammal, and bird diversity in an Oregon white oak (*Q. garryana*) woodland in coastal northern California before and after a conifer removal treatment. We found that encroaching conifers used shallower water sources than oaks late in the growing season, increased oak vulnerability to water stress under warm, dry conditions despite increasing oak water status, reduced oak gas exchange, decreased understory plant diversity, increased mammal diversity, and did not affect bird diversity. We also found that removing conifers did not significantly increase oak water stress, significantly increased oak gas exchange, particularly in heavily encroached stands, and did not have a measurable impact on plant, mammal, or bird diversity within the first two post-treatment years. Our data offer a mechanism, increased gas exchange, to explain the increased oak growth rates measured in response to conifer removal treatments. Our data also indicate that decreased vigor (gas exchange) and increased midday water stress sensitivity to dry conditions are likely responsible for the reduced drought resistance measured in encroached oaks compared to unencroached oaks. Given the climate projections for a hotter and drier future, these findings highlight the need for and potential efficacy of conifer removal as a tool to restore Pacific Northwest oak woodlands.

11. FOGG, A.M.[1], McLAUGHLIN, B.[2] and HERRERA, A.[3]

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Novel Climate Change Adaptation Strategies for Conserving Drought-Adaptive Blue Oak Genotypes in California

Climate change and drought has caused substantial recent mortality of the endemic California blue oak (*Quercus douglasii*), concentrated at the species' xeric range edge. Blue oaks are the foundational species in California oak woodlands and have been stewarded for millennia by Indigenous communities. Losing populations from the xeric 'trailing' edge of their range threatens their genetic diversity and climate adaptation potential. Because acorns cannot tolerate conventional seed bank storage, we evaluated a novel approach to conserve drought-adapted blue oak genotypes through field gene banking in partnership with working ranches. In 2018 and 2019, we collected and planted blue oak acorns from multiple trailing edge locations and 12 ranches we identified as planting locations in the northern part of their range. We monitored survival over 5-6 growing seasons. First year survival of local and trailing edge genotypes was sufficient to establish a viable population in a restoration context (84% vs. 57%, respectively). By July 2024, survival decreased to 49% and 32%, respectively. Local seedlings established in 2018 averaged 10cm taller than the trailing edge seedlings. Height was similar among seedlings planted in 2019. While moving and planting seeds from different genotypes is a new, relatively interventionist strategy, the risk of losing narrow-ranged, endemic oaks in a changing climate is also high. The dispersed field gene bank maintains options as transplants can be removed before reproductive maturity if needed, and trailing edge genetic resources will be preserved in multiple locations even as they are lost from their original populations.

12. JONES, M.I.[1], and EWING, C.[2]
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Mediterranean Oak Borer and Other Pests and Diseases of Oaks

The Mediterranean oak borer (MOB), *Xyleborus monographus*, is an invasive ambrosia beetle native to Europe, the Middle East, and North Africa, where it primarily attacks oak species. The first North American infestations of MOB were confirmed in Valley oaks (*Quercus lobata*) in Napa County, California in late 2019, followed by Lake, Sonoma, Sacramento Counties in 2020. In 2024, MOB was also found in El Dorado, Mendocino, and Solano Counties. The insect has also been detected in 4 counties in Oregon. MOB attacks at least 12 species of oaks in its native range. In California, it has been found infesting all three native species of white oak: most commonly Valley oak and to a lesser extent, blue oak (*Q. douglasii*) and Oregon white oak (*Q. garryana*). All ambrosia beetles transfer fungi to their hosts which is utilized by both larvae and adults for nutrition. Some of these fungi can be pathogenic and cause tree diseases that may lead to tree decline and, sometimes, tree death. Oak trees infested with MOB are most easily identified by damage caused by the beetle's tunneling activity (galleries) in the xylem. Other signs and symptoms of MOB tunneling activity include boring dust in cracks of the tree bark, and sometimes oozing sap. However, incipient stages of MOB infestations have signs and symptoms common to other endemic and invasive oak pests, making earlier detection challenging. For more information and a MOB pest alert can be found here: https://www.ucanr.edu/sites/mobpc/

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North Coast Oak Woodland Restoration: Oregon White Oak and Black Oak Tree Response to Release from Douglas-fir Encroachment

North Coast oak woodlands, dominated by deciduous Oregon white oak (*Quercus garryana*) and California black oak (*Q. kelloggii*), have long been central to the ecology and culture of the region. Oak woodlands support high levels of biodiversity and provide unique habitat for wildlife, and are deeply rooted in the human history of the region, as oaks have both sustained and been sustained by Native Americans, ranchers, and other local groups throughout recent history. However, management, lack of management, and landscape changes over the last century have altered these ecosystems, and both black and white oak woodlands are in decline throughout their ranges. One of the primary concerns in North Coast oak woodlands is the absence of the disturbance regimes that historically shaped and maintained these ecosystems. Both black and white oak woodlands are fire-adapted, depending on frequent, low- to moderate-intensity fires to prevent the establishment of invading fire-sensitive vegetation and supply conditions suitable for regeneration. Fire exclusion over the last century has resulted in both direct and indirect impacts to oak woodlands, affecting their recruitment and persistence, stand structures and fire regimes, and overall ability to persist on the landscape. The purpose of the research project was to assess the effectiveness of conifer removal treatments in Humboldt and Trinity Counties and provide guidance to agencies and operators interested in doing this work. We evaluated three key aspects of woodland restoration: 1) tree and stand-

level responses to different oak release treatments; 2) mechanisms of oak decline in encroached stands and trajectory of oak health post-treatment; and 3) a survey of treatment costs and the ease of implementation and longer-term maintenance. This work demonstrated the effectiveness of managing Douglas-fir (*Pseudotsuga menziesii*) encroachment into Oregon white and California black oak woodlands and provided critical data regarding the response of stand health variables, floristic diversity, wildlife habitat values, fuels, among other variables.

14. HANOFEE, S.
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Rediscoveries, Range Extensions, and Otherwise Notable Collections while Creating the Upcoming Flora of Nevada County

During the production of the first county-wide flora of Nevada County, extensive field research was conducted to document general occurrence data and to verify historical and rumored plant taxa that were weakly supported but thought to be present within the county. Though the field surveys most often resulted in failure to locate the targeted taxa, these excursions led to the unplanned discovery or rediscovery of several notable species that will be added or confirmed for inclusion in the flora. This work also led to the discovery of several likely undescribed taxa which warrant awareness and further study, with one such species currently in publication as new to science. In most cases, these plants are charismatic and in well-traveled areas, not morphologically cryptic species or the result of any extraordinary effort to reach difficult-to-access or understudied locales. These results highlight the gaps in our knowledge of plant distributions and the likelihood that undocumented diversity still remains to be revealed throughout much of California.

15. THORNE, K.M.[1], JONES, S.F.[2], MILANO, E.R.[3], O'DELL, R.[4], FERRELL, M.[5], and VANDERGAST, A.G.[6]
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A New Subspecies of *Oenothera deltoides* from the Eastern Antioch Dunes Sand Sheet in the San Francisco Bay-Delta Region

California contains exceptional biodiversity in geography and plant life, including numerous endemic species, some of which are cryptic. The *Oenothera deltoides* species complex represents a prime example of cryptic diversity. Here, we will discuss a new subspecies of *Oenothera deltoides, O. deltoides subsp. julpunensis* that is a local endemic of windblown sand deposits on the eastern Antioch Dunes sand sheet in the San Francisco Bay-Delta region of California, USA. In this region two *O. deltoides* subspecies are currently recognized: *O. deltoides subsp. howellii* and *O. d. cognata*. Subspecies *O. d. howellii* is a federal- and state listed endangered plant and while conducting field surveys for *O. d. howellii* in the summer of 2019 acute observers commented that some of the plants may be morphologically unique. With the goal of providing clarity to managers and better understanding of California's diverse flora, we addressed the puzzle of *O. deltoides* by combining range-wide field surveys with modern genomic tools. We will discuss the proposed subspecies, its ecology and distribution. As a somewhat cryptic local endemic with small population size and disappearing habitat, the proposed subspecies would benefit from conservation and management to persist as a member of the California flora.

16. **PRESTON, R.E.**
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Newly Described *Atriplex gypsophila* (Chenopodiaceae) and a Summary of Annual *Atriplex* Species of California's Great Valley

In California, the genus *Atriplex* is a diverse group of ca. 42 species and 53 infraspecific taxa, including shrubs, perennials, and annuals that typically grow in soils with a high level of salts. I recently described a new species, *Atriplex gypsophila* R.E. Preston, published in Madroño in 2024. This species occurs in the Interior South Coast Ranges from the Panoche Hills in Fresno County to the Kettleman Hills in Kings County. The plants grow on gypsum-rich marine sediments, in contrast with relatives that grow in alkaline soils on the floor of the Great Valley. I first collected it in 2001 and keyed it to *Atriplex vallicola*, based on the *Atriplex* key in the Jepson Manual first edition. Although I had studied rare annual *Atriplex* species throughout the Great Valley, it wasn't until 2017, when I visited the type locality for *A. vallicola*, that I realized the plants from the Coast Range foothills were not that species. I compared the foothill plants with other annual *Atriplex* species from the valley floor, in particular *A. vallicola* and *A. coronata*, and identified the key features that supported recognizing a new species. These three species can be differentiated morphologically by diaspore shape and size, leaf shape, and stature, and by their habitat association. It is likely that other annual *Atriplex* taxa still remain to be described in California.

17. **MATSON, S.**
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A New *Carex* for California: *Carex holmgreniorum*

I will present a story about discovering a species of *Carex* from Mono County which is new for California. Beginning in 2013, I photographed a *Carex* at a location called BLM Spring in the Fish Slough region of Mono County, just north of Bishop. I did nothing with these images until early 2022 when I posted them to iNaturalist. There are not a lot of reviewers of *Carex* observations, but the few that did chime it could not agree. A suggestion from Barbara Wilson lead to a resolution of this mystery sedge in 2023.

*****Numbers 18 through 24 are Lightning Talks*****

18. **MATTHEW YAMAMOTO**
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Mysteries in the Mountains: the Flora of the McGee Creek Watershed, Mono County

19. **JULIA MICHAELS**
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Maintaining Healthy Stands of *Stipa pulchra* Using Fire and Grazing

20. **ANNIE ALLEN**
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Klamath Mountain Vegetation Mapping and Classification

21. **VICTORIA MATTSSON**
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Post-Fire Seed Predation in a Mixed Conifer Forest

22. **BROOK CONSTANZ**
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Visual Preferences of Stakeholders Along the Sacramento River

23. KEES HOOD
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The Davis Rewilding Society: Lessons Learned from a Native Plant Student Organization

24. HUGH SAFFORD
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High Elevation Jeffrey Pine in the Southern Sierra Nevada

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25. REYNOLDS, P.
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Production of Native Seed Ecotypes to Support Diverse Large-scale Conservation Efforts in California

The production of source-identified native seed (seed of known genetic origin) is an essential component of restoring and enhancing resilient, high-quality habitat. The numerous steps required to produce source-identified native seed are complex, detailed, and must be implemented carefully and correctly to produce habitat restoration appropriate native seed. Heritage Growers (HG) has taken on the ambitious task of developing new ecotypes and producing large quantities of source-identified native seed to support conservation efforts in California. HG is a fully integrated restoration-appropriate native seed and native plant producer that includes a wildland seed collection team, a large-scale farming operation with 208 acres of native seed production and growing, a demonstration and research garden, seed cleaning facility, seed storage facility, and a nursery operation all designed to support habitat restoration efforts in California. HG is partnering with Federal, State and local agencies, non-profit organizations, tribes, conservation bankers, restoration contractors and landowners to provide the seed, plants, and guidance needed to successfully establish native vegetation that is appropriate for each restoration project. Pat will take you through the native seed production process, talk to you about the numerous and diverse ways that HG is working with partners to help them achieve their habitat restoration goals while weaving in the many intricacies involved in running a non-profit organization program that provides products that do not follow the economic rules associated with the production and sales of most commodities.

26. MACKEY Jr., H.E.
Retired Environmental Scientist, Chico, CA. littlebrownb@yahoo.com

Evaluation of Effects of the Dixie Forest Fire on the Ephemeral Geophytes, *Dicentra uniflora* and *Dicentra pauciflora* (Papaveraceae) at Three Long-Term Study Sites in Butte County, Northern California

Studies from 2009-2024 provide information of effects on these ephemeral geophytes following the Dixie Fire in summer 2021. Emergence of both is linked to snowmelt, with senescence in 5-6 weeks. Tubers and bulblets of *D. uniflora* develop in the shallow mineral soil and are deeper (2.5-4 cm), than the rhizomes and bulblets of *D. pauciflora* (1.5-2.5 cm). Data at 3 locations permitted surveys in spring of 2022, 2023, and 2024 to evaluate effects of fire. Preliminary results varied and were likely affected by heavy snowfall during the winter of 2022-2023. Observations include the following: 1) *D. uniflora* had reduced flower and leaf production in 2022 through 2024 and complete elimination at the scattered seed plot at Summit; 2) *D. uniflora* was also reduced from erosion and loose of duff at Summit and hazardous tree removal adjacent to the dirt roadway; 3) unburned or moderately burned scattered seed plots of *D. uniflora* and bulblet and rhizomes plots of *D. pauciflora* survived; and 4) there was increase of flowering of *D. pauciflora* in 2023, but it was not possible to determine if this was from increase snowfall in 2022-2023 or increase sunlight through a reduced canopy. Both have underground structures a few centimeters in the soil; thus, they can likely survive all but the most intense forest fires. The loss of these species in intensely burned areas may require decades, if not centuries for recovery, given the slow growth rates and long time periods for these species to reach maturity.

27. MILLER III, D.G.
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Manzanita Shrubs and Specialist Gall Aphids on Sites Recovering from Wildfire at Big Chico Creek Ecological Reserve

Fire is a major ecological process maintaining chaparral ecosystems in California. Following a 1999 wildfire at our study site in the Cascade Range foothills, I have tracked the appearance of young manzanita (*Arctostaphylos)* plants and their colonization by *Tamalia* aphids (Aphididae) beginning in 2003; hence I have collected data on rates of colonization by the gall-inducers *Tamalia coweni* and their inquilines (*Tamalia inquilinus*). My methods included mapping the spatial distribution of >500 host plants in a 1-ha study population using a Trimble® global positioning system (GPS) instrument and a Geographic Information System (GIS) to process data. I surveyed juvenile shrubs and a random sample of mature plants to estimate the frequency and timing of plants colonized by *T. coweni*. Additionally, I sampled galls over the growing season to estimate the frequency of inquilines occupying galls. My results show that, beginning in 2008, less than 4% of the 135 juvenile plants were colonized by *Tamalia coweni* as evidenced by the presence of new galls. The proportion of plants colonized has increased continuously: over 85% had been colonized by 2023. Assuming *T. coweni* colonizes young plants (sinks) from existing populations on mature plants (sources), these results may conform to a minimum dispersal distance hypothesis, although this remains to be tested explicitly. My data further suggest that *T. inquilinus* can disperse and colonize new habitats efficiently, in synchronization with *T. coweni*. My results have implications for patterns of evolutionary diversification in both gall-inducer and inquiline lineages.

28. DAWSON, A.[1], COMENDANT, T.[2], HENIFIN, K.[3], MICHELI, L.[4], THORNE, J.[5], and TUKMAN, M.[6]
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Fire and Vegetation Trends and Cycles in the Southern Mayacamas

We present vegetation and fire history for a study area covering about 50 sq. mi along the Mayacamas ridge between Napa and Sonoma Valleys. Catastrophic fires have regularly occurred here every forty to fifty years, in: 1880, 1923, 1964, and 2017. Indigenous elders provided long-term background for fire and vegetation patterns within a context where cultural burning was regularly practiced. Detailed fire and vegetation history was mapped with a suite of sources covering the period from 1870 – 2020. To compare the early land survey record with more recent vegetation maps, data was sorted into broad Lifeform and Forest Type categories. Fire history was assessed using CALFIRE-mapped burn perimeters dating to the 1940s along with narrative sources (e.g., newspapers) to extend the picture into the late 19th century. Frequent Burn Zones (FBZs) and Rare Burn Zones (RBZs) were identified and analyzed for vegetation changes and post-fire recovery. Results showed an overall decline in shrubland and an increase in woodland during the study period. The most fire-prone places were also where the most dynamic vegetation change occurred. In as little as three decades, places that were exclusively shrublands (100%) in the aftermath of fire became primarily woodland (75%), only to burn again within a few years. Catastrophic fires appear to show a correlation with woodland cover >60%. This has implications for guiding cultural and prescribed burning and other fuel reduction strategies. This work was funded under the CALFIRE Forest Health Research Program, Grant 8GG19813.

29. RICKARD, H.R.
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Pírish Stewardship: Informal Observations on the Effect of Repeated Fire for Plants Stewardship at a Karuk-Owned Site

The Karuk ("upriver") people have stewarded the middle Klamath River basin since time immemorial, contributing to an exceptionally biodiverse cultural landscape. Traditionally *pírish* or "plants" are tended for virtually every aspect of life: food, fiber, medicine, shelter, ceremony, etc. Although people use various traditional methods, one of the primary tools for vegetation management is fire. Despite settler Invasion and continued occupation of Karuk lands, Karuk people and Karuk Department of Natural Resources (KDNR) staff continue traditional stewardship practices, integrating them into collaborative management with agency and non-profit partners. One site in particular has pulled focus in recent years. After it was restored to Karuk ownership, Karuk people have been able to apply annual prescribed fire for cultural objectives at least once a year since (11 years). In this talk, we share successes and challenges, informal observations, and lessons learned for collaborative Tribe-led stewardship. Some of the impacts we have noticed include changes in native-invasive plant composition, cultural plant quality and access, and community benefit following repeated Indigenous-led fire at different seasons.

30. WINKLER, D.N.
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Floral Associations Documented in the California Bumble Bee Atlas

I present flora visitation data of bumble bees (genus *Bombus*) from three years of community science data in California. The California Bumble Bee Atlas is a community science initiative launched in 2022 to systematically, non-lethally survey bumble bees throughout California. To date, Atlas volunteers have documented over 18,000 observations of bumble bees and their associated forage plants. Bumble bees were observed visiting 342 plant genera in 2022 and 2023, and many more in 2024. I screened the floral associates for threatened, endangered, or CNPS Rare Plant Inventory rankings. Bees were recorded visiting several species of rare plant, including state and federally listed species. Bumble bees also visited non-native plant species, including several genera that contained native and non-native species like *Cirsium*. Bees visited certain genera more frequently than others, showing a preference for specific nectar and pollen sources. While bumble bees are generalist foragers, their wide use of rare or threatened plants demonstrates that even plants with limited distributions are important to them. Many rare plants also rely on pollinating animals to thrive, which underscores the interconnected nature of plant-pollinator conservation and management.

31. MARTIN, A.N.[1], STULIGROSS, C.[2], WILLIAMS, N.M.[3], NOROIAN, H.M.[4], MELONE, G.[5], and VANNETTE, R.L.[6]
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Acquisition and Environmental Filtering of Introduced Floral Microbes in the Blue Orchard Bee, *Osmia lignaria*

Microbial dispersal and subsequent establishment in a new habitat are often difficult to track in complex environments, but they underlie community assembly and microbial control efforts. Flowers host microbial communities which can be picked up and vectored by bees to new flowers, establish within the adult bee gut, or enter food stores for developing bee offspring (pollen provisions), offering a tractable linked system to examine dispersal and establishment dynamics. In this study, we experimentally introduced a community of microbes to flowers visited by foraging and nesting blue orchard bees (*Osmia lignaria*). Bacterial and fungal communities in flowers, adult bees, and pollen provisions were assessed prior to and after microbial introduction using amplicon sequencing and qPCR to determine: 1) if flowers are a route of microbial acquisition for bees and pollen provisions, 2) if environmental filtering occurs differently among habitat types, and 3) if there is transmission between the broader community of microbes present within each habitat. We reveal that focal microbial taxa were detected to varying degrees in all habitats but only after inoculation, demonstrating that flowers are a source of microbial acquisition for bees and pollen provisions. Overall, this study experimentally tracks microbial establishment through pollination networks, showing variation in the ability of microbes to colonize habitats within the bee-flower system.

32. NELSON, R.A.[1], WILLIAMS, N.[2], VALDOVINOS, F.S.[3], and HARRISON, S.[4]

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Cross-Ecosystem Effects of Plant Invasions on Serpentine Plant-Pollinator Networks

Whether anthropogenic global changes can have cross-ecosystem effects on plant-pollinator biodiversity remains an emerging ecological question. Evidence remains equivocal as to if plant invasions have competitive or facilitative pollinator-mediated indirect effects on native plant reproduction. This question, however, has been primarily explored within single ecosystems even though pollinators are highly mobile foragers that cross ecological boundaries. Here, we examine whether an invaded non-serpentine plant community has indirect, cross-boundary effects on the pollination, seed set, and plant-pollinator network role of the neighboring native serpentine plant community via spillover competition for shared pollinators. Leveraging a patchy mosaic of invaded, non-serpentine meadows that co-occur with native plant-dominated, serpentine meadows, we conducted an observational study to investigate this question in Northern California grasslands. We show that as the ratio of invasive to native plant flowers at the boundary increases, native plant pollinator visitation, seed set, and contribution to plant-pollinator network structure decreases. Thus, via indirect effects from spillover competition for shared pollinators, invasive plants can have cross-ecosystem effects on the pollination of native plants in a neighboring ecosystem.

33. LENARD, A.[1], HLADIK, M.[2], DITTEMORE, C.[3], and FORISTER, M.[4]

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Pesticide Contamination of Butterfly Host Plants in the Modified Landscapes of California's Central Valley

Non-target pesticide impacts are believed to be among the chief factors contributing to the declining viability of pollinator populations, especially in the most intensively managed and modified landscapes. Studies are needed that document pesticide drift and accumulation in green spaces adjacent to ag-

riculture and within cities. Here, we describe recent and ongoing efforts to document pesticide contamination of open spaces in Northern California, with particular focus on the contamination of plants used as larval hosts of butterflies. We also focus on contamination within National Wildlife Refuges, comparing interior plots to edge plots that border agricultural fields. We find ubiquitous contamination of plants across a range of habitat types and hypothesize that associated non-target impacts are contributing to the decline of not only the most rare and localized butterfly species but also more wide-ranging species whose historical population dynamics have depended on movement through low elevation and now-degraded habitats.

34. McDONALD, K.
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Coastal Prairie Restoration and the Recovery of Endangered Western Lily (*Lilium occidentale*) at Table Bluff Ecological Reserve in Humboldt County, California

Table Bluff Ecological Reserve supports a population of federally and state endangered western lily (*Lilium occidentale*) and many culturally significant plants in remnant native coastal prairie and scrub edge habitats. The California Department of Fish and Wildlife has partnered with the Wiyot Tribe and Mattole Restoration Council to restore coastal prairie and implement recommendations from the U.S. Fish and Wildlife Service for western lily recovery. The project passed a major milestone in December 2023 by removing native conifer encroachment from western lily habitat as well as many non-native trees and shrubs. In the summer following restoration thinning and winter grazing with goats, the reproductive western lily population increased by 63% to 147 flowering plants. Starting in 2025, an experimental pilot project will test coastal prairie restoration techniques to benefit western lily and culturally significant plants. The degraded pasture on the Ecological Reserve will be restored based on experimental pilot project results and Traditional Ecological Knowledge, and a small scenic nature trail will be created with interpretive signage highlighting the ecological and cultural significance of the area.

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Why the Calflora Database is Such Good News

California is the only state with a database like Calflora. The Calflora Database aggregates plant observations and specimens from thousands of sources. These observations and specimens are available for you from the Calflora website, an independent nonprofit database. The sense of completeness that each distribution map offers as well as the ability to drill down to the details of each record is good news for researchers, scientists, amateur botanists, and you. We all benefit from access to this collated data: such good news!

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Mapping Individual Vernal Pools within the California Central Valley

Vernal pools, ephemeral wetlands crucial for biodiversity, face significant threats from land-use changes and climate shifts. Accurate mapping of these ecosystems is essential for their conservation and management. The San Francisco Estuary Institute (SFEI), in collaboration with the California Department of Transportation, recently completed a project employing object-based machine learning methods to refine existing vernal pool system mapping within Vernal Pool systems, previously mapped by Carol Witham, across the central valley. Our methodology leverages an object-based image analysis and random forest algorithm, utilizing high-resolution LiDAR data and multispectral imagery. This approach represents an improvement on historical methods of heads up digitization, and provides an opportunity to efficiently map at scale to capture these sensitive features over a wider area as well as to support change analysis. Join to learn more about how this work improved upon inventories of sensitive wetland habitats and how SFEI continues to build upon this effort.

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Conservation Seed Collection for Rare Species Impacted by the Caldor Fire: Retractile Roots and Community Science Among the Lava Caps of Eldorado National Forest

The Caldor Fire started August 14, 2021, and burned nearly 222k acres in the Eldorado National Forest. Using existing data of rare plant populations mapped prior to the fire, CNPS worked with US Forest Service in support of rehabilitation efforts in the Caldor Fire scar by making conservation seed collections of three rare taxa affected by the fire: *Lewisia kelloggii* ssp. *hutchisonii* (Hutchison's lewisia), *Calochortus clavatus* var. *avius* (Pleasant Valley mariposa lily), and *Navarretia prolifera* ssp. *lutea* (yellow bur navarretia). To accomplish project goals, CNPS worked with more than 60 volunteer community scientists to help collect presence/absence and phenology data on the 750 total mapped populations in our data set throughout the season. CNPS staff then worked with volunteers and USFS staff to make conservation seed collections for these species. A portion of the seed has been put into long-term storage at the California Botanic Garden and the rest was retained by USFS for more direct, short-term rehabilitation goals in the forest. Through these seed banking efforts, we documented various aspects of the life history, habitat, threats, and current status of surveyed populations. We present novel documentation of a rare and unique phenomenon in some plants of retreating entirely underground after flowering via retractile root, a unique life history trait exhibited by *Lewisia kelloggii* – and how to collect seed from retreated plants! We also share successes and methods of working with a large volunteer group to accomplish specific project goals.

ABSTRACTS FOR POSTERS

Abstracts are in alphabetical order by primary author name; index to authors is on page 37.

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Site-Specific Variation in Plant Functional Traits Across Microhabitats Under Solar Panels in Coastal Grasslands

As the demand for renewable energy grows, photovoltaic (PV) systems are increasingly installed in sensitive ecosystems like coastal California grasslands. Unlike traditional large-scale solar farms, PV microgrids are smaller, distributed solar arrays that are integrated into the landscape, potentially altering local environmental conditions such as light and moisture availability. These altered conditions under solar panels create unique microhabitats that may affect plant communities. This study examines plant functional traits: plant height, specific leaf area (SLA), leaf dry matter content (LDMC), and lobedness. These traits were collected from the most dominant species: *Agrostis stolonifera*, *Anthoxanthum odoratum*, *Arrhenatherum elatius*, *Avena barbata*, and *Bromus hordeaceus*, among others at three coastal rangelands within Humboldt County in 2024. We assessed these traits in three areas relative to the solar panels: beneath the top edge of the panel (Top), under the bottom edge (Bottom), and in the open field between two rows of panels (Field) along six 100-meter transects. Functional traits are collected to help reveal how plants respond to these unique microhabitats caused by solar infrastructure. An analysis of variance (ANOVA) was conducted on the traits and found that LDMC varied by site but not by the panel position, while SLA differed significantly by site, and position. While SLA was highest at KNE, especially beneath the top edge of the panels. These findings highlight the importance of considering site-specific factors like soil moisture and solar radiation when installing solar installations on grasslands to minimize the impact it has on certain plant communities.

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Coast Redwood Seedling Survival Across Multiple Years in Regions Modeled as no Longer Suitable for Redwood Establishment

Coast redwoods (*Sequoia sempervirens*) inhabit a narrow band of coastal California, and species models suggest climate change is contracting the suitable range significantly. However, seedling recruitment is complex. Early climate change effects are expected at range extremes, yet exceptional abiotic conditions may allow for seedling establishment and persistence in microsites located within areas modeled as outside the seedling climate envelope.

In 2018, we began monitoring redwood seedling dynamics at Pepperwood Preserve in northern California (Sonoma County), on the edge of the species range, after a 2017 fire. We established two 20x50 m plots along an elevational gradient, tracking seedling germination and survival as well as temperature, humidity, and soil moisture. From 2018 through fall 2022, we observed healthy seedling recruitment each year, but by each fall's end, survival was generally <8%.

In late 2022, our plot partially burned due to prescribed fire, and winter 2022-2023 brought a series of atmospheric rivers, which ended the prevailing drought and saturated soils. Across the 2023 season, we observed significant seedling survival for the first time.

In 2024, we followed 2023 and 2024 seedling and site variables through November 2024. By summer's end 2024, most 2024 seedlings (88%, similar to years before 2023) had died, while more than 50% of the 2023 survivors were still alive. These results suggest that a narrow set of abiotic factors in a redwood seedling's first year may allow establishment at range extremes, even in locations deemed no longer suitable according to species climate models.

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Prescribed Fire Intensity and the Fuels that are Left Behind in California's Maritime Chaparral

Maritime chaparral burns at high severity, but also has unique fire intensities within sites due to weather, topography, and fuels. These differences cause unique fire effects, including fuel consumption and biodiversity. The San José State University NSF Wildfire Interdisciplinary Research Center collaborated with CALFIRE to prescribe a headfire within a steep canyon near Salinas, CA in October 2022 (the California Canyon Fire Experiment). This highly instrumented prescribed fire provided an opportunity to investigate the relationship between thermal and visible image measurements from drone, helicopter, and ground stations to fire effects. We used remote sensed imagery to describe fire intensity, including maximum temperature and duration at high temperatures, at plots across a range of fire intensities. We also compared published methods of measuring post-fire remaining twig diameter for *Adenostoma fasciculatum* (chamise) and *Salvia mellifera* (black sage), which can be used to estimate differences in fire intensity. We need to review these methods because there are more wildfires and prescribed fires occurring, and both researchers and managers want to assess fire effects. For prescribed fires, there are also concerns that those prescribed fires may not be hot enough to meet ecological goals. More understanding of fire effects within maritime chaparral fires is needed to grasp the implications on biodiversity, and refining methods of estimating fire intensity can help researchers and managers in this goal.

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Pine Hill Preserve – a Biodiversity Hotspot in El Dorado County

Pine Hill Preserve was established to protect rare native plants in El Dorado County, California that occur on a particular soil type known as gabbro. The 30,000-acre gabbro "island" stretches north from Cameron Park to Folsom Lake. This volcanically-derived soil forms an ecological island sandwiched between valley soils to the west, and mountain soils to the east. 740-plus plant taxa (native and exotic) have been recorded on the gabbro island and adjacent soils so that almost 7% of the plant species known in California are represented within this tiny fraction of the state, making it a nationally significant site of plant diversity. Eight plant species are rare or extremely rare; 5 are federally listed; 4 occur nowhere else in the world. El Dorado County gabbro plant communities are threatened by residential development and the suppression of the natural fire regime in the chaparral.

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The Underground Connection: The Effects of Fire Intensity on Soil Microbial Communities and Mycorrhizal Fungi in Blue Oak Woodlands

The 2024 Park Fire, the fourth-largest fire in California history, burned 429,603 acres across Butte and Tehama Counties. Unfortunately, climate change continues to stress ecosystems with prolonged periods of high temperatures and drought, resulting in larger and more destructive wildfires across California. Fire disturbance impacts soil chemistry, microbial communities, plant-fungal interactions, and ultimately soil health. While fire is a natural process in many California ecosystems, it remains unclear to what extent fire intensity influences soil fungal communities and ectomycorrhizal symbiosis in fire-adapted ecosystems such as blue oak woodlands. The mutualistic symbiotic relationship between *Quercus douglasii* (blue oak) and ectomycorrhizal fungi is a crucial plant-fungal interaction that facilitates nutrient and water exchange and supports soil erosion control. Given the essential role of these fungi, I propose investigating the effects of fire intensity on soil fungal communities and the survivability of ectomycorrhizal fungi in blue oak woodlands recently burned during the Park Fire at the Big Chico Creek Ecological Reserve. Soil cores will be collected beneath blue oak trees from areas impacted by high, medium, low, and no-fire intensity zones. Fungal communities and soil chemistry will be characterized from each soil core. Additionally, I will establish a greenhouse experiment to bait ectomycorrhizal fungi with blue oak seedlings from each fire intensity zone to assess post-fire survivability. This research will provide insights into the resilience of fungal symbionts in fire-impacted blue oak woodlands.

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Observational Support for Reduced Herbivory in the Perfoliate Bracts of *Mimulus glaucescens* (Shield Bracted Monkeyflower)

Mimulus glaucescens (syn. *Erythranthe glaucescens*) has long fascinated botanists and naturalists in northern California due to its unique perfoliate leaf morphology and its regional endemism, where it is known only from the foothills of the southern Cascade Range and adjacent northern Sierra Nevada. Perfoliation describes leaves that are completely fused around the stem, creating a cup or disk shape, and it has evolved independently in other plant species, such as in miner's lettuce *(Claytonia perfoliata).* Researchers have previously hypothesized that perfoliate bracts serve to impede or restrict movement by crawling herbivores, providing extra protection to the high value reproductive organs, in accordance with the optimal defense hypothesis. A study on *Mimulus glaucescens* by Katherine Toll, 2023 found that perfoliate bracts had lower probabilities of herbivory than basal leaves and could deter crawling herbivores, such as caterpillars, from reaching the floral apex of the plant.

Preliminary results from my Master's thesis also find observational support that perfoliate bracts experience reduced herbivory in *Mimulus glaucescens*. In spring 2024, I collected plant trait and herbivore data of *Mimulus glaucescens* spanning an elevation gradient across its range. I surveyed 30-50 plants from 10 populations with low elevation sites near Upper Bidwell Park into the Sierra foothills up to 1,220 meters elevation. A Chi-square analysis revealed that across plant organs, perfoliate bracts experienced a lower proportion of herbivore damage than basal leaves or flowers. My study finds further support that herbivore deterrence may be an evolutionary driver of perfoliation in *Mimulus glaucescens.*

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Priority Effects of Foliar Fungal Endophytes in Leaf Litter Decomposition

Foliar endophytic fungi (FEF) live inside the leaves of plants and are invisible to the unaided eye. These fungi have been shown to play important roles in plants by providing defense against pathogens and aid-

ing in water retention, particularly in hot, dry climates. However, the roles of some fungal endophytes remain unclear. The goal of this project is to investigate and determine which of these fungi are involved in the decomposition of leaf litter after leaves have fallen from trees. Since fungal endophyte communities are already present in the leaves before they abscise, they have the advantage of being established. This advantage allows them to increase their population size, which can influence the establishment of other fungal decomposers. The interactions between early colonizers and later arrivals can range from facilitation to complete exclusion, affecting the rates at which leaves decompose and influencing the carbon cycle. To investigate the roles of fungal endophytes in the decomposition of leaf litter and ultimately their influence on the carbon cycle, this project will aim to 1) determine how fungal endophytes influence the composition of leaf litter fungal communities through priority effects; 2) investigate the efficiency of fungal endophytes as leaf decomposers; and 3) determine how fungal endophyte communities and leaf litter communities change over time. By understanding the influence of fungal endophytes on leaf litter decomposition and the carbon cycle, the results of this project could have important implications for understanding and managing ecosystem services.

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Evaluating Local Adaptation to Drought in *Erythranthe guttata* Across Temporal and Spatial Scales

Drought is a critical selective force influencing plant growth, fecundity, and phenology. As climate change is expected to increase aridity globally, understanding plant responses to water stress is crucial for assessing population-level fitness and informing conservation efforts. This study investigates local adaptation to drought in 18 populations of *Erythranthe guttata* (formerly *Mimulus guttatus*), a species with a patchy distribution across seasonal wetland landscapes subjected to varying drought intensities. Using seeds collected during the historic 2010s drought, I examined phenotypic differences in a resurrection garden, comparing responses to two water treatments (drought and prolonged) across populations and years. Fitness-related traits measured included days to first flower, plant height, fruit number, and leaf production at first flowering. I hypothesize that drought responses will differ significantly among populations and years, with population fitness diverging between the beginning and end of the 2010s drought. Additionally, I expect individuals grown from drier years and populations seed sources to exhibit stronger fitness under the drought water treatment.

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Characterizing California Grasslands to Support Increased Species Diversity in Grassland Restoration

Ecological restoration projects often use a limited number of common species for planting or seeding efforts. However, common approaches for species selection may fall short of adequately mitigating biodiversity loss and recovering ecosystem functions. Functional traits are measurable plant characteristics that can assist with plant selection as they can inform mechanisms of establishment, guide selection to enhance ecosystem functions, and aid species diversification efforts. We asked 1) does functional trait diversity contribute to ecosystem functions and 2) what abiotic and biotic conditions influence functional

trait responses and species abundance? We assessed plant community composition at three remnant California grassland communities along a latitudinal gradient at three field sites in Humboldt, Sonoma, and San Luis Obispo counties. We measured functional leaf traits and assessed functional diversity metrics related to drought stress and resource use: specific leaf area, lobedness, leaf dry matter content, δ13C, and C:N. We sampled community aboveground biomass via plant clipping, and belowground biomass with root cores. We sourced digital raster data for annual precipitation and vapor pressure deficit. We used climate and soil data to assess environmental relationships with plant abundance, trait expression, functional diversity, and biomass. We expect functional richness or community-weighted trait means to correlate with biomass or plant abundance. These results may identify plant traits suited to local site conditions and inform plant selection to target desired ecosystem functions.

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Effects of Drought on Plant-Soil Feedbacks in Medusahead and Wild Oat

Medusahead (*Taeniatherum caput-medusae*) is a noxious weed in California that is particularly detrimental to rangelands due to its unpalatability. Medusahead produces dense thatch and outcompetes more palatable (though non-native) forage grasses such as wild oat (*Avena barbata*). Managing Medusahead and promoting forage grasses is an important goal for land managers. Although most research focuses on how competition affects Medusahead invasion, soil microbes may play a role.

All plants associate with soil microbes, which can promote or inhibit their own growth or the growth of neighboring plants. These plant-soil relationships produce feedbacks which can dictate invasion dynamics. These plant-microbe relationships are occurring against a backdrop of climate change; California is anticipated to experience more severe drought as climate change intensifies. Droughts can impact microbial communities and may change how plant-soil feedbacks in Medusahead impact invasion dynamics.

We tested whether Medusahead promotes beneficial microbes that boost its own growth (a positive plant-soil feedback), or whether it produces a detrimental microbial community that inhibits its own growth (a negative plant-soil feedback) under two rainfall regimes. Results suggest that both Medusahead and wild oat cultivate soil communities that inhibit themselves, and that these negative feedbacks weaken under drought. This suggests Medusahead associates with microbes that limit its growth without negatively affecting wild oat; future research should identify these microbial taxa as potential biocontrol agents. It also suggests Medusahead patches will become more persistent in the future; consequently, early intervention by land managers will be needed to control Medusahead invasion.

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Coast Redwoods with Signs of Past Drought Stress make New Needles that have Modified Hydraulic Structure by Reducing Surface Waxiness

Our previous study showed drought-stressed coast redwoods on our campus began recovery when conditions improved. We hypothesized that recovery might include changes in needle structure related to how easily water might be taken up, as coast redwoods absorb fog water through their needles.

Coast redwood needles have high phenotypic plasticity, and needle traits depend on relative position on the tree. Increased height correlates with hydraulic constraints that affect needle development, and overall water status is critical for needle development.

Stomatal density and needle wax fraction are two of the traits most correlated with coast redwood water uptake. We evaluated stomatal density and wax fraction in needles produced more than one year after the most recent drought ended. We used the wax fraction analysis technique outlined in Chin et al. 2023 and a modification of their stomatal density protocol.

Needles were collected in summer 2024 from an avenue of planted redwoods in Santa Clara County from trees assessed as healthy or stressed/recovering. We collected from lower canopy branches and stump sprouts, designating exposure as sun or shade.

For healthy and stressed-tree needles, stomatal densities were similar; although stomatal density was higher in the lower canopy than in sprouts. Sprout needles from healthy trees were significantly waxier than their canopy needles. Notably, sprout needles from stressed trees had significantly less wax than their own canopy needles, and less wax than healthy-tree sprout needles. This suggests that these redwoods recovering from drought stress are constructing needles that optimize water uptake over CO_2 uptake.

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Assessing the Impacts of Drought and Woody Debris on *Pleuropogon hooverianus* Development

The increasing frequency of drought poses a significant threat to biodiversity in California grasslands. *Pleuropogon hooverianus* (North Coast Semaphore Grass) is a listed threatened species endemic to California's north coast. While populations of *P. hooverianus* have been documented to occur naturally with woody debris on the soil surface, the interactions between woody debris and drought stress on plant development are poorly understood for land management. Our study explores the impacts of drought, woody debris, and their interaction on the development of *P. hooverianus.* In a controlled greenhouse in Arcata, CA, we tested the impacts of episodic drought, woody debris, and its combination on *P. hooverianus.* We measured soil moisture, above and belowground biomass, and functional leaf traits: specific leaf area, leaf dry matter content, relative growth rate. Measured traits relate to how plants allocate resources. As expected, drought reduced height growth rate and aboveground biomass, including live-green biomass, indicating drought limits growth. The drought treatment increased the proportion of standing dead biomass, further indicating drought-related stress. The interaction between woody debris and drought resulted in lower leaf dry matter content and a marginal increase in specific leaf area, suggesting that plants in this treatment prioritized resource acquisition. These findings suggest that while woody debris may initially buffer drought effects, it could reduce long-term drought resilience by altering resource use. Understanding their interaction can inform adaptive management strategies for population recovery during the increased frequency of droughts projected for California.

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Flora of the Boulder Creek Watershed, Jennie Lakes Wilderness, and Evans Grove Complex, Fresno and Tulare Counties, California

The Sierra Nevada in California features globally significant levels of plant diversity; however, floristic sampling within the mountain range has been extremely uneven, and undersampled areas remain. Floristic inventories in these sampling gaps frequently reveal new rare taxa and range extensions of known taxa. During the 2024 and 2025 field seasons, a floristic inventory of one understudied portion of the range in the vicinity of Big Meadows and Boulder Creek (Fresno and Tulare counties) is being conducted to search for novel taxa, document range extensions, and provide a comprehensive understanding of the local plant communities. Sampling for this research covers more than 200 km² of land and focuses especially on areas with known occurrences of rare species, no historical collections, and unique features associated with endemism. Approximately 1,400 specimens will be collected, identified, and deposited in herbaria to support the resulting voucher-based annotated species checklist and inventory. To date, over 720

specimens have been collected, including at least nine minimum-rank taxa with California rare plant ranks (CRPR taxa). In the first season of this study, logging activity has been documented in the vicinity of at least eight CRPR taxa, and cattle grazing has been recorded in the vicinity of at least four CRPR taxa. High-intensity fire, invasive species, recreation, logging, grazing, and climate change all represent significant threats to the plants of this study area; thus, conducting a thorough botanical inventory is essential to conserving plant biodiversity in this understudied portion of California's Sierra Nevada.

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Analyzing Soil Property Dynamics Beneath Photovoltaic Systems in Coastal Grasslands

The development of photovoltaic (PV) systems in coastal grasslands has the potential to provide renewable energy in rural areas where energy reliability is often a challenge. However, the impact of photovoltaic infrastructure on coastal grassland soil properties and ecosystem services has not been extensively studied. Our study examines the impact of photovoltaic (PV) systems on key soil properties, including bulk density, organic matter content, and moisture retention, across three coastal grassland sites throughout 2024.

For field sample analysis, three photovoltaic microgrid sites were sampled in Humboldt County. At the Lazy J and Kneeland sites, 32 soil samples were collected, divided among four replicates. Each replicate consisted of eight samples taken from four different panel positions: the lowest point of the panel (B), the center of the panel (C), the top of the panel (T), and the middle of the panel arrays (M). For each panel position, two samples were collected at two depths: 0-5 cm and 5-10 cm. The Airport site had a total of 56 soil samples among seven replicates.

By analyzing soil conditions beneath photovoltaic (PV) infrastructure, the study highlights opportunities to design agrivoltaic systems that prioritize long-term soil health while maintaining energy efficiency and agricultural productivity. The findings contribute to the development of multifunctional land use, integrating renewable energy with working landscapes, and provide insights for optimizing land-use practices that balance energy production with ecological sustainability.

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Salvage and Transplantation of Coast Lily, Swamp Harebell, and Point Reyes Ceanothus from Roadside Habitat in Sonoma County

Preceding critical roadside public safety and culvert repairs, we salvaged and transplanted individuals from three rare plant subpopulations in roadside habitat in Sonoma County that would otherwise have been removed: Coast lily (*Lilium maritimum*) (CRPR 1B.1), swamp harebell (*Eastwoodiella* [*Campanula*] *californica*) (CRPR 1B.2), and Point Reyes ceanothus (*Ceanothus gloriosus* var. *gloriosus*) (CRPR 4.3). Plants were manually salvaged, by digging up each bulb or plant by hand, or harvested as cuttings. All bulbs, plants, and cuttings were transplanted into areas with similar microhabitat variables (topography, aspect, soil, hydrology, and plant associates) in nearby roadside habitat. All hand tools were sanitized using 70 percent isopropyl alcohol to avoid introducing *Phytophthora* or other pathogens. Propagation, salvage, and transplantation of these species outside of nursery conditions is not well documented, and several practical lessons were noted in the field during the salvage and transplantation process. Continued monitoring will be conducted to evaluate plant survivorship and transplantation success. Results of this study may provide information regarding the effectiveness of salvage and transplantation for these rare species, be helpful to other practitioners, and useful in future roadway avoidance and minimization efforts.

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Nonnative Species Impact on Native Species Composition on Targeted BLM Riparian and Wetland Assessment, Inventory, and Monitoring (AIM) Sites.

The Assessment, Inventory and Monitoring (AIM) protocol for Riparian and Wetland ecosystems was developed by the Bureau of Land Management (BLM) to fill a need for the large-scale consistent monitoring of sensitive wetland and riparian areas. Under the AIM protocol, wetland areas are classified as sites exhibiting consistent hydrological influence with significant cover of plant species classified by the BLM as obligate or facultative wetland. Land managers use data collected through the AIM protocol to assess resource conditions and make management decisions such as invasive species removal and grazing allotment assessment. For the past three years, the California Native Plant Society (CNPS) collected AIM data across California in collaboration with BLM and the Colorado Natural Heritage Program. In 2024, CNPS AIM crews sampled 120 plots across California and Nevada R&W habitats. Using this protocol, we collected data on species richness for each plot, in which we can compare absolute cover of invasive, exotic, and native species across general wetland types within the California Floristic Province, Great Basin, and southern deserts. Our comparison will identify the most common exotic species across five watershed systems encompassing 25 plots across three years, with revisits assessed. Additionally, we will compare absolute cover of both functional groups to identify trends between habitat degradation and impacts, invasive species cover, and native species cover and richness. Protecting wetland and riparian areas from continued stressors is critical to ensuring robust ecological systems that are preserved across public lands.

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Investigating Putative Hybrids of *Fremontodendron decumbens* and *F. californicum* in the Sierra Foothills

Fremontodendron (Flannelbush, Fremontia) is a genus of shrubs in the Malvaceae (Mallow family) native primarily to California. There are three species in the genus, *Fremontodendron californicum*, *F. mexicanum* and *F. decumbens. F. californicum* is widespread, whereas *F. decumbens* is endemic to gabbro soils in the Sierra Nevada foothills and was listed as endangered in 1996. *F. decumbens* is mainly distinguished from *F. californicum* by its orange or reddish flowers and decumbent habit. Many plants with a decumbent habit but lacking the floral characters to be placed in *F. decumbens* have been collected over the years, and there has long been speculation as to whether these could be hybrids between *F. californicum* and *F. decumbens*. Here we investigated the potential hybrid origin of morphologically intermediate individuals using full genome resequencing data from 99 individuals of *F. californicum*, *F. decumbens* and potential hybrids, as well as a suite of 10 morphological characters measured in the field on 68 individuals. We found no evidence that the morphologically intermediate forms are of hybrid origin; rather, they generally group genetically with *F. californicum*. We also found that specimens from populations noted to be morphologically intermediate showed considerable overlap with *F. californicum*, but not *F. decumbens* in a morphological principal components analysis. The results lead us to conclude that *F. decumbens* is indeed a genetically distinct taxon, and that individuals of *F. californicum* with a decumbent habit, but lacking the distinct floral characters of *F. decumbens*, are not the results of hybridization.

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A Methodology Used for a Complex Seed Collection Contract with the USFS Involving Multiple Provisional Seed Zones

The Eldorado National Forest issued an RFP in the spring of 2023 for seed collection in proximity to the Caldor and Mosquito fires. This two-year contract involves the collection of 35 species totaling 350 lbs. with multiple collections of most species within 11 Provisional seed zones defined by temperature and aridity. These zones cover elevations from the western foothills at 2000 ft. to the Sierra crest at 8000 ft. We designed a methodology that incorporated the required FS contract documentation and allowed us to follow the floristic development through the spring and summer of 2023. Seed collections followed the elevational and aspect gradients of the Eldorado NF geography.

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Assessing Seed Density of Blue Wildrye (*Elymus glaucus*) for Restoring Native Flora in Burn Pile Scars in Northern California

This thesis examines the addition of native *Elymus glaucus* seeds to burn scars left behind after pile burning to aid the establishment of native flora post-fire. To achieve this, piles were built 1.5 meters tall and wide and burned in the fall of 2023. Piles were composed of understory species such as *Heteromeles arbutifolia*, *Ceanothus integerrimus*, *Pinus sabiniana*, *Arctostaphylos manzanita* ssp. *manzanita*, and *Arctostaphylos viscida* ssp. *viscida*. In December of 2023, the half-meter by half-meter quadrat in the center of each burn scar was hand-seeded with four different quantities of seeds: no seed (control), 0.5 grams of seed, 1.0 grams of seed, and 1.5 grams of seed. In May of 2024, all above-ground shoots were collected at each pile; then, they were dried and weighed for the biomass. Tukey multiple comparisons of means test showed significant differences between no addition of seeds and 0.5 gram to 1.5 gram densities at an alpha level of 0.05. This study found that at all densities, adding *E. glaucus* seeds in the burn scars produced more biomass of native vegetation than the control piles. These results suggest that using native perennial grass seeds, such as *E. glaucus*, as a restoration tool positively impacts burn scars. The research contributes to growing knowledge around post-fire restoration practices in oak woodlands.

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Northern California Prairie and Vernal Pool Complex Ecosystem: Thirty Years of Research and Teaching at the Tuscan Preserve

The Tuscan Preserve, a 60-acre conservation easement, was created on the Wurlitzer Ranch in northern Butte County in 1991 as a compensatory vernal pool and seasonal wetlands mitigation site for cumulative impacts of the buildout of a housing development in southeast Chico. Tuscan, Inc., developed and implemented a detailed mitigation plan to create 6 acres of seasonal wetlands and vernal pool habitat on the preserve and to establish a new, self-sustaining population of Butte County Meadowfoam. The preserve has been used for over 30 years as a teaching and research laboratory and ecological touchstone. Busloads of professional resource scientists, students, and other groups have been exposed to the natural resources and ecological attributes of the preserve in the field. Several graduate students have received their degrees pursuing advanced research in botany and ecology on the preserve; a multitude of professional resource scientists have toured, surveyed, and investigated the ecological characteristics of the preserve; hundreds of black angus and fairy shrimp and a few burrowing owls have foraged across the site for the last 35 years. The high-quality Northern California Prairie and Vernal Pool Complex preserve is open to ideas for research projects that could take advantage of an accurately mapped site, documented to great scientific detail, with a record of long-term baseline dynamics on the ranch and rangeland.

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Effects of Late Spring Snows in 2024 on Phenology and Survival of *Dicentra uniflora* at Carpenter Ridge and Scott's John Meadow, Butte County, Northern California

The ephemeral nature of *D. uniflora* required several years to understand its life history. It appears following snowmelt, flowers, and disappears in 5-6 weeks, during which fruit and seed production occur. Late snows do not normally occur after *D. uniflora* has emerged. Total rainfall and snowfall for 2018 and 2024 were similar. However, in 2024, Carpenter Ridge had late snows in April and May while *D. uniflora* was in flower. Data on seed set and seed production were collected in 2024 and compared with data from 2018. Frozen and non-frozen fruits were collected and counts of aborted, immature, and mature ovules were also made. Mean number of ovules per fruit were similar for 2018 (X = 48) and 2024 (X = 56) and was not significantly difference between frozen and non-frozen fruits in 2024. Percent seed set in 2024 of frozen fruits was significantly lower, 53.9% versus 90.4%, than for non-frozen fruits. Percent seed set was 81% on Ridge in 2018. Late snows were detrimental to fruit maturation and seed production. However, it is difficult, given the complexity of factors of (1) unpredictable spring weather patterns, (2) higher summer temperatures, (3) drier autumns with less and later precipitation, and (4) extremes from fires to know what the future of this ephemeral geophyte will be. This is especially true, since it may require 2 or more decades for *D. uniflora* to reach maturity, flower, and maintain a viable seed source within its range in California.

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A Functional Assessment Model for Upland Habitats: A New Tool Under Development to Measure Ecological Functions of Upland Habitats in California

Biological consultants are often tasked with characterizing upland habitats and assessing whether various projects will significantly impact habitats onsite or nearby but to date have had no objective tools to do this. The author is developing a set of models for measuring ecological functions in an objective manner to be used to establish baseline conditions, relative to the conditions in a region for the same habitat class, and then using the model to measure expected changes to each habitat function as a result of a specific project. This tool can be used to determine if the project would result in a significant change in one or more of the habitat functions. The functions would be measured and scored through measuring as a set of observable variables. This model can then be used to identify specific actions that can be taken to improve habitat functions as potential mitigation measures. Finally, it can then be used to monitor changes of the site over time. This tool follows the basic approach used by the U.S. Army Corps of Engineers and U.S. Environmental Protection Agency in their Hydrogeomorphic Assessment Method for wetland habitats.

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Fine Scale Grassland Mapping and Sampling in Select East Bay Regional Parks

California native grasslands are valued for their important ecosystem functions including providing habitat for common and special status wildlife and plant species, and their beautiful wildflower displays. However, little is known about the location, distribution, and composition of California native grasslands. Grassland sampling and mapping is needed to better understand this resource and inform management and protection. Nomad Ecology and Benson Bio Consulting partnered with Tukman Geospatial, East Bay Regional Park District, California Department of Fish and Wildlife Vegetation Classification and Mapping Program (Veg-CAMP), and the California Native Plant Society (CNPS) Vegetation Program to map 12,000 acres of grasslands over two years in 16 parks within the East Bay Regional Parks District. This

project ran concurrently with, and contributed to, a larger fine scale county-wide vegetation mapping effort in Alameda and Contra Costa counties. Our project goals were to use ground-based techniques to map native grasslands to the association-level and sample stands using CNPS/CDFW protocols. The team collected over 200 grassland relevés that were analyzed by CNPS and informed the Alameda and Contra Costa Counties Fine Scale Vegetation Classification, as well as grassland classification throughout the state. Initial results showed that native grasslands made up approximately 30% of the survey area. Over 50 different herbaceous vegetation types were mapped. Several new provisional herbaceous vegetation types were described as a result of this effort.

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Fire Effects on the Soil Seed Bank of Blue Oak Woodlands in Northern California

Fire is a critical ecological process in shaping oak woodlands through natural ignitions and indigenous practices. However, fire suppression has disrupted this balance, leaving gaps in understanding fire's effects. This study investigates the 2024 Park Fire's impact on the soil seed bank of seven blue oak (*Quercus douglasii*) woodland (BOW(S)) sites at Big Chico Creek Ecological Reserve (BCCER) in Butte County. Seed bank samples were collected 6 months prior to the park fire, and again 2 months post-fire. Samples were then prepped in lab and then trayed for grow out in a greenhouse to investigate seed bank response. Preliminary field data indicate moderate to moderate-high burn severity, with mixed in-situ severities influenced by site characteristics such as slope, aspect, elevation (268-353 m), and fuel types ranging from grass to woody shrubs. Ash depth (0-2 cm) and soil color (black/brown to red) varied across sites, reflecting burn severity. In the greenhouse, low-severity sites, like BOW 1 and BOW 2, show rapid initial germination and growth, while high-severity sites, like BOW 5 and BOW 6, exhibit slower germination and homogenization. Post-fire samples demonstrate higher germination and growth compared to pre-fire, potentially due to changes in C:N. Another notable preliminary observation is the emergence of increased germination of grasses in post-fire samples compared with pre-fire samples. As large wildfires continue to burn these ecosystems, it is more important than ever to understand fire's ecological effects on understory vegetation communities within blue oak woodlands at BCCER.

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Comparing the Root Traits of 20 California Grassland Species Under Experimental Drought Conditions

California is projected to experience more intense and prolonged droughts under current climate change trajectories, with abnormally dry years likely to be especially warm. Less consistent winter precipitation may lead to ecological mismatches between precipitation events and the physiological needs of plants. Ecological restoration aims to increase native biodiversity as well as resilience to environmental changes. Due in part to a lack of technical data, most restoration efforts utilize a small set of perennial species, which can result in biotic homogenization at the landscape level. By selecting for traits suited to local environmental conditions, trait-based methodologies have the potential to create more climate resilient outcomes in ecological restoration. While data about above-ground plant traits is relatively abundant, root traits such as specific root length and root tissue density are far less characterized. In order to achieve climate resilient restoration goals and avoid biotic homogenization, the root traits of lesser known and underutilized grassland species need to be characterized. We are proposing a greenhouse-based root trait study to assess drought resilience in 20 California grassland species, 15 "uncharacterized" and 5 "common", across four functional groups. Utilizing a "Lethal Drought Index" protocol, we will grow each species from seed in 20 pots containing 10 individuals each for a total of 200 individuals per species and subject them to varying levels of drought intensity. We hypothesize that common species with widespread

geographic ranges will exhibit a high degree of trait plasticity, while less common species will display a lower range of trait variability.

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Influence of Prescribed Fire on *Quercus douglasii* Resilience Post-wildfire

With an increase in uncharacteristic wildfires across California, many oak woodlands in California have seen notable degradation in vegetation community composition following wildfires. *Quercus douglasii* (blue oak) woodlands are the most abundant oak woodland species type in California. Prescribed fire has been used across these ecosystems to promote natural disturbance and reduce catastrophic wildfire risk. Despite this, wildfires do occur. This research examines *Q. douglasii* tree mortality within two months after the 2024 Park Fire in the Big Chico Creek Ecological Reserve (BCCER). We utilized long-term monitoring plots established pre-fire; seven plots with and four plots without prior prescribed fire. Plots were established in spring 2024, two months prior to the Park Fire, and trees 10cm or more in DBH were measured and assessed. Plots were sampled again in September 2024, two months post-wildfire. Trees were assessed for appearance of survivorship, presence of epicormic sprouts, and basal resprouting. Overall, *Q. douglasii* mortality was 55%, with 15% of the surviving trees exhibiting basal resprouting and 75% with epicormic shoots. There was a 69% mortality of *Q. douglasii* trees with pre-wildfire prescribed fire (N=67). Trees without pre-wildfire prescribed fire (N=53) had 38% mortality. These results suggest that prescribed fire treatments within *Q. douglasii* woodlands did not influence the survivorship of trees in the study following the 2024 Park Fire. Examining factors such as adjacent fuel loading, tree density, and fuel consumption may produce better indicators of wildfire tree mortality within *Q. douglasii* woodlands.

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Managing Ótakim Séwi (Big Chico Creek)

Healthy riparian corridors provide oases for native plants and animals, but creeks and rivers are often neglected in urban areas. Urban riparian corridors are especially vulnerable to invasion by neighboring horticultural plantings and noxious species. Ótakim Séwi (Big Chico Creek) is an ancestral fishing and resource area for the Mechoopda Tribe. This creek now runs through urbanized Chico and the Chico State campus in a condition of extreme neglect. We report preliminary findings based on vegetation surveys and GIS mapping on the Chico State campus of some unique threats to native biodiversity. These data will be used to create a complete management plan to guide rehabilitation efforts and priorities for native biodiversity along this urban riparian corridor, including improving habitat for the federal listed valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), and steelhead and spring-run Chinook salmon (*Oncorhynchus tshawytscha*) on the Chico State campus.

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Seed and Seedling Functional Trait Variation Across Life History and Experimental Growth Media

Plant functional traits are measurable characteristics that represent ecological strategies and can indicate fitness and success under certain environmental conditions. Traits vary based on environments that shape nutrient-acquisition strategies and life history strategies. Seedlings are extremely vulnerable and experi-

ence rapid changes, so understanding their traits and fitness under different conditions can help inform seed-based approaches to help bolster restoration outcomes. Early life traits are typically measured under controlled conditions for growth medium, light, water, and humidity. However, it is unclear how common laboratory growth media and life histories affect seed and seedling functional traits in some California native plants. Our hypotheses were: (1) seed and seedling traits will vary across life histories and (2) seed and seedling traits will vary across growth media. To assess our hypotheses, we quantified seed and seedling traits related to nutrient acquisition and survival. Ten species were selected in five pairs, with each pair containing an annual and perennial of the same genus. Eight replicates were grown per species in plates with 2% agar or field soil (n=8). We harvested seedlings seven days after germination and quantified functional traits. Preliminary results show that seed and seedling traits vary across life histories, and seed traits vary across growth media. This may indicate careful consideration of the use of seed traits for management depending on the context for which traits were measured, as traits measured in a greenhouse setting may vary in field soil or agar.

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Bushy Lake Eco-Cultural Restoration Project Design – Integrating Cultural Keystone Species and Development of Culturally Significant Plant Associations

The Bushy Lake Eco-Cultural Restoration Project (lower American River, Sacramento, CA) incorporates Indigenous Traditional Ecological Knowledge (TEK), Western Ecological Knowledge (WEK) and Traditional Resource Management (TRM) of the Nisenan, Miwok and Maidu traditions into restoration project site design and management. The project demonstrates the integration of Cultural Keystone Species and development of Culturally Significant Plant Associations into eco-cultural restoration design (Zedler and Stevens 2018). In the field of restoration ecology, there has been a debate between "reference condition" and "novel ecosystem". This eco-cultural restoration project, in a "novel" and highly disturbed ecosystem, is based on the integration of culturally significant plants and TEK into project design. Cultural keystone species include white root (*Carex barbarae*); mugwort (*Artemisia douglasiana*); dogbane (*Apocynum cannabinum*); tule (*Schoenoplectus acutus*); milkweed (*Asclepias* species); blue elderberry (*Sambucus caerulea* ssp. *mexicana)* and sandbar willow (*Salix exigua*). A 2021 wildfire provided an unplanned experimental variable to document vegetation response. Results demonstrate that cultural plants (adapted to millennia of Traditional Fire Management) were resilient and recovered within one year. Significant hand weeding is required to manage post-fire recruitment of invasive species. Herbicides are not used due to indigenous environmental justice concerns protecting individuals gathering food, medicine, and fiber. Project results additionally informed a restoration planting palette with native, fire resilient, and culturally significant species. The planting palette includes developing proposed Cultural Plant Alliances to complement and expand upon CNPS floristically defined vegetation plant alliances and vegetation associations. Proposed alliances represented areas dominated by culturally significant species.

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A Floristic Inventory of the Owens River Headwater Area, Mono County, California

The Sierra Nevada occupies ~20% of California's landmass yet contains more than half of the state's plant diversity. Many areas in the Sierra Nevada need further botanical investigation. The Owens River Headwaters Area (ORHA) is one such area. My study area encompasses approximately 54 mi^2 and includes the Owens River Headwater and Ansel Adams designated wilderness area in the Inyo National Forest and National Forest land surrounding the wilderness area. This area is biogeographically unique and is characterized by high-elevation meadows, lakes, mixed conifer forests, volcanic outcrops, and pumice pebble plains. Over the course of two field seasons (2023-2024), a comprehensive floristic inventory will document the vascular flora of the ORHA and culminate in an annotated species checklist. Voucher specimens have been collected and will be distributed to several herbaria. All corresponding data

will be shared with the Consortium of California Herbaria 2 portal, and observations of vouchered specimens will be uploaded to iNaturalist. So far, 1,325 collections have been made, representing 61 families, 152 genera, and 220 minimum-ranked taxa have been identified. In the context of extreme biodiversity loss, where California has been at the forefront of experiencing numerous environmental threats such as increasing drought, high-intensity fires, logging, recreational activities, and other human impacts, this research will provide valuable information on the floristic diversity of the OHRA. The data will have direct applications in conservation and land management strategies to help maintain the ORHA and, more broadly, help understand species diversity and plant communities in California.

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Are the Oaks Okay?

California's quintessential oaks are keystone species providing cover and nesting habitat, food sources, and fire resilience across a wide geographic and elevational range. Given their cultural importance and wildlife value, oak species are often included in revegetation and restoration projects. However, the acorns, seedlings, and saplings face a multitude of barriers to establishment, including acorn predation, drought, rodent damage (e.g., girdling, soil disturbance), and herbivory. Stillwater Sciences pooled lessons learned from a variety of projects throughout northern California that included oak plantings, investigated the difficulties with implementing some measures at a large scale, and are currently in the trial phase of some novel, nature-based solutions for some of the impediments to establishing and restoring native oak woodlands.

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Simulating Plant Drought Response Using Urban Environments

Novel changes in weather patterns due to the climate crisis create selective pressures for organisms, including terrestrial plants, to adapt. Simulations predict that California will experience increased droughts with an upsurge of severity in the upcoming years, creating a lack of moisture. Urban heat islands (UHI) are areas in urban settings where temperatures are elevated which lead to increased evapotranspiration. The increased temperatures are due to impervious surfaces and increase in heat absorbance via asphalt and other materials commonly found in urban areas. Plants found in cities, a case of a UHI, may show changes which may help with lowering levels of moisture in the environment. Utilizing populations of *Erodium cicutarium* (Common stork's bill; Geraniaceae) found along the urban-rural gradient in and around San José, we will conduct a greenhouse experiment with drought treatments. The use of the urban populations is to represent accounts of plants growing under the effects of the UHIs and compare them to rural populations which have unchanged levels of moisture. This experiment will test for differences among populations and plasticity, looking at flower physiology and morphology, giving us more insight on how climate influences plants. This experiment will also provide useful information on an invasive species that plagues California.

INDEX OF AUTHORS

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The California Invasive Plant Council (Cal-IPC) protects California's environment and economy from invasive plants. We provide leadership for partners across the state working to stop the spread of wildland weeds. Access our resources, network with other professionals and volunteers, and support our advocacy for strong policy and programs. Learn more at www.cal-ipc.org.

California Native Grasslands Association
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The California Native Grasslands Association's mission is to promote, preserve, and restore the diversity of California's native grasses and grassland ecosystems through education, advocacy, research, and stewardship. We work towards increasing public understanding and appreciation of the value of native grassland ecosystems.

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California Native Plant Society (CNPS) protects California's native plants and their natural habitats, today and into the future, through science, education, stewardship, gardening, and advocacy. We envision a future in which native plant diversity flourishes, where everyone has access to native plants in both the built environment and the wild, and where people of all backgrounds play a vital role in the conservation of our native plant heritage.

For 60 years, CNPS staff and volunteers have worked alongside scientists, government officials, and regional planners to protect habitats and species and to advocate for well-informed environmental practices, regulations, and policies. CNPS has 13,000 members and volunteers in 36 chapters in California and Baja California, Mexico and 100,000 online supporters who share our commitment to native plants.

Carex Working Group
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Carex Working Group is a small botanical consulting firm located in Corvallis. We have done botanical surveys in the Pacific Coast states, but now we are winding down our business. We still teach identification classes and do some specimen identification.

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F.M. Roberts Publications originated as a self-publishing source for botanical guides and checklists in southern California but has expanded to include wildlife and wildflower themed T-shirts, prints, and note cards based on gouache watercolor and acrylic paintings rendered by Fred M. Roberts. Display will include my Tree and Scrub Oak (*Quercus*) shirts, California lilies (*Lilium*) design, and Sierra Nevada Range mariposa lily (*Calochortus* species).

Friends of the Ahart Herbarium
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The Friends of The Ahart Herbarium is an all-volunteer organization that promotes botanical education and community outreach. Our mission is to provide support for the herbarium and demonstrate and publicize the value of the herbarium to the community.

The Ahart Herbarium allows scientists, students, state agencies, and visitors to see and examine more than 115,300 North State plant specimens, dating from the pre-1930s to today. This living laboratory and historical archive helps us study regional plants, identify rare species, and recover genetic information – it is a critical resource as our changing climate rapidly reshapes local ecosystems.

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Since 1970, the highly trained ecologists and professionals at H. T. Harvey & Associates have delivered exceptional consulting services to public agencies, private entities, and nonprofit organizations. The expertise of our staff encompasses a wide range of biological and design disciplines. We apply our expertise in plant and wetland ecology, wildlife ecology, aquatic ecology, restoration ecology, and landscape architecture in pursuit of our mission to create ecologically sound solutions to our client's complex natural resource challenges. Our botany group is composed of highly skilled plant taxonomists and ecologists with expertise across a range of habitats in California, the western United States, and Hawai‘i.

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ICF is a global advisory and technology services provider. In the Environment & Planning Division of ICF, we are passionate about doing what's right for our clients, our people, the communities where we live and work, and the environment. We are planners, scientists, program managers, communicators, economists, technologists, and strategists. We are collaborative, curious, and committed to excellence. Our core values are: interact with integrity; challenge assumptions; bring your passion; work together; embrace differences; and be greater than.

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Founded in 1961, Kleinfelder, Inc. is a full-service engineering consulting firm providing solutions across multiple markets to meet complex infrastructure and natural resource challenges. Kleinfelder's Bay Area professional staff consists of more than 200 biologists, botanists, ecologists, engineers, environmental planners, and spatial analysts. Kleinfelder works for municipal, state, federal, and commercial/industrial clients throughout California. Our broad spectrum of services can range from biological surveys, reporting, and preparing resource agency permit applications to environmental documentation and management of complex data in support of informed decision-making.

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The NativeSeed Group is a network of geographically-specialized native seed companies that share inventory and expertise. We work to provide high-quality, locally-sourced and genetically appropriate native seed for restoration and conservation projects across California.

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Founded in 2004 Nomad's seasoned ecology professionals have built their careers in the San Francisco Bay Area and have an intricate knowledge of our region' ecosystems and regulatory environment. Since that time, Nomad has completed over 1,000 CEQA/NEPA and resource management based projects and maintains a staff of botanists, rare plant specialists, vegetation and wetland ecologists, wildlife biologists, regulatory specialists, GIS practitioners, arborists, and drone pilots.

We provide a full suite of natural resource related surveys, documents, and regulatory assistance to comply with all applicable state and federal environmental regulations, including the California Environmental Quality Act (CEQA), National Environmental Policy Act (NEPA), Federal and State Endangered Species Acts, and the Clean Water Act, among others. Nomad provides biological resources expertise from the beginning phases of project design, helps clients minimize impacts to biological resources informed by survey results and reporting, assists clients with obtaining permits from relevant regulatory agencies, provides biological monitoring throughout project construction, completes restoration design and implementation after project construction, and conducts long term monitoring to comply with permit conditions.

Our services are also well suited for the land management arena by enriching the knowledge of land and resource managers, park agencies, and non-governmental organizations in the facilitation of meaningful stewardship-driven natural resources management as well as sound project assistance through environmental documentation and permitting.

Rincon Consultants, Inc.
Representatives: Susan Dewar
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Rincon Consultants, Inc. is a multi-disciplinary environmental science, planning, and engineering consulting firm that provides quality professional services to government and industry. Our principal service is to provide environmental support and scientific research to create and sustain innovative solutions to natural resource, sustainability, and environmental impacts. Rincon prides itself on the considerable depth of its staff, which includes certified urban planners, environmental scientists and engineers, accredited LEED professionals, noise and air quality experts, geologists, biologists, and cultural and historical resource specialists. Our approach to every project is centered upon the design and development of innovative solutions that respond to our clients' specific needs in a cost-effective manner.

Rincon's corporate culture focuses on providing environmental consulting services in a manner that is beneficial to both the environment and our client's needs. When hired, we perceive ourselves as an extension of our client's team and function with the best interests of the client in mind. By managing each project with a focus on three primary objectives – economic efficiency, technical excellence, and sustainable approach – we can provide superior service that efficiently and effectively meets the needs of our clients.

Stillwater Sciences
Representatives: Nicole Jurjavcic
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Stillwater specializes in science-based, technical approaches to environmental issues. By integrating geomorphic and biological research to understand critical ecosystem processes, we work to identify effective measures for restoring and managing rivers and their floodplains as functioning ecosystems. Our areas of expertise include fish and aquatic ecology, geomorphology, botany and riparian ecology, restoration engineering, water quality, wildlife, spatial analysis/GIS, and state and federal permitting including Cutting the Green Tape pathways. Our botanical services include rare plant surveys and monitoring; revegetation, restoration, and habitat planning; planting plan design/implementation; riparian habitat mapping;

modeling of riparian-vegetation dynamics; development of invasive weed control measures; and jurisdictional wetland delineation.

University and Jepson Herbaria
Representatives: Staci Markos, Nina House, and Jason Alexander
Website: https://ucjeps.berkeley.edu/ • Email: ucjeps-collections@berkeley.edu

The University and Jepson Herbaria at U.C. Berkeley are an active center for studying plant evolution and diversity. The mission of the Herbaria is to promote botanical research, education, training, and conservation in California and worldwide. The collection houses over 2.2 million specimens and associated libraries and archives, emphasizing the California flora, global ferns, West Coast marine algae, California lichens, bryophytes, mistletoes, and members of the sunflower family.