



PLANT DIVERSITY AND VIABILITY
in uncertain times

THE TWELFTH SYMPOSIUM
PRESENTED BY

NORTHERN CALIFORNIA BOTANISTS
at California State University, Chico
8–10 January 2024

Plant Diversity and Viability in Uncertain Times

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Cover photo courtesy of Daria Snider. This is a view of Mount Shasta from the north, looking across the western juniper (*Juniperus occidentalis*) and sagebrush (*Artemisia tridentata*) steppe around Shasta Valley. Mount Shasta is one of the few mountains where glaciers and permanent snowfields haven't been rapidly shrinking as the planet's climate warms. 23 July 2022.

WELCOME!

Northern California Botanists

welcomes you
to our twelfth symposium

MISSION STATEMENT: Northern California Botanists is an organization with the purpose of increasing knowledge and communication among agency, consulting, academic, and other botanists about botanical issues concerning science, conservation, education, and professional development. Our primary objectives are to establish a communication forum via occasional meetings, a scholarship fund for students working on botanical problems in northern California, a job forum, and symposia that focus on the botany of northern California.

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TABLE OF CONTENTS

Program of Presentations by Invited Speakers.....	1
Post-symposium Workshops.....	8
Abstracts of Talks.....	9
Abstracts for Posters.....	23
Index of Authors.....	39
Exhibitors	41

Evaluation of 2024 Northern California Botanists Symposium

We'd love to hear your thoughts about this twelfth 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/kYh2FtReDQA3MtcUA>

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 39)

MONDAY, 8 JANUARY 2024

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

ALL DAY Posters on display – Bell Memorial Union second floor Room 203
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: Climate Change

9:00 – 10:20 a.m.

Session Chair: Russell Huddleston - Environmental Protection Agency, Region 9

2. Monitoring Alpine Plants as Climate Changes, a GLORIA Great Basin Update.
Jim and Catie Bishop - GLORIA Great Basin
3. Subalpine and Alpine Plant Community Turnover in Yosemite National Park Following 30 Years of Climate Warming.
Rachel Friesen - Cal Poly, San Luis Obispo
4. Climate Change and Vernal Pools on the Modoc Plateau.
Kyle Merriam - U.S. Forest Service
5. Long-Term Collection Records Reveal Phenological Misalignment Between Northern California Plants and Their Pollinators.
Laura Lampe - California State University, Chico

10:20 – 10:40 a.m. Break

Session 2: Bryophytes

10:40 a.m. – 12:00 p.m.

Session Chair: Ben Carter - San Jose State University

6. New Insights into the Evolutionary History and Floristics of California's Non-Vascular Plants.
Ben Carter - San Jose State University
7. Species Delimitation of a Moss Clade in a Global Hotspot for Bryophyte Diversity.
Larke Reeber - San Jose State University
8. A Preliminary Bryophyte Flora of Henry W. Coe State Park.
John McLaughlin - San Jose State University
9. The Relationship Between Sexual Condition, Sex Chromosomes, and Ploidy in *Syntrichia*.
Jenna Ekwealor - San Francisco State University

12:00 – 1:20 p.m.

LUNCH

12:30 – 1:20 p.m.

Career Panel for students and emerging professionals in botany

Session 3: Vegetation Classification

1:20 – 2:40 p.m.

Session Chair: Teresa Sholars - College of the Redwoods

10. Nearing the Finish-Line: A Path Forward to Completing a State-Wide Vegetation Classification and Fine-Scale Map.
Rachel Boul - California Department of Fish and Wildlife
11. Updated Vegetation Concepts for Northern California Coast Ranges and the Modoc Plateau.
Betsy Harbert - California Department of Fish and Wildlife
12. A Few Observations of Herbaceous Plant Communities from the Fascinating San Joaquin Desert Region of the Central Interior Coast Ranges.
Alex Hubner - U.C. Santa Cruz Arboretum
13. Fine-Scale Vegetation Mapping and Inventory Across the Greater San Francisco Bay Area, California: With a Focus on Alameda and Contra Costa Counties.
Julie Evens - California Native Plant Society

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. Distribution and discovery of Northern California bryophytes.
Jim Shevock - California Academy of the Sciences
15. Looking for One Thing and Finding Another: Phylogenomic Study of *Eriodictyon capitatum* (Namaceae) Resolves the Placement of the Enigmatic *Nama rothrockii*.
Matt Guilliams - Santa Barbara Botanic Garden
16. New Taxa from the Marble Mountains.
Dana York - California Academy of the Sciences
17. A New *Lewisia* from the Southeastern Klamath Ranges.
Jessica O'Brien - Sierra Pacific Industries

Session 5: Lightning Talks

4:20 – 5:00 p.m.

Session Chair: Kristen Kaczynski - California State University, Chico

18. Response of Layne's Butterweed (*Packera layneae*) to Fuels Treatments, High Severity Fire, and Fire Suppression Activities.
Chelsea Morgan - Tahoe National Forest
19. The Boom and Bust of Vernal Pool Rare Plant Populations.
Joy Baccei - U.C. Natural Reserve System
20. Updates on the Flora of the Snow Mountain Wilderness Project.
Jen Pagel - San Francisco State University
21. Recent Additions to CESA.
Kristi Lazar - California Department of Fish and Wildlife
22. Plant Pollinator Relationships at the Pine Hill Preserve.
Landon Eldridge - Bureau of Land Management
23. Sierra Nevada Backpack Botany.
Michael Uhler - Regional Parks Botanic Garden
24. Historical Trends in the Emergence of the Ephemeral Geophytes, *Dicentra uniflora* and *Dicentra pauciflora* (Papaveraceae) in Northern California as Indication of Climate Warming.
Hal Mackey - Retired Environmental Scientist

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. The Heart of Conservation – Engaging Human Passion for Conservation Success.
John Vollmar – *Vollmar Natural Lands Consulting, Inc.*

TUESDAY, 9 JANUARY 2024

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

ALL DAY Posters on display – Bell Memorial Union second floor Room 203
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 39)

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

Session Chair: Jane Van Susteren - California Board of Forestry

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: Meadow and Grassland Restoration

10:10 – 11:30 a.m.

Session Chair: Jane Van Susteren - California Board of Forestry

26. Lessons Learned from Long-Term Restoration Outcomes of Restored Coastal Prairies.
Justin Luong - Cal Poly, Humboldt
27. Thatch Management Using Mowing and Grazing to Benefit the Behren's Endangered Butterfly (*Speyeria zerene behrensii*), Manchester, California, USA.
Terra Fuller - California State Parks
28. Restoration of Meadows in the Sierra.
Evan Wolf - Evan Wolf, LLC
29. Restoration of Plant/Pollinator Mutualisms in Serpentine Grasslands.
Rebecca Nelson - U.C. Davis

11:30 a.m. – 12:50 p.m. LUNCH

12:50 – 1:20 p.m. Raffle, Auction, and Awards

Session 8: Local Floras

1:20 – 2:40 p.m.

Session Chair: David Magney - Althouse and Meade, Inc.

30. Methods to Develop Locally Rare Plant Lists Using Ventura County Flora as an Example.
David Magney - Althouse and Meade, Inc.
31. Checklist of the Flora and Locally Rare Taxa of San Mateo County.
Toni Corelli - Santa Clara Valley Chapter, CNPS
32. Inspirations and Development of *A Flora of Napa County* and Some Lessons Learned.
Jake Ruygt - Napa Botanical Survey Services
33. Built on a Legacy – Second edition of Vascular Plants of San Luis Obispo County, California
David Keil - Cal Poly, San Luis Obispo

2:40 – 3:00 p.m.

Break

Session 9: Now the Good News

3:00 – 4:20 p.m.

Session Chair: Joe Silveira - U.S. Fish and Wildlife Service, retired

34. Vegetation Trends and Cycles in the Fire-Prone Landscapes of Lake, Napa, and Sonoma Counties.
Arthur Dawson - Baseline Consulting
35. Floodplain Restoration on Disconnected Gravel Bars in the Sacramento Watershed.
Michael Rogner - River Partners
36. Adventures and Discoveries Across 30 years of Conservation Work at Fort Ord National Monument (1993-2023).
Bruce Delgado - Bureau of Land Management
Aubrie Heckel - Bureau of Land Management
37. Frank and Joan Randall Tehachapi Preserve: Botany, Vegetation and Conservation Overview of 82,000 Acres at the Convergence of the Tehachapi and Southern Sierra Mountain Ranges.
Zach Principe - The Nature Conservancy
Neal Kramer - Kramer Botanical

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, herbarium curator, outside of the Bell Memorial Union Auditorium to walk across campus to the herbarium

POST-SYMPOSIUM WORKSHOPS

WEDNESDAY, 10 JANUARY 2024

Workshop 1: Soils, Landforms, and Vegetation of Big Chico Creek Canyon and Beyond.

Time: 8:30 a.m. – 3:00 p.m. (bring a lunch and hiking shoes)

Location: Big Chico Creek Canyon and adjacent Cascade foothills, Bidwell Park

Instructor: **Andrew Conlin** - Soil Scientist, Chico Soil Survey Office, Natural Resources Conservation Service

Meet: Highway 32 Park & Ride (carpool to Upper Park Wildwood Avenue to parking lot at north side of 5-Mile bridge; commute time is approximately 10 minutes).

This trip begins in the floodplain of Big Chico Creek and travels back in time across the older deposits of the creek and up onto the Cascade foothills. The first route covers a condensed sequence of the major landforms that occur in the Sacramento Valley, as well as the transition to the Tuscan Formation in the Cascade foothills— in less than 1 mile. The second route is a 1.5-mile, one-way walk up the bottom of Big Chico Creek Canyon, applying what was observed on the first route and viewing the slot canyon in the Lovejoy basalt, which controls the stream dynamics in this reach of the canyon. Vegetation and habits will be correlated to soil characteristics and landforms along both routes. Understanding the relationship of soils, geologic landforms, vegetation and plants is essential to recognizing landscape features foundational to natural history study and essential to ecological habitat restoration and associated research.

Workshop 2: Heritage Growers Source Identified Native Seed Production Facility Tour.

Time: 8:00 a.m. – 12:00 p.m. (arrive at Heritage Growers at 9:00; bring a lunch for an hour-long post-tour chat & networking)

Location: Davis Ranches Farm Headquarters, 7681 Sycamore Slough Road, Colusa, CA 95932

Instructor: **Pat Reynolds and Michele Ranieri** - River Partners / Heritage Growers

Meet: Highway 32 Park & Ride (commute time is approximately 1 hour; carpooling arrangements can be made at the symposium on Monday and Tuesday).

This field trip is a tour to the Heritage Growers source identified native seed production facility. It will cover all aspects of the numerous steps involved in the production of restoration appropriate native seed. The tour will include a visit to Heritage Growers' demonstration garden where new ecotypes and new species are trialed, seed is produced for the nursery operation and small plot amplifications are implemented. We will also visit Heritage Growers' production fields where more than 100 distinct species and ecotypes are produced over approximately 170 acres. Discussions will include methods for field establishment including direct seeding and plug installation, how fields are maintained including irrigation and weed control, how seeds are harvested including how large farm equipment such as swathers and combines are utilized to efficiently harvest seed at scale. The field trip will cover the seed conditioning (cleaning) process including how seeds are dried, the various methods used to clean seed and how the seeds are stored, tested, and retested. Woven throughout the fieldtrip will be examples of various Best Management Practices Heritage Growers use to maintain genetic integrity of different ecotypes.

This is a 3-hour tour that will also include an additional, optional, 1-hour lunchtime gathering where we will discuss source identified native seed issues, including the importance and advantages of selecting local ecotypes for ecological habitat restoration.

ABSTRACTS OF TALKS

Abstracts are in chronological order; index to authors is on page 39.

1. **HANSON, L.**

2837 Mariposa Avenue, Chico, CA, 95973. linneachanson@gmail.com

Welcome to our Twelfth Northern California Botanists Symposium

I'd like to welcome all of you to our twelfth symposium, *Plant Diversity and Viability in Uncertain Times*. We hope you will enjoy the program that we have organized for you this year with great speakers and posters. Our keynote speaker, John Vollmar, will address, *The Heart of Conservation-Engaging Human Passion for Conservation Success*. 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. **BISHOP, J., and BISHOP, C.**

GLORIA Great Basin, 1144 Mount Ida Road, Oroville, CA 95966. cjbishop1991@sbcglobal.net

Monitoring Alpine Plants as Climate Changes, a GLORIA Great Basin Update

In 2004 the international Global Observation Research Initiative in Alpine Environments (GLORIA) was initiated in North America, with the first summit surveys completed within or at the border of the Great Basin. The GLORIA Great Basin project has been through 20 field seasons, with improvements in methods and increases in the number of project sites. It has amassed a very large, high quality data base on alpine plant species. The GLORIA Great Basin nonprofit organization was formed to manage the expanding project. The efficiency and safety of our field work has been improved. Data analysis has progressed much in the last few years, a scientific paper published, and further research projects are underway. Partial answers to the question of how climate change is affecting alpine ecosystems are emerging.

3. **FRIESEN, R.E.¹, and GROSSENBACHER, D.L.²**

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²Biological Sciences Department, California Polytechnic State University; 1 Grand Ave, San Luis Obispo, CA 93407. dgrossen@calpoly.edu

Subalpine and Alpine Plant Community Turnover in Yosemite National Park Following 30 Years of Climate Warming

Subalpine and alpine areas in California are warming at faster rates than lowland parts of the state. Faced with a rapidly changing climate, high-elevation plants in California will either adapt to the new climate, move to higher elevations or latitudes, persist in refugia, or go extinct. Some models predict that certain alpine plant communities will largely be gone by the end of the century because of the rapid rate of change, discontinuous population distributions, and lack of upslope area. However, uniform alpine plant extinctions may not occur across large landscapes because of lags in dispersal, establishment, and extinction. Studies have demonstrated that shifts in subalpine and alpine plant communities have already happened in some parts of the world, but studies have yet to be done in Yosemite National Park. In this study, we resurvey historic vegetation plots in Yosemite to investigate community turnover in response to climate change over the last 30 years.

4. **MERRIAM, K.E.¹, MONTRONE, A.², SAITO, L.³, WEISBERG, P.G.⁴, GOSEJOHAN, M.⁵, and MEJIAE, J.F.⁶**

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Climate Change and Vernal Pools on the Modoc Plateau

Vernal pools are seasonal wetlands that support diverse communities of rare and endemic species. These species are highly adapted to the hydrologic conditions of their vernal pool habitats and are often classified according to their tolerances for inundation length. Vernal pools across California have been destroyed by agricultural conversion and urban development. Remaining vernal pool habitats now face an emerging threat from climate change as predicted changes in temperature and patterns of precipitation could significantly alter vernal pool hydrology. To better understand this threat, we developed an approach to investigate the potential impacts of climate change on hydrology and plant communities of vernal pools on the Modoc Plateau. We created a mass-balance hydrologic model coupled to a statistical model of plant community distribution. The hydrologic and vegetative models were calibrated using field measurements from a vernal pool in northeastern California. Using downscaled data from global climate models, the coupled model suggests that warmer conditions will lead to the pool being inundated for a shorter time, but with little change in maximum depth. Our simulations predict that climate change will result in sharp reductions in hydroperiod, particularly for large, shallow pools characteristic of the Modoc Plateau. This trend could lead to declines of vernal pool specialist species associated with longer inundation periods. Species associated with shorter inundation periods, including nonnative and upland species, are likely to increase. Our model approach could be improved with longer term data and by applying it at more sites to broaden its applicability.

5. **LAMPE, L.A.¹, IVEY, C.T.², and DONATELLO, R.A.³**

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Long-Term Collection Records Reveal Phenological Misalignment Between Northern California Plants and Their Pollinators

Phenologies of taxa across the globe have shifted in recent decades as climatic cues have changed. Inter-specific interactions, including those between flowering plants and pollinators, are dependent on the alignment of their respective flowering and flight phenologies. We investigated historical phenological shifts in selected plants and pollinators, as well as the potential for phenological mismatches, within lowland and alpine habitats of Northern California. We examined 120 years of plant and insect pollinator collection records and used collection dates to test whether phenological shifts have occurred over this time period in related taxa occurring in these contrasting habitats. In lowland habitats, the magnitude or direction of apparent phenological change varied between plants and their pollinators, suggesting that misalignment of plant-pollinator phenologies in lowland habitats may be a concern. Alpine collection records, on the other hand, were limited, especially for pollinators, and as a consequence, estimates of phenological change over time had lower precision. Our ability to evaluate the hypothesis of plant-pollinator phenological change was thereby constrained in alpine habitats. Identifying the potential for phenological misalignment, especially in communities thought to be at more acute risk from ongoing climate change such

as alpine habitats, will aid in predicting and ameliorating consequences for species interactions and, by extension, biodiversity.

6. **CARTER, B.**

Carl W. Sharsmith Herbarium, Biological Sciences, San Jose State University; One Washington Square, San Jose, CA 95192. Benjamin.carter@sjsu.edu

New Insights into the Evolutionary History and Floristics of California's Non-Vascular Plants

With more than 800 species in the state, bryophytes (mosses, liverworts and hornworts) comprise a diverse and ecologically important component of California's flora. In this talk, an overview of the floristic and biogeographical significance of California bryophytes will be provided, as well as recent highlights in our rapidly increasing knowledge of bryophytes across the state. In addition to highlighting recent activity in bryophyte conservation, we will cover important similarities (and differences!) between the biogeography and evolutionary history of vascular plants and bryophytes, discuss significant new finds and floristic black holes, and identify tools and opportunities for botanists looking to develop a richer appreciation of the (nonvascular) California flora.

7. **REEBER, L.**

San Jose State University, 1766 Stanley Dollar Drive, #4A, Walnut Creek, CA 94595. larke.reeber@sjsu.edu

Species Delimitation of a Moss Clade in a Global Hotspot for Bryophyte Diversity

Homalothecium is a wide-spread genus of moss with its center of diversity in northern California, a global hotspot for bryophyte diversity and endemism. Although most of the species within the genus are easily identified, the species *H. pinnatifidum* is more challenging to differentiate because its morphology is highly variable. As a result, there is disagreement among bryologists about whether it is a distinct species from its geographically-separated closest relative or whether it represents more than one species. This study is a morphometric and genetic analysis to determine how it should be classified.

8. **MCLAUGHLIN, J.**

San Jose State University, 1208 Bay Road, East Palo Alto, CA 94303. john.mclaughlin@sjsu.edu

A Preliminary Bryophyte Flora of Henry W. Coe State Park

Henry W. Coe State Park (HWCSP) is a botanically important preserve in the interior Coast Ranges of California that until now has been overlooked bryologically. Comprising 179 species, one variety, and three undescribed taxa, the bryophyte flora of HWCSP currently represents 22% of California's bryophyte diversity. Situated along the Diablo Range, this state park contains relictual taxa from the exterior coast ranges as well as rare and disjunct populations from within California. One species, *Aloina rigida* is reported new to California along with 29 species from Santa Clara County and 62 species from Stanislaus County further highlighting the state's need for bryological surveys.

9. **EKWEALOR, J.T.B.^{1,2}, BRINDA, J.C.³, ROY, S.W.⁴, JÁUREGUI-LAZO, J.A.⁵, NOSRATINIA, S.⁶, GUILL, K.E.⁷, MISHLER, B.D.⁸, OLIVER, M.J.⁹, and ROTHFELS, C.J.¹⁰**

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The Relationship Between Sexual Condition, Sex Chromosomes, and Ploidy in *Syntrichia*

Polyploidy, the state of having more than two full genomic complements in the sporophytic generation, is ubiquitous across the plant tree of life and is a major component of plant diversity. Nearly 20% of bryophyte species are estimated to contain at least two ploidy levels, and many more undescribed polyploid species are expected. The moss *Syntrichia* occurs worldwide in a variety of habitats, comprising about 100 species, many of which are reported to contain multiple cytotypes. In addition to polyploidization generating new *Syntrichia* species directly, it may play a role in altering sexual systems in these mosses. Most *Syntrichia* species have separate (unisexual) male and female gametophytes, with the sexes determined by a U/V system (individuals with a U chromosome are female, those with a V chromosome are male). However, cosexuality (termed monoicy) is also common in the genus. Here we used genome skimming data to infer presence of sex chromosomes combined with a target capture approach, including de novo assembly of target loci and assembly homeologs in polyploid individuals, to test the relationship between U/V chromosome karyotype, sexual condition (unisexual or cosexual gametophytes), and ploidy in *Syntrichia*. We infer several polyploids within *Syntrichia* and phase homeologs across loci to infer a multi-locus reticulate tree for the genus. We find support for the prediction that cosexuality can evolve from polyploidization and many cosexual *Syntrichia* species have both U and V sex chromosomes, suggesting aneuploid or polyploid origin.

10. BOUL, R.

Vegetation Classification and Mapping Program (VegCAMP), California Department of Fish and Wildlife, 1700 9th Street, 4th Floor, Sacramento, CA 95811. Rachele.Boul@wildlife.ca.gov

Nearing the Finish-Line: A Path Forward to Completing a State-Wide Vegetation Classification and Fine-Scale Map

Vegetation communities are an excellent biological indicator of wildlife habitat quality and ecosystem function by providing a synthesis of environmental gradients that ecologists and conservation biologists require to understand the terrestrial landscape. Fine-scale vegetation maps are used by the California Department of Fish and Wildlife, other state and federal agencies, non-governmental agencies, and the public for conservation and land management planning. The Survey of California Vegetation (SCV) is the state standard for classifying and mapping California's vegetation as natural communities set forth by the Vegetation Classification and Mapping Program (VegCAMP). The SCV starts with the collection of plant data characterizing vegetation in the field that is analyzed to develop a standardized classification of natural community types, which is then used to create fine-scale digital vegetation maps. The objective of the SCV is to develop a state-wide digital vegetation classification and map that is uniform in resolution and supported by field data, using a repeatable methodology. VegCAMP has been working towards this goal since the late 1990's. Recent funding through the Legislature in support of California's "30 by 30" goal has contributed to making significant headway towards a state-wide vegetation classification and map! Join me in exploring the journey to this point, for an overview of our current projects, and the steps to the final phase!

11. RATCHFORD, J.¹, and HARBERT, B.²

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Updated Vegetation Concepts for Northern California Coast Ranges and the Modoc Plateau

California is one of the most diverse regions of the world, with habitats ranging from the majestic redwoods along the coast to sweeping sagebrush vistas at the edge of the Great Basin. Vegetation, or the repeating patterns of associated plant species across the landscape, is an excellent surrogate for understanding habitat and ecosystems, and plays an important role in wildlife and natural lands conservation. A rigorous definition of vegetation types allows us to understand their extent, distribution, and sensitivity within the state, which is critical for an informed state regulatory process that calls for addressing impacts to vegetation. The California Department of Fish and Wildlife's Vegetation Classification and Mapping Program (VegCAMP) develops and maintains the state's vegetation classification and definitions through standardized quantitative sampling and analysis. VegCAMP has two large regional vegetation classification projects in progress: the Modoc Plateau and the Northern California Coast ranges. We will discuss newly described and regionally significant vegetation types and their ecological settings identified as a result of this work. These projects have allowed us to better define and understand the vegetation types in these regions, which will ultimately aid in land management and habitat conservation.

12. HUBNER, A

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A Few Observations Of Herbaceous Plant Communities From The Fascinating San Joaquin Desert Region Of The Central Interior Coast Ranges

Our team is collecting data for the ongoing fine scale vegetation mapping and classification effort of California, focusing on the Northern Sierra Nevada mountains, Napa County, and the Interior Coast Ranges. Here I will focus on data collected in early spring 2023 in the Central Interior Coast Ranges of San Benito and Fresno counties, particularly the Kettleman Hills and Cantua Creek. This region is a hotspot for edaphic diversity, and with adequate rainfall, the hills come alive in a dense patchwork of botanical treasures across diverse soil types and aspects. Herbaceous communities of interest include *Oenothera deltoides*-*Abronia pogonantha*-*Deinandra kelloggii* on active windblown sand, *Eriogonum nudum* var. *indicatum*-*Amsinckia furcata* on acidic marine shale, and *Lepidium jaredii*-*Deinandra halliana* and *Madia radiata* on vertic clay, among others. Some of these await definition in the Manual of California Vegetation.

13. EVENS, J.E.¹, BIBBO, M.², FRANCO, D.³, ROBERTSON, D.⁴, and TUKMAN, M.⁵

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Fine-Scale Vegetation Mapping and Inventory Across the Greater San Francisco Bay Area, California: With a Focus on Alameda and Contra Costa Counties

Vegetation inventorying, classification, and mapping is occurring in county-wide efforts across the Greater San Francisco Bay area, including the following projects: Alameda & Contra Costa counties (2022-2025), Santa Cruz & Santa Clara counties (2019-2022), Marin & San Mateo counties (2018-2022), and Sonoma County (2014-18). This region of the Greater Bay Area is home to incredible biodiversity, vast wildlands, and rapidly growing agricultural, industrial, and residential developments. The inventory and mapping efforts will inform decisionmakers on conservation priorities, wildfire risks, restoration of habitats, and other land management actions. A collaboration of geospatial and botanical partners are involved in these projects, including Tukman Geospatial LLC, Kass Green & Associates, Aerial Information Systems, California Native Plant Society, UC Santa Cruz, and various local consulting botany firms with funding acquired from the California Department of Fish & Wildlife, CA Natural Resources Agency, East Bay Regional Parks, Golden Gate National Parks Conservancy, National Park Service, Sonoma County

Ag+ Open Space, US Geological Survey, and many others. The products of these collaborative efforts include ground-based efforts (with >10,000 vegetation surveys, county-wide classifications and keys) that inform machine learning and manual mapping for enhanced lifeform maps, fine-scale vegetation maps, wildland fuels maps, lidar-derivative products, and an online portal to access the hundreds of datasets. In the Alameda-Contra Costa Area, we have collected 2 years of vegetation data to represent a rich diversity of types from upland and wetland meadows, maritime chaparral and coastal scrub, to hardwood and conifer woodland types. As the risks of destructive wildfires, human development, droughts, and other stressors increase, land managers and decision makers need tools and information that will help them protect natural areas and neighboring communities alike.

14. SHEVOCK, J.R.

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Distribution and Discovery of Northern California Bryophytes

Even after decades of specimen acquisition, much discovery remains in Northern California regarding bryophyte species diversity, distribution, rarity, community structure, and site-specific microhabitat preferences. In just the past year alone, three mosses as California endemics are species new to science, and seven species represent the first documented occurrence in California. Why is this? Northern California contains the greatest number of bryophyte species in California, and yet, thousands of square miles have not even received a cursory sampling of these amazing land plants. Conducting localized floras that are specimen-based with high quality labeled voucher specimens deposited in herbaria are essential to fill-in this major void of our knowledge of California's first land plants. As one example, a 2021 published bryoflora of the Russian Wilderness and adjacent slopes of the Salmon Mountains, Klamath National Forest, Siskiyou County confirmed that this small area of only 112.8 sq. mi. (or 1.8 % of the land base of Siskiyou County) comprises 33% of the bryophytes currently documented for California. Ongoing bryophyte inventory efforts in the Marble Mountain Wilderness, Klamath National Forest has already yielded several bryophytes as new additions for the California bryoflora. Many other areas of Northern California are likely to yield similar results through detailed field inventory efforts.

15. GUILLIAMS, C.M.¹, and HASENSTAB-LEHMAN, K.E.²

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Looking for One Thing and Finding Another: Phylogenomic Study of *Eriodictyon capitatum* (Namaceae) Resolves the Placement of the Enigmatic *Nama rothrockii*

The recently circumscribed Namaceae includes three genera – *Eriodictyon*, *Nama*, and *Wigandia* – and over 70 species. In general, members of *Nama* are annual plants, while members of *Eriodictyon* and *Wigandia* are shrubs or trees. Three Namaceae taxa could be described as intermediate: *E. lobbii* and *N. rothrockii* are both rhizomatous perennial herbs, and *E. parryi* is a subshrub. Early phylogenetic evidence demonstrated the close relationship of *E. lobbii* [*Nama lobbii*] and *E. parryi* [*Turricula parryi*] to *Eriodictyon*, but the placement of *N. rothrockii* near *Eriodictyon* lacked statistical support. Here we discuss a recent phylogenetic analysis of *Eriodictyon*, performed to examine support for the circumscription of the Federally Endangered Central Coast endemic, *E. capitatum*. Sampling for the study included one or more samples of all recognized *Eriodictyon* taxa, along with samples of *Nama rothrockii*, two other annual *Nama* taxa, and *Wigandia*. Statistical support was strong at most nodes of the tree, and samples by taxon largely formed clades. *Eriodictyon capitatum* was monophyletic with maximum statistical support and sister to *E. altissimum*. Samples of *E. parryi* formed a clade with various placements in the genus, while *E. lobbii* samples were firmly nested within *Eriodictyon*. Samples of *N. rothrockii* were resolved as a well-supported clade on a long branch sister to *Eriodictyon*. While clearly not belonging with other members of *Nama*, the long separation of *N. rothrockii* from its common ancestor with *Eriodictyon* suggests that it may be better treated in its own genus.

16. YORK, D.A.

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New Taxa from the Marble Mountains

While documenting the vascular flora of the Marble Mountain Wilderness, a novel *Allium* [Alliaceae] and *Draba* [Brassicaceae], both Klamath Mountains endemics, were found in the wilderness or just outside the boundary. *Allium klamathense* D.A. York & E. Magnaghi sp. nov. (unpublished) was found, in May 2021, on a rocky terrace dominated or bordered by *Arctostaphylos nevadensis*, *Calocedrus decurrens*, *Pinus monticola*, *P. ponderosa*, and *Tsuga mertensiana*. Wilderness populations were found on volcanogenic metasedimentary and metavolcanic rocks with possible mafic (elevated amounts magnesium and iron) characteristics. The other known populations were found in the Siskiyou Mountains and are associated with ultramafic serpentine soils. Several historic collections of *Allium klamathense* were made throughout the Siskiyou Mountains from 1950 to 1980. Those collections were either originally named or later annotated to *Allium siskiyouense* Ownby. Differences between *Allium klamathense* and *A. siskiyouense* include leaf shape, tepal size and color, and the shape of the ovary crests. *Draba somnia* D.A. York sp. nov. (unpublished) was discovered by the author, in June 2022, on the rocky cliffs of Snoozer Ridge. The geology of Snoozer Ridge is mafic, metavolcanic rock. The entire population consists of 20 individual pulvinate clumps located in a subalpine coniferous forest. *Draba somnia* is the only perennial, white-flowered *Draba* found in the Klamath Mountains. The only *Draba* in California or Oregon that is superficially similar is *Draba lonchocarpa*. *Draba somnia* differs in vestiture and fruit morphometrics. Efforts to find other populations will be undertaken in 2024.

17. O'BRIEN, J.¹, GUILLIAMS, C.M.², PUENTES, S.³, and LINDSTRAND III, L.⁴

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A New *Lewisia* from the Southeastern Klamath Ranges

This talk presents the discovery of a new *Lewisia* species from northern California. In June 2010, an unknown *Lewisia* was observed at the northeast end of Trinity Lake on Bragdon Shale Formation substrate. After stumping SPI Botanists Jessica O'Brien and Stephanie Puentes, Dean Taylor inspired us to pursue the species, suggesting it was potentially a new taxon. When discovered the taxon best fit the description of *L. kelloggii* subsp. *hutchinsonii* K. Brandegee, though morphological traits suggested it may be a new species. Recent genetic analysis combined with our previous observations confirmed that this a new taxon. A manuscript is in preparation. Field surveys from 2010 to 2023 have documented it from several areas in the eastern Klamath Ranges of northeastern Trinity and northwestern Shasta counties, where it occurs on open, often disturbed shaley ridgelines and slopes in conifer forest habitat. Field surveys have documented it occurring with other rare taxa including *Allium siskiyouense*, *Arnica venosa*, *Erythronium citrinum* var. *roderickii*, and *Silene salmonacea*.

Numbers 18 through 24 are Lightning Talks

18. CHELSEA MORGAN

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Response of Layne's Butterweed (*Packera layneae*) to Fuels Treatments, High Severity Fire, and Fire Suppression Activities

19. JOY BACCEI

UC Natural Reserve System, UC Merced Vernal Pools and Grassland Reserve - jbaccei@ucmerced.edu

The Boom and Bust of Vernal Pool Rare Plant Populations

20. JEN PAGEL

Harry D. Thiers Herbarium at San Francisco State University - jenrenepagel@gmail.com

Updates on the Flora of the Snow Mountain Wilderness Project

21. KRISTI LAZAR

California Department of Fish and Wildlife - Kristi.Lazar@wildlife.ca.gov

Recent Additions to CESA

22. LANDON ELDRIDGE

Bureau of Land Management - leldridge@blm.gov

Plant Pollinator Relationships at the Pine Hill Preserve

23. MICHAEL UHLER

Regional Parks Botanic Garden - muhler@ebparks.org

Sierra Nevada Backpack Botany

24. HAL MACKEY

Retired Environmental Scientist - littlebrownb@yahoo.com

Historical Trends in the Emergence of the Ephemeral Geophytes, *Dicentra uniflora* and *Dicentra pauciflora* (Papaveraceae) in Northern California as Indication of Climate Warming

25. VOLLMAR, J.

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The Heart of Conservation – Engaging Human Passion for Conservation Success

Beginning with seed funding from the U.S. Environmental Protection Agency and East Merced Resource Conservation District in 1998, John Vollmar has worked over the past 25 years to conserve the expansive and rich vernal pool landscapes of eastern Merced County. These mostly intact landscapes are contiguous with the vast blue oak savannas and woodlands of western Mariposa County. Together, they create a Great Valley-Sierra Nevada Foothill block of mostly private natural lands connecting with two national forests, Yosemite National Park, and beyond. Protecting Merced County's vernal pool-grasslands is an essential component to conserving a contiguous, functional habitat corridor from the Great Valley, through the Sierra Nevada, to the Great Basin. But, how do we achieve meaningful, landscape-scale conservation, especially in areas with numerous private landowners? Working with landowners, land trusts, environmental consultants, mitigation buyers, and others, Mr. Vollmar has gained a unique perspective on how we achieve such conservation over time, and the critical role of human passion at its core. Building on this understanding, and analyzing data on geologic formations, rare species occurrence records, predicted habitat modeling for these species, and other factors, he and colleagues at Vollmar Natural Lands Consulting recently published a reference manual and user's guide for the Conservation of Great Valley Vernal Pool Landscapes. It is intended to inspire, motivate, and guide ongoing conservation of these special habitats throughout the Great Valley. Mr. Vollmar will present a history of his work in eastern Merced County, key lessons learned along the way, and a walk-through of his recently published conservation guide as a model for others to consider in their pursuit of conservation interests, in the Great Valley and elsewhere.

26. LUONG, J.^{1,2}, PRESS, D.M.³, and HOLL, K.D.⁴

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Lessons Learned from Long-Term Restoration Outcomes of Restored Coastal Prairies

Governmental and non-governmental organizations spend considerable funding on restoring ecosystems to counter biodiversity loss, yet outcomes are often not assessed at a regional scale. Monitoring is done ≤ 5 years after project-implementation, if at all, and rarely assesses the effects of management practices on project success. We combined vegetation surveys and management interviews to compare long-term restoration outcomes of 37 California coastal grassland projects (5–33 years post-implementation) that spanned a 1000-km north-south gradient. We found that coastal grassland restoration is largely successful at reaching project goals (95 %) and a standard performance metric (80 %) to restore native cover, but land managers preferentially use a small number of well-tested, “high success” species, potentially at the expense of regional diversity. Medium and high maintenance intensity resulted in lower non-native cover and improved native cover and rarefied native richness. Managers of voluntary (non-statutory) sites were more open to assessing outcomes and spent less per hectare compared to legally mandated (statutory) projects but achieved similar plant cover and even higher rarefied richness. Statutory project managers indicated that regulatory agencies sometimes lowered compliance goals for native cover if the initial targets were not met. Additional funding for greater maintenance intensity and incorporating more locally distinctive species (*i.e.*, endemic or range-restricted) may help counteract potential unintended consequences from preferential plant selection, and inter-agency coordination of species selection could reduce biotic homogenization. We recommend delegating funds to a third-party monitoring group to ensure legally mandated compliance and consistency in assessment.

27. FULLER, T.

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Thatch Management Using Mowing and Grazing to Benefit the Behren’s Endangered Butterfly (*Speyeria zerene behrensi*), Manchester, California, USA

The Behren’s silverspot butterfly (*Speyeria zerene behrensi*) is a federally endangered coastal butterfly found in Mendocino County. Behren’s silverspot occupies early successional coastal terrace habitat containing the caterpillar’s host plant – western early blue violet (*Viola adunca* subsp. *adunca*) – as well as adult nectar sources and suitable adult courtship areas. The host plant is patchily distributed on moist coastal terraces and sand dunes and can tolerate frequent disturbances. Research has shown, Behren’s silverspot larval development to pupa depends on high densities of *Viola*. Manchester State Park has documented butterfly detections and currently contains scattered patches of *Viola*. Invasive perennial grasses now occupy the park due to farming and the absence of historic disturbances of fire and Roosevelt elk (*Cervus canadensis roosevelti*). State Parks initiated two vegetation management treatments from 2016 to 2020, to improve habitat for *Viola* by reducing invasive grass thatch. Treatments consisted of rotational grazing and mowing and monitoring data was collected that provided insight into treatment effects. Monitoring consisted of *Viola* counts, optical grass density monitoring and Behren’s silverspot counts. Results from monitoring efforts found increases in *Viola* numbers post-treatments compared to controls. Optical density measurably decreased immediately post-treatment; however, there was no-measurable change after the following grow season or compared to controls. Treatments did reduce thatch and increased the number of *Viola* plants; however, non-native grasses, including bent grasses (*Agrostis* sp.) whose dominance was more apparent post-treatment, will likely be a long-term management challenge in restoring Manchester’s native plant diversity.

28. WOLF, E.W.

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Restoration of Meadows in the Sierra

The restoration of wetlands (meadows) in the Sierra Nevada involves identifying and re-establishing the stabilizing feedbacks between soil/geomorphic, hydrologic, and vegetation processes. The use of mechanized equipment allows the re-creation of natural geomorphology in

gully-eroded meadows within days to weeks. Restored geomorphology causes the return of natural hydrology hours to days later. However, the re-establishment of natural wetland vegetation takes years to reach reference conditions. Plants in the Cyperaceae (sedges) are usually dominant in sheetflow mountain wetlands and their dense aboveground shoots and leaves and belowground root and rhizome network stabilizes soil for centuries to millennia. Initial planting density of *Scirpus microcarpus* significantly impacted the shoot density four years later. Plantings that were initially as dense as reference sites grew to 2-3 times reference shoot density after 3-4 years post-planting. These dense plantings provided good initial plant cover and erosion protection, but after several years were much shorter when compared to less dense initial plantings that took 2-3 years to reach reference shoot density. Soil compaction also significantly slowed belowground plant spread and reduced aboveground height. Adding wood chips to gully fill significantly reduces soil compaction, promoting belowground vegetative spread and resulting in approximately double the vegetated area after two growing seasons compared to unamended compacted soil. Rapid establishment of natural-density native wetland plants is essential for restoration project success and several methods help accelerate that process. The plants make the meadow.

29. NELSON, R.A.¹, DRITZ, S.², VALDOVINOS, F.S.³, and AIGNER, P.A.⁴

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Restoration of Plant/Pollinator Mutualisms in Serpentine Grasslands

Plant-pollinator mutualisms contribute to biodiversity and ecosystem function, and are the frequent targets of restoration efforts, yet the effects of plant community restoration on the diversity and structure of plant-pollinator mutualisms have yet to be fully examined. We examined plant-pollinator networks in serpentine grasslands where the experimental removal of a noxious invasive grass (barbed goatgrass, *Aegilops triuncialis*) led to significant recovery of native plant cover and diversity. Restoration via goatgrass removal led to increased pollinator richness, Shannon diversity, and abundance, relative to invaded and unrestored grasslands. Restoration decreased the nestedness of plant-pollinator networks, increased the niche overlap of pollinators, and enhanced the role of the most abundant native flowering plant (*Lasthenia californica*) as a core hub for pollinators.

30. MAGNEY, D.L.

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Methods to Develop Locally Rare Plant Lists Using Ventura County Flora as an Example

California has long focused on determining which vascular plants are rare statewide through the California Native Plant Society (CNPS) Rare Plant Program in collaboration with the California Natural Diversity Database (CNDDB). Much work has also been done over the last 20 plus years to identify plants that are rare locally, primarily at the county level. This is necessary since the majority of land use decisions that affect botanical resources are made at the county (and city) government level. County General Plans require conservation of biological resources through conservation goals and ordinances. Using detailed research on the flora of Ventura County, the author has determined which native taxa are rare in Ventura County and published a list, which is updated regularly, on the Ventura Flora website and the CNPS Channel Islands Chapter's website. The list uses the rarity ranking definitions used by CNDDB and all other similar programs in the other 49 states. Locally Rare is defined as taxa with 5 or fewer populations within the boundaries of Ventura County. Locally Uncommon are those native taxa with 6 to 10 extant

populations within the county. The author is chair of the CNPS Locally Rare Plants Committee that is slowly developing criteria and tools to develop lists of locally rare plants in all 58 California counties. The purpose of identifying locally rare plants is to provide a tool to help conserve the native flora at the local level where land use decisions are made.

31. CORELLI, T.

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Checklist of the Flora and Locally Rare Taxa of San Mateo County

This presentation delves into the development of a digital vascular plant checklist and locally rare taxa for San Mateo County. It details the method used to compile the list, highlighting the pivotal role fieldwork, collaboration and electronic data played in expediting and at times complicating the process. I will share insights gained, lessons learned, and the ongoing tasks essential to further enrich and refine the checklist for publication.

32. RUYGT, J.A.

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Inspirations and Development of *A Flora of Napa County* and Some Lessons Learned

After several years of studying the flora of Napa County and through personal associations with members of the Napa Valley Chapter of the California Native Plant Society, I was inspired to write a flora of Napa County. Several annotated lists and a Pacific Union College database had previously been compiled but no handbook was available for individuals or institutions interested in the flora of the county. I embarked on a comprehensive study of the local flora in 1976. *A Flora of Napa County* was published in 2020 and incorporates extensive research of county lists, herbaria files, and field notes in addition to forty years of personal field study. Methodology and timeline of the development process is described. The flora includes introductory chapters on local geography, geology, vegetation, special status plants and more. To encourage use by professional as well as amateur botanists, it provides binomial keys, illustrations and photo plates with 334 photos created by the author. Over 1700 native and naturalized taxa are covered in the guide.

33. KEIL, D.J.

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Built on a Legacy – Second edition of Vascular Plants of San Luis Obispo County, California

Robert F. Hoover's 1970 Vascular Plants of San Luis Obispo County, California served as a foundation for developing this expanded county flora that includes numerous additions, both native and introduced, including several species newly described since the first edition. The second edition includes enhanced keys, taxonomic descriptions, flowering times, selective synonymy, and detailed range statements. The classification system is based on current knowledge of phylogenetic relationships, and the nomenclature is up to date. Alphabetical arrangement of taxa within major taxonomic groups aids users in navigating the flora. Selective use of terminology and a detailed glossary enhance the user experience. The flora includes a selection of photos illustrating landscapes, plant communities, and habitats in the county plus photos of 480 native members of the flora.

34. DAWSON, A.¹, COMENDANT, T.², HENIFIN, K.³, MICHELI, L.⁴, THORNE, J.⁵, and TUKMAN, M.⁶

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Vegetation Trends and Cycles in the Fire-Prone Landscapes of Lake, Napa, and Sonoma Counties (CALFIRE Forest Health Research Program, Grant 8GG19813)

We present vegetation and fire history at four fire-prone study areas (as identified by CALFIRE) totaling 200 sq. mi in Sonoma, Napa and Lake Counties. Indigenous elders provided long-term data for fire and vegetation patterns within a context where cultural burning was regularly practiced. Historical vegetation change over the last 150 years was assessed with a suite of historical surveys and vegetation maps, covering the period from 1870 – 2020. To compare time periods, vegetation data was sorted into broad Lifeform and Forest Type categories. Fire history was assessed using CAL FIRE-mapped perimeters dating to the 1940s and narrative sources (e.g., newspapers) to extend and other narrative sources, earlier fires were mapped to the late 19th century, thus creating a fire record that coincided with the vegetation record. Frequent Burn Zones (FBZs), Rare Burn Zones (RBZs) and Timber Harvest Zones (THZ) were identified and analyzed for vegetation changes and post-fire recovery. Results showed an overall decline in shrublands and an increase in woodlands 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 almost exclusively shrublands (100%) in the aftermath of fire, became primarily woodland (65%). Catastrophic fires appear to show a correlation with woodland cover >60%. This has implications for developing a univariate ‘fire exposure metric’ for guiding cultural and prescribed burning and other fuel reduction strategies.

35. ROGNER, M.

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Floodplain Restoration on Disconnected Gravel Bars in the Sacramento Watershed

Due to dams, bank revetment, and altered hydrology, the ability for the Sacramento River to meander has been severely degraded throughout its lower reaches. This degradation of physical process has left relict gravel bars scattered on floodplains now largely disconnected from the river. In 2013 River Partners experimented with eight late-summer wildflower species, testing to see if local ecotypes adapted to similar conditions could be used to restore a 7-acre gravel bar located on the La BARRANCA Unit of the Sacramento River National Wildlife Refuge. Utilizing results from ongoing long-term monitoring of the site, River Partners has amplified lessons-learned to be able to restore much larger areas of similar soil conditions elsewhere in the Sacramento watershed. In 2022, wildlife monitoring in partnership with the Xerces Society was implemented to help evaluate project outcomes, and these data, along with plant community trajectory including the use of additional plant species are being refined to improve floodplain restoration techniques.

36. DELGADO, B.¹, and HECKEL, A.²

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Adventures and Discoveries Across 30 years of Conservation Work at Fort Ord National Monument (1993-2023)

We will present an overview of research and restoration projects completed on Fort Ord National Monument since 1993. These demonstrate that successful conservation of natural resources can co-exist with incredible recreation. Some of the projects highlighted include targeted goat grazing aiming to reduce annual grasses and increase native forbs and bunchgrasses, unique habitat restoration of degraded Army sites in maritime chaparral and other plant communities, and conserving rare vernal pool plants by removing 110 wild pigs. Four endemic plant species have been described in the last several years here. An innovative ‘EcoCrew’ of 8 staff will be described as a good model to concurrently engage undergrads and recent graduates in several other conservation projects.

37. **PRINCIPE, Z.¹, and KRAMER, N.²**

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Frank and Joan Randall Tehachapi Preserve: Botany, Vegetation and Conservation Overview of 82,000 Acres at the Convergence of the Tehachapi and Southern Sierra Mountain Ranges

In 2022, The Nature Conservancy announced the creation of the Frank and Joan Randall Tehachapi Preserve in Kern County, California, securing a system of intact natural habitats covering nearly 82,000 acres and linking the Sierra Nevada Mountains with the Tehachapi Mountains. The location and grand scope of this Preserve allows it to achieve multiple conservation goals simultaneously. The Preserve is a critical component of one of the most important wildlife corridors in California. The Preserve is located near the confluence of four ecoregions resulting in a rich diversity of species with influence from each distinct region. Its wide elevational range (approximately 800-6900 feet) allows it to support representative vegetation communities from low-elevation grasslands to oak woodlands to coniferous forest. The unbroken elevational gradients provide opportunities for plant species with restricted ranges to redistribute themselves in the face of climate change. While we continue working to gain a more complete understanding of the Preserve's overall biodiversity, we have already accumulated significant information regarding the Preserve's botanical diversity. Botanical surveys were initiated in 2015 on properties destined to become part of the Preserve and have continued in recent years as Preserve boundaries have expanded. To date, nearly 800 plant taxa representing 87 families have been documented. More than 300 individual records representing 21 different rare, threatened and endangered species have been documented. Monitoring and research has focused on blue oak which includes phenological monitoring, stand structure and composition, dendrochronology studies and landscape genomics.

ABSTRACTS FOR POSTERS

Abstracts are in alphabetical order by primary author name; index to authors is on page 39.

1. ALLEN, A., BENTO, S., TATOR, M., GRABE D., HOM, J., HUNTER, S., NASIF, S., TEVES, N., BOUL, R., HAYNES, T., and TYDLASKA, M.

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California Department of Fish and Wildlife, Vegetation Classification and Mapping Program

Surveying Vegetation Communities in the Northern California Coast and Coast Ranges: Vegetation Ecology in Post Burn Environments

Between the peaks of the Yolla Bolly Mountains, the lowlands of Lake County, the Redwood forests of Del Norte County and the coastal scrub of Mendocino County, the Northern California Coast (NCC) and Northern California Coast Ranges (NCCR) ecoregions represent a staggering array of ecological diversity. Climate change and the increased frequency and intensity of wildfires in these regions represent a looming threat to vegetation, wildlife, and the extensive wildland urban interface. In 2022, the California Department of Fish and Wildlife's (CDFW) Vegetation Classification and Mapping Program (Veg-CAMP) recognized the NCC and NCCR ecoregions as a top priority for fine-scale vegetation classification and mapping to aid in conservation and land management. The purpose of the North Coast Vegetation Project is to collect vegetation data, develop a vegetation classification, and map vegetation communities across the landscape within the NCC and NCCR ecoregions of California. As one of the most important vectors of change on California's landscapes, fire will play a large role in the classification and mapping of the vegetation communities in these regions. Throughout the 2022 and 2023 field seasons, CDFW crews had a unique opportunity to document early successional vegetation types across the landscape. Of the 2,879,611 acres of the NCCR survey area, over 53 percent has burned between 2019 and 2022. This poster examines the progress made on the North Coast Vegetation Project and the challenges and highlights that crews experienced throughout the region in post-burn environments.

2. AVILA, D., BOLINAS, T., and COBIÁN, G.M.

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Eliminating Foliar Endophytic Fungi from *Quercus lobata* Leaves for Studying Priority Effects in Leaf Litter Fungal Communities

Foliar endophytic fungi (FEF) are fungi that live inside the leaves of plants. These fungi are thought to be non-pathogenic because leaves are not showing symptoms of disease at the time of collection. While endophytes have been shown to play important roles in plant physiology, defense, and stress tolerance, it is unclear the role that FEF play in the community assembly process once leaves have undergone senescence and abscission, known as priority effects. In order to experimentally investigate the role of priority effects on leaf decay communities, we needed to determine a way to eliminate FEF from leaves with minimal damage to leaf chemistry. We chose *Quercus lobata* as our host organism. Since we were interested in eliminating FEF, we surface sterilized leaves to remove epiphytic fungi. Next, to determine the optimal time to eliminate FEF with minimal damage to leaf chemistry we subjected surface sterilized leaves to either varying times of UV radiation or varying times and high temperatures. We determined the optimal treatment, we obtained leaf disk punches and planted the disks on nutrient media and observed for fungal growth. Therefore, the optimal treatment would be the one requiring either the least UV radiation or the lowest temperature for the shortest time to prevent fungal growth. Exposure to heat at 75 °C for 15 minutes was the optimal treatment for eliminating FEF from *Q. lobata* leaves. The findings from this pilot study will be used for a manipulative field experiment to test the priority effects of FEF on leaf litter fungal community assembly.

3. **BENTEROU, C.D.¹, RUSSELL, W.¹, STASIEWICZ, A.^{1,3}, KATO, K.², and WILKIN, K.²**

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Wildfire Mitigation Influence on Fuels and Flora in the California Home Ignition Zone and Vice Versa

Consecutive years of devastating home losses to wildfires urge home fuel reduction and construction improvements. Existing research correlates better house survival with these modifications to the home ignition zone (HIZ), now required in California. These changes to mitigate wildfire structure loss, (e.g., reducing continuity of canopy and understory vegetation and removing surface fuels), introduce ecological changes in the HIZ. Fuel break disturbances can increase plant invasions and diminish biodiversity, but the nature of maintaining defensible space also provides opportunities to control invasive species and promote native biodiversity at the parcel level. Adequate research on mitigation compliance is lacking, and so its ecological influence remains unknown.

Two years of data on wildfire mitigation compliance (California code and two voluntary standards) was collected at 177 participating residences in three Santa Cruz Mountains (2022) and two Sierra Nevada (2023) communities in order to analyze the relationship of mitigations implemented to vegetative species richness and understory cover, forest canopy cover, and surface fuel dispersal for a variety of California forest types (Coast Range mixed evergreen and Sierran foothill and mixed-conifer forests). Generalized linear mixed-effects models (GLMM) were used to associate patterns in biodiversity with wildfire safety.

This research advances the current understanding of CA HIZ mitigation implementation in California and better defines its role in shaping HIZ ecology.

4. **BILODEAU, C., ADELSTEIN, E., KEEVER, M., RODRIGUEZ, K., JURJAVCIC, N., and BUTLER, N.**

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Fens, Fire, and Forest Management: Effects of the Dixie Fire on Sierra Nevada Fens

High severity wildfires threaten fens by decreasing biodiversity, providing a pathway for introduction of invasive species, and increasing instability of the ecosystem. Lower severity wildfire can increase downstream water availability, which may result in expansion of fens over time. Fire suppression activities may enable woody plant invasion, promoting desiccation of meadow margins through evapotranspiration. Few studies have measured available groundwater in fens following watershed-level fires, and in situ data is lacking to concretely link evapotranspiration, groundwater availability, and fen condition.

In 2015, Stillwater Sciences conducted vegetation surveys in several fens near Bucks and Grassy Lakes. In 2021, the Dixie Fire burned through those fens and others in the area. In 2022, Stillwater's internal grant system funded post-fire vegetation surveys and the placement of 12 piezometers across three fens near Bucks and Grassy Lakes to study how the fens had changed since 2015. The study looked at the effects of fire on plant assemblage and conifer encroachment, the relationship between fine-scale fire severity and groundwater and between fire severity and fen condition. Preliminary analysis revealed higher rates of groundwater recession at the lowest severity site, possibly indicating higher rates of evapotranspiration, which may result in less available water to unburned fens. The degree of conifer encroachment was highest at the highest severity site, though fire suppression may have prevented encroaching conifers from burning. Invasive plants were observed colonizing newly deposited silt in the highest severity site. Results in combination with longer-term studies may help guide management of fire in fen ecosystems.

5. **BISCOE, A.**

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The Evolution and Implications of the Range Limits of a Sierra Nevada Foothill Endemic, *Mimulus glaucescens*

Mimulus glaucescens is an annual monkeyflower endemic to the Sierra Nevada foothills. *Mimulus glaucescens* can serve as a model organism to investigate the evolution of range limits in native plants and help predict if they may respond to climate change through shifting their range or adapting in place.

Mimulus glaucescens occurs on and off serpentine soils, which is a harsh environment due to low nutrients, low water holding ability, and heavy metals. In response to climate change, *Mimulus glaucescens* can potentially adapt in place due to its tolerance to stressful conditions, or undergo a range shift since it can colonize a variety of habitat types.

In the field in 2024 I'll test the hypothesis that populations in the center of *Mimulus glaucescens*' range will have higher mean fitness than populations along the margins. I'll collect fitness measures of population average plant height, number of flowers per plant, number of seeds produced per plant, and above-ground biomass. Spanning an elevation gradient, I'll survey replicate western marginal populations in the valley, central populations near Butte Creek Canyon, and the higher elevation eastern marginal foothill populations. To test for potential effects of spatiotemporal environmental variation on population fitness, I'll survey plant populations for rates and types of herbivore damage at field sites. If higher elevation eastern marginal populations have the highest population fitness, this could indicate potential for an upslope migration tracking suitable conditions under climate change. Alternatively, central populations with higher average fitness signals potential to adapt in place to climate change.

6. **BLACKMAN, B.¹, BOYNTON, R.², BRANDY, S.², HAMM, L.¹, HOLT, S.³, KAWA, D.², KOOYERS, N.³, RUNCIE, D.², SEXTON, J.⁴, STERN, M.², and THORNE, J.²**

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Building Networks to Inform the Practice of Assisted Gene Flow

Preserving biological diversity in the face of climate change is a major societal challenge, and land managers face daily decisions about how to do so. Because climate change is rapidly altering the environmental contexts of natural populations, local management actions that solely seek to conserve existing diversity, habitats, and resources are likely to be insufficient, as populations will still become increasingly maladapted to their local conditions. Assisted gene flow, the managed movement of individuals or gametes between populations within species ranges, has gained increasing attention in recent years as a strategy to mitigate local maladaptation in the short and long term. However, whether and how assisted gene flow is implemented varies greatly at the local level, and there is no one prevailing set of agency guidelines on how best to source seed. Funded by the new NSF Organismal Responses to Climate Change (ORCC) Program, our team is building two networks to inform the practice of assisted gene flow. Working in the common monkeyflower, we are building network models that connect genotype to phenotype to fitness in order to explore how integrative knowledge of climate-adaptive genotypes and traits could improve seed source selection. Second, we are building a network of land managers in California and Oregon with a shared interest in learning about and implementing assisted gene flow, including organizing two workshops on the strategy over the course of the grant. With these two networks we hope to promote assisted gene flow as a conservation practices and restoration method.

7. **BRILLANTE, P., BEYERL, T., VIOLETT, S., and WHITTINGTON, T.**

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Challenges in Identification of Tuolumne iris (*Iris hartwegii* ssp. *columbiana*), mariposa clarkia (*Clarkia biloba* ssp. *australis*), and Small's southern clarkia (*Clarkia australis*) on the Stanislaus National Forest, Tuolumne County

Several sensitive and unique plants occur in Tuolumne County, including mariposa clarkia (*Clarkia biloba* ssp. *australis*), Small's southern clarkia (*Clarkia australis*), and Tuolumne iris (*Iris hartwegii* ssp. *columbiana*). Identification challenges, including inconsistent and variable morphological characters, overlapping dichotomous key traits, and taxonomic issues were encountered during botanical surveys for these target species that were performed as part of the Social and Ecological Resilience Across the Landscape Fuels (SERAL) Program. Examples of the identification difficulties encountered are presented. Further research is needed to help make definitive identifications of these species less challenging and to clarify taxonomic issues.

8. **CASHMAN, G., LAMPHEAR, D., BUDESILICH, M., and SHEDLOCK, A.**

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Landscape Level Botanical Management in an Industrial Timberland Environment: Development of the County Line Botanical Management Area.

For over two decades, Green Diamond Resource Company (GDRCo) has conducted pre-disturbance floristic surveys for Timber Harvesting Plans (THPs), covering more than 160,000 acres, or nearly 40% of the current ownership. The overarching goal of GDRCo's Sensitive Plant Conservation Plan (SPCP) is to utilize this vast dataset to effectively manage special status plant species at a landscape level, rather than on a project-by-project basis. To achieve this, Botanical Management Areas (BMAs) are established and paired with region-specific Botanical Management Plans (BMPs), outlining compatible land management practices and plant protection measures for the sensitive plants known to occur in these areas. In 2023, GDRCo collaborated with the California Department of Fish and Wildlife (CDFW) to develop the County Line Botanical Management Area (CLBMA), spanning approximately 54,000 acres in the Coastal Klamath region of Northwest California. The CLBMA is an ideal candidate for landscape-level management for several reasons: (1) The area has a relatively predictable forest type, (2) it has been extensively surveyed by GDRCo botanists, (3) there are relatively few special status plant species known to occur in the area. A thorough scoping effort and accompanying risk analysis was performed for the CLBMA, leading to the development of a suite of conservation measures as a BMP. These measures include THP level surveys, annual monitoring of known special status plant occurrences, and yearly surveys of high-quality habitat outside of project areas. Ultimately, this proactive approach to rare plant management will allow for more focus to ongoing projects that conserve known sensitive botanical resources.

9. **CONSTANTZ, B., HOLL, K., and STELLA, J.**

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Convergence and Divergence in Restored Riparian Overstories and Understories along the Sacramento River, California

Restoration ecology theory predicts that modifying the initial conditions of a degraded site facilitates its convergence with remnant habitat. However, observational research has rarely examined the potential for convergence from the degradation of remnant sites instead of the recovery of restored sites. Restoration researchers have recognized the importance of studying dynamic trajectories at multiple sites over time to characterize the successional pathways of restored communities. This study repeats surveys of the understory, shrub and overstory communities of restored and reference forests in 37 restoration and 41 reference sites along a 100-km span of the Sacramento River, California, up to 16 years later to evaluate whether these forests are converging. We found that restored forests native basal area and stem density are similar to remnant forest values, though the species composition differs substantially. In contrast, the

shrub layer of restored sites is dominated by the invasive, shade-tolerant species, *Rubus armeniacus*, and native understory cover has stopped increasing. Most native species in the understory were woody, while remnant forests have more native and exotic graminoids and native forbs. This result underscores that targeting remnant forests alone may not be the most effective goal for recovering degraded communities.

10. ELDREDGE, L., WEINMANN, S., and PICARDAT, J.

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Pollinator-Plant Interactions at Pine Hill Preserve: Informing Management of Endangered Flora

Pine Hill Preserve is a collaborative effort among eight federal, state, and local government agencies and two private non-profit organizations to protect rare plant habitat in western El Dorado County. This 4,940-acre preserve is home to 10% of California's native floral diversity and 9 rare plant species (including 5 that are federally listed). To improve our understanding of local pollinators and their interactions with rare plants at Pine Hill Preserve, we have been collecting data on bees and lepidopterans since 2014 and May of 2023, respectively. Through our pollinator collections and observations, we are gaining valuable insight into the unique relationships that exist between pollinators and rare plants. Thus far, we have documented over 150 native species of bees (68 from rare plants) and 25 native species of lepidopterans on other native flora. Through our work we are compiling baseline pollinator data for the Preserve and have observed shifts in plant-pollinator interactions over time. We are also learning about narrow plant-pollinator relationships, including one species of bee that is a pollen specialist on one of the endangered plants. This deeper understanding of Pine Hill Preserve's pollination network informs our management decisions and enables us to more effectively work towards the conservation and recovery of Pine Hill Preserve's rare plants.

11. FRANK, A.¹, LAMBRECHT, S.¹, CARTER, B.^{2,3}, and MISIEWICZ, T.⁴

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Populations of *Erysimum franciscanum* and Their Growth Response Effects from Water Availability may Indicate Local Adaptation: Implications for Rare Plant Populations in California

Rare plants endemic to California need a broader body of research examining individual study species and their ecological habits to better inform conservation methods throughout the state. *Erysimum franciscanum* being endemic to the San Francisco Bay Area is a unique study species to examine population level ecological factors that can shed light into its abilities to withstand certain climate pressures. The inter-annual variance in precipitation found along the species' entire range, and its behavior as a semi-annual/biennial plant, makes it an exemplary specimen for case study. For this study, we ask the following questions: 1) Are *E. franciscanum* populations locally adapted to their sites with respect to water availability? 2) Do populations exhibit specific tolerances to drought expressed through their fitness responses? 3) How will populations sampled respond differently to future climate change scenarios? We assume that the populations of *E. franciscanum* are locally adapted to their specific locations throughout the Bay Area based on water availability. Expected results could inform future studies on locally adapted populations of rare or threatened California endemic species (particularly annuals and biennials) and their potential population level responses if unable to tolerate future climate scenarios. Populations of *E. franciscanum* were collected from four locations along the entirety of the San Francisco Bay peninsula (its natural range). Plants are currently growing in the San Jose State University greenhouse where they will undergo two water trials; a control with ample available water; a drought trial that will simulate seasonal precipitation drydown. Ultimately, findings will help inform local and state conservationists on this rare species and will provide accessible replication for future studies on other rare and endemic species.

12. GEARY, M., and WEST VALLEY COLLEGE PLANT BIOLOGY STUDENTS

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Fierce Urgency: On the Fly Development of a Coast Redwood Drought-Response Monitoring Program on a College Campus

Many species are predicted to range shift as climate changes. Some shifts may cause type conversions – redwood forest might become oak woodlands. Transitions are well-documented in the fossil record, but we do not know what they look like on human time scales. Research on redwood recovery after fire has demonstrated their resilience, but little has been done on how or whether redwoods recover after drought.

At the West Valley College campus in Santa Clara County our planted redwoods include a row of 200+ trees running 900 m N-S. In 2015, I began using them for teaching tree measurement techniques; in spring 2019 we noticed trees with browning. California had experienced drought in the recent past (2012-2016) but we had not seen this before.

In fall 2019, students recorded tree “health”: <5% of trees showed stress. In fall 2021, students evaluated “canopy greenness”; ~10% of trees looked <80% green. In spring 2022 we tagged 80 trees, started a photo database, and assessed greenness (>50% of trees were <80% green). By fall 2022 the number of severely stressed trees was rising. And then the rains came.

This study has been challenging. I intended to develop methodologies with my classes; we were derailed by the pandemic even as the drought worsened. Students are inconsistent with data collection, especially with qualitative methods. But... re-surveys in spring and fall 2023 showed almost every tree showing recovery, even trees with <10% greenness in 2022. We are improving methods, adding drones and microscopy, and continuing to monitor.

13. HANOFEE, S.

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Preliminary Results and Notable Finds from a Floristic Inventory of the Lava Caps of Nevada County

Sierran lava caps are known for harboring unique plant communities and high rates of endemism. Recent work from within the extensive lava caps of Tuolumne and Calaveras Counties has resulted in several recently described species in addition to the known rare plants endemic to these habitats. Nevada County is home to many lava caps which have been historically under-documented. Do any of the endemic species known from the central Sierran lava caps occur north to Nevada County and do any novel species exist within these habitats that are as-of-yet unknown to science? Surveys were conducted in an attempt to document a full floristic inventory of accessible lava cap habitats in Nevada County. Collections have been made from six sites. Three sites have been completed so far. Another three sites are currently incomplete and several more have not yet been visited. Results so far have indicated quite a few county records, range and elevation extensions, and otherwise notable collections.

14. HOEFT, A., HEINE, M., and REYES T.

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Multiple Years of Data Collection in Wetland and Riparian Habitats Throughout California for the Bureau of Land Management’s Assessment, Inventory and Monitoring Program

For the past two field seasons, California Native Plant Society (CNPS) has been a part of a team of vegetation ecologists jointly collecting riparian and wetland Assessment, Inventory, and Monitoring (AIM) data across California for the Bureau of Land Management (BLM). The Riparian and Wetland AIM protocol is an intensive suite of sampling methods to capture various biotic and abiotic data in riparian and wetland systems scattered throughout much of California’s botanical eco-regions. This protocol is used in

riparian areas, floodplains and wetlands, bridging the information gap between terrestrial and lotic areas. A few of the sampling methods included in the protocol are soil disturbance, bare ground, vegetation composition, vegetation structure, soil characterization, water sources, water quality, and annual use measurements. CNPS crews were responsible for sampling 40 of 120 sites in each of the past two years, spanning diverse habitats from the Mojave Desert to the North Coast. This coming sampling season of 2024, CNPS crews will sample or resample the full 120 sites across the state, expanding into the Modoc Plateau and parts of Northwestern Nevada. The data is synthesized and managed by the BLM and made publicly available to increase the understanding of riparian and wetland sites throughout California.

15. JONES, C., and VARGAS, O.

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Species Boundaries of the Rare Menzies' wallflower (Brassicaceae: *Erysimum menziesii*), an Endemic of the Northern California Coast

The California Floristic Province (CFP) is considered a major hotspot of global plant diversity, comprising 6,143 total native vascular plants, of which 2,612 (42%) are endemic to the region. Previous studies have attempted to explain the origin of this diversity, but little is known about the microevolutionary process promoting speciation, specifically for narrow rare endemics. A California species that is considered a rare narrow endemic is *Erysimum menziesii*, a dune endemic distributed along the California coast from Monterey County to Humboldt County. The evolutionary origin of *E. menziesii* is currently unknown, and its species boundaries are unclear. To understand the origin and the species boundaries of *E. menziesii*, I will: 1) test the different hypotheses about *E. menziesii*'s phylogenetic position relative to other species in the genus (direct descendant of *E. capitatum* vs. sister to *E. concinnum*) and 2) examine the genetic, biogeographical, and morphological evidence to test for the ecological budding and allopatric speciation, 3) use gathered evidence from aims 1 and 2 to clearly define the taxonomic boundaries of the species in terms of morphology, genetics, and biogeography.

196 samples from Monterey to Del Norte County, California, will be collected from nine sites. As we collect tissue, morphological features will be measured. DNA will be extracted from the tissue samples and sequenced using RADSeq. Loci recovery will be performed using ipyrad, and the phylogeny will be inferred using IQtree. A principal coordinate analysis (PCoA) will be performed using genetic information and morphological data showing each population's (dis)similarities.

16. ROSSI, V.¹, CONRAD, K.¹, HERNANDEZ-MENA, J.¹, LEÓN-OSPER, M.², NARBONA, E.², FULLER, A.³, and WHITTALL, J.¹

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The Biochemistry of Attraction: Red Flowers and their Hummingbird Pollinators in California

California has ~130 red flowered species that fit the hummingbird pollination syndrome. Although red could be an adaptation to attract hummingbirds, elegant experiments in a few species suggest that red flowers are an adaptation to prevent bee-visitation (hummingbird attraction is driven by nectar traits). In a few well-studied cases, red flowers are created by combining red anthocyanins (pelargonidin) with yellow carotenoids. To test the broader applicability of these findings, we quantified the color of 31 red flowered, hummingbird pollinated species using digital images, UV-Vis reflectance, and biochemical analyses. Only 45% of sampled red flowers produce both pelargonidins and carotenoids. Some red flowers produce cyanidin (a pink anthocyanin) with carotenoids (23%) while others produce pelargonidins without carotenoids (23%). Cyanidins without carotenoids was the rarest of these four pigment categories (9%). The UV-Vis reflectance spectra for these four pigment combinations reveal no substantial effect on UV reflectance and only subtle effects on reflectance between 400-500 nm. However, the type of anthocyanin has a dramatic effect on reflectance around 600 nm (pelargonidins cause an orange shift). When interpreting

these spectra in light of hummingbird vision, neither the type of anthocyanin, nor the presence of carotenoids have a significant effect on floral conspicuousness. These results leave us wondering, “Why are there so many different ways to make red hummingbird pollinated flowers?” We consider the light environment, background color, elevation and phylogenetic constraints in order to further understand the biochemical diversity underlying hummingbird red flowers in California.

17. KANG, H.

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Special-Status Plants and Their Relationship with Roadsides

Plants have mastered the art of adapting and are one of the first indicators of climate change. Special-status species have experienced significant habitat loss and fragmentation in the last several decades. These losses stem from historic events such as hydraulic mining, agricultural, and road developments. Some special-status species have resorted to roadsides as much of their habitat is no longer available. Roadside habitats provide an ecological corridor and refuge for some special-status species. These roadside communities include habitat supporting vegetation and influence microclimatic conditions through these spatial patterns. This poster investigates roadside specialist species from part of ICF’s 2023 field season.

18. KIEFFER, C.

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***Corallorhiza trifida*, Rediscovered in the Lake Tahoe Basin, after a Century**

Corallorhiza trifida Châtel. (Early Coralroot) is one of the rarest orchids in California. Though it is more common elsewhere in North America, it was not known to occur in California until 1977 when a disjunct population was discovered in Plumas County. This past June while conducting field work near South Lake Tahoe, CA, US Forest Service botanist Dr. Alexander Ebert and I found a new record of *C. trifida*.

This discovery initiated my research to learn more about the range and abundance of the species in California. Since reports of *C. trifida* in California are often misidentified as *Corallorhiza maculata* f. *flavida* I wanted to verify each record. I searched numerous online herbarium databases and contacted several botanists and herbarium managers to acquire more information.

I learned that *C. trifida* was actually documented in California over a century ago! I located a 1920 specimen from El Dorado County that was previously misidentified until 1990. I also discovered another new population and was able to refute a few records from the Calflora database. While other records could not be verified since no specimens or photographs were taken, I plan to search and try to relocate those records.

Perhaps *C. trifida* individuals hide so well that they have been overlooked and are just waiting in the mosses and grasses for someone to notice them. Have you seen this orchid? Be on the lookout!

More information on this project will be published in an upcoming issue of the Native Orchid Conference Journal.

19. LAMPHEAR, D., CASHMAN, G., BUDESILICH, M., and SHEDLOCK, A.

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A Habitat Suitability Model for *Monotropa uniflora* (Ghost pipe) on Green Diamond Resource Company Timberlands in North Coastal California

Since 2001, Green Diamond Resource Company (GDRCo) has been conducting pre-disturbance floristic surveys of Timber Harvesting Plans. *Monotropa uniflora* (ghost pipe) is a special status plant with a California Rare Plant Rank of 2B.2 that has been frequently detected in the northern regions of the California ownership. Over the course of many years, GDRCo has collected and maintained detailed data regarding

the locations and quality of these ghost pipe populations. In an effort to better understand the distribution of ghost pipe across the landscape, a habitat suitability model was created using Maxent. The model was created using 1235 presence records collected between 2001 and 2023 from the GDRCo botanical database. In addition, detailed landscape scale climatological, topographical, and physical spatial data were used for prediction. Some of the most significant contributing variables include precipitation, elevation, latitude and soil metrics and elevation. The Smith River and northern Klamath regions of GDRCo's ownership exhibit the highest habitat suitability indices. The model will be instrumental in future monitoring efforts and assessment of ghost pipe's status.

20. MACDONALD, R.

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20 Years of Observations of Butte County Meadowfoam, *Limnanthes floccosa* subsp. *californica* on the Doe Mill Preserve in the City of Chico.

We are maintaining a complete yearly count of capsule production. We document populations which expand and contract greatly. We believe that direct climatic input is a significant driver for the strongly varying success of seed bank replenishment. Under present conditions, most years do not afford abundant growth and seed bank recharge. A small shift in climate may deny the few "superior" seed-set years.

The 2010-2011 hydrological year is an example of how Butte County Meadowfoam (BCM) population and seed production is severely impacted by climate pattern. Early winter rain was good, but prolonged drought during seedling stage cut population numbers and forced early maturity of "miniaturized" plants. The 2010-2011 population was only 18 % of the recent 7 year average. We can point to the linkage of climate input and seed bank performance for many of the years in 20 years of observations.

The survival of BCM is going to be impacted if climate patterns change significantly from present conditions. We have included observations for alternative climate states, and they show how little we understand. A severe drought year (2020 -2021) with +/- 7.83" ppt brought near record seed production, perhaps as a result of reduced competition. 2021-2022 was near average (13.93" +/-) ppt, and BCM capsule counts fell greatly. 2022-2023 was wet (22.55" +/- ppt), but capsule production was very high. An accurate long term record is the only way to approach a real understanding of BCM's life cycle.

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Preliminary Evaluation of Effects of 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 2009-2023 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 and 2023 to evaluate effects of fire. Preliminary results varied and were likely affected by heavy snowfall during winter of 2022-2023. Observations include the following: 1) *D. uniflora* had reduced flower and leaf production in 2022 and 2023 and almost complete elimination at the scattered seed plot at Summit; 2) *D. uniflora* may also have been reduced from erosion and removal of duff at Summit; 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.

22. **MATSUDA, E.**

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Restoration Success with Endangered Pallid Manzanitas

Pallid manzanitas (*Arctostaphylos pallida*) are a federally protected species of ~1400 plants found only in Alameda and Contra Costa counties. Over the past 7 years, Friends of Sausal Creek and partners removed overstory trees and competing vegetation from a population of 3 struggling pallid manzanitas. Overstory tree removal created explosive population growth, and the population is now a thriving community of 127 individuals. Pallid manzanitas are notoriously difficult to propagate and most populations are in decline, so such significant natural recruitment is monumental for this species. Over half of these young plants fruited for the first time in 2022, and we are working to expand this success in other pallid manzanita populations in the Sausal Creek watershed.

23. **MICHAELS, J.**

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Managing *Stipa pulchra* for Native Seed Production

Native seed farms present a unique opportunity to test land management strategies in a controlled environment. At Hedgerow Farms, we employ techniques such as mowing and burning with the goal of establishing successful stands of native plants that produce high-quality seed. The results of these trials may also provide useful insights for land managers who employ similar techniques.

We describe an ongoing trial in which we are testing mowing, burning, and swathing on replicated production fields of Purple needlegrass (*Stipa pulchra*). The observed effects are compared to ‘old growth’ control fields where the grasses are left untreated in the field through Fall dormancy. Examined response variables include inflorescent counts and seed production per individual compared to the control fields.

24. **MILLER III, D.G.¹, and YOLDAŞ, F.²**

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Colonization of *Arctostaphylos* host plants by *Tamalia* gall aphids as evidence of ecological succession

Fire is an ecological process maintaining chaparral ecosystems in California. Following a 1999 wildfire at our study site in the Cascade Range foothills, we have tracked the appearance of manzanita (*Arctostaphylos*) plants and their colonization by *Tamalia* aphids (Aphididae) beginning in 2003. We tested the hypothesis of minimum dispersal distance to predict the rates of colonization by the gall-inducers (*Tamalia coweni*) and their inquilines (*Tamalia inquilinus*). Our methods included mapping the spatial distribution of 500 host plants in a 1-hectare study population using a high-precision Trimble GPS instrument and GIS to process data. We surveyed all juvenile shrubs and a random sample of mature plants to estimate the frequency and timing of plants colonized by gall-inducers. Additionally, we sampled galls over the entire growing season to estimate the frequency of inquilines invading galls.

Our results show that, beginning in 2008, less than 4% of the 135 juvenile plants were colonized by *Tamalia* aphids as seen by the presence of new galls. Over 35% of plants had been colonized by 2022. Assuming *Tamalia* aphids colonize young plants (sinks) from existing populations on mature plants (sources), our results are generally consistent with a minimum dispersal distance hypothesis, although spatial scale varies across one order of magnitude. Our data further suggest inquilines can disperse and colonize new habitats efficiently, in synchronization with their gall-inducing host aphids. Our results have implications for patterns of evolutionary diversification in both gall-inducer and inquiline lineages.

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Differential Local Adaptation Detected in Soil Generalist, *Erysimum capitatum*, Across California Serpentine Exposures

The soil-plant interactions between serpentine and vascular plants have been well documented and serpentine is often used as a model system to understand evolution and adaptation. However, previous botanical studies often treat all serpentine as homogeneous environments ignoring differences between serpentine exposures of varying composition. *Erysimum capitatum* (Western Wallflower) is a widespread soil generalist and in California, it can be found inhabiting non-serpentine soil as well as numerous serpentine formations across the state. Thus, *E. capitatum* provides the ideal system to investigate adaptation in populations sourced from differing serpentine exposures. The goals of this study were to test populations for local adaptation, determine if a serpentine ecotype was present, and test whether serpentine populations experience a home site advantage when grown across varying serpentine soils. Seeds and soil were collected from four serpentine exposures and four nearby paired non-serpentine locations within California. A reciprocal transplant greenhouse experiment was conducted using soil from the four serpentine exposures and one non-serpentine soil. Evidence was found for local adaptation within two of the sites studied but a consistent serpentine ecotype was not supported. However, all serpentine populations outperformed non-serpentine populations on a serpentine soil with high nickel, iron, and cobalt content suggesting that a genetic basis underlying adaptation to soils with heavy metals is conserved across all serpentine populations. The results establish that the response to variation in composition between serpentine exposures must be considered when defining a species adaptation to serpentine.

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The Influence of Drought and Warming on *Lupinus nipomensis*: Implications for Survival, Morphology, Reproduction, and Microbial Communities.

Environmental DNA (eDNA) multilocus metabarcoding reveals significant differences in soil microbial communities associated with the federally- and CA state-endangered *Lupinus nipomensis* (Fabaceae), between wet-cool and dry-warm microhabitats. In this study, 20 experimental plots in Arroyo Grande, California, representing various combinations of these microhabitats and the presence or absence of *L. nipomensis*, were selected for soil sampling. A parallel controlled greenhouse study with *L. nipomensis* under warm-droughted and well-watered conditions was conducted to compare the microbial communities in both settings. Leaf gas exchange and plant trait data indicate that droughted plants in the greenhouse showed increased water use efficiency and applied reproductive strategies. Findings highlight a contrast between field and greenhouse microbial communities associated with *L. nipomensis*. The microbial communities in field soils exhibited greater species richness and evenness compared to those in greenhouse soils. In the field, we observed an overrepresentation of nutrient-cycling microbes and disease organisms, but a surprising underrepresentation of nitrogen-fixing microorganisms. Microhabitat conditions significantly influenced microbial community beta diversity in the field, while no significant differences were observed in the alpha or beta diversity regarding the presence of *L. nipomensis* in soil samples. This suggests that a combination of factors influence the growth and reproduction and presence of *L. nipomensis* other than just soil microbes. This study underscores the value of eDNA analysis in understanding soil microbial community dynamics for conservation efforts and exposes the disparity between greenhouse and field conditions in studying soil microbes.

27. **PATTEN, M., GARDNER, L., and MELCER, R.**

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Fine-scale Vegetation Mapping in California State Parks

Fine-scale vegetation mapping is a crucial tool to help wildland managers understand wildlife habitat, prioritize restoration actions, and protect sensitive resources. California State Parks scientists are conducting a gap analysis to determine the status of high-quality fine-scale vegetation maps throughout state park properties, and prioritize new mapping efforts. CDFW's VegCAMP program has created fine-scale vegetation maps and vegetation classifications for a significant portion of the state, and many State Park properties are covered by these regional projects. However, some of these maps may be less accurate than desired if they are decades out of date or have experienced large-scale disturbances, such as wildfire, since mapping took place. Furthermore, a significant portion of state park properties are not mapped, and many are located in areas that do not have a regional vegetation classification. To address these challenges, State Parks scientists have been evaluating existing maps against current aerial imagery, ground-truthing, conducting vegetation surveys, creating provisional vegetation community descriptions, and creating new maps using VegCAMP standards. This has led to significant improvements in our knowledge of the vegetation community diversity within our parks.

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A Prickly Pappose Tarplant Success Story: Disturbance in the Delta

Centromadia parryi subsp. *parryi* (pappose tarplant) is a special-status annual herb in the Asteraceae family that is endemic to California with a California Rare Plant Rank of 1B.2. It occurs in coastal salt marshes and alkaline grasslands, predominantly within the San Francisco Bay Delta, Sacramento Valley, and inner North Coast ranges. Botanical surveys prior to construction of the Arnold Slough Tidal Habitat Restoration Project documented over 6,000 individuals within 100 acres of high marsh alkali grassland. Prior to project implementation, over 4,800 seeds were salvaged then seeded across the site following construction. Seeded locations varied in elevation above existing tidal datums to assess potential impacts of the increased tidal range expected following restoration, disturbance level to assess impacts of construction, and seed preparation and sowing methodology to assess germination requirements. Two years of monitoring the existing population and seeded locations suggests that microtopography and water availability may be more important than relative elevation for this species, with higher germination documented in swales and vernal wet areas. Compared to the pre-construction census, areas seeded following construction disturbance increased five times that documented at reference populations during the same time period, suggesting that disturbance supports population growth. Finally, application of locally-sourced mulch (i.e., shredded salt grass and pappose tarplant vegetative material) at the time of seeding did not appear to affect germination success. Overall, results indicate that with careful planning and a healthy dose of disturbance, re-seeding suitable habitat after restoration-related construction activities can result in population increases for pappose tarplant.

29. **SEGARRA, I., and SEXTON, J.**

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The Encroachment of Non-Native Plant Species into Vernal Pools at the Merced Vernal Pools and Grassland Reserve

Vernal pools are seasonal wetlands that fill during winter rains and transition to a mosaic of endemic plants as spring progresses. Vernal pools are one of the few low-elevation habitats in California dominated by native plant species; however, the native diversity of these habitats is threatened by non-native species. In this study, I investigated the encroachment of two non-native grass species in the genus *Hordeum* into vernal pools at UC Merced's Merced Vernal Pools and Grassland Reserve. I also investigated the encroachment of *Hordeum* species under differing cattle grazing schedules to understand the effect of cattle

grazing on reducing non-native species encroachment. I collected data on the community of species within the vernal pools, including first and second dominant plant species, percent native and non-native plant species; additionally, I collected data on the encroachment of *Hordeum* within vernal pools as well as other site-specific data (i.e., area of vernal pools). Results found an average of 0.88 m encroachment of *Hordeum* in all twenty vernal pools surveyed and that the area of a vernal pool is correlated negatively with the percentage of non-native plant species within the pool ($C=-0.4744$). Additionally, the cattle grazing schedule displayed a marginal effect ($p=0.07$) on the average encroachment of *Hordeum* signifying a need to develop future studies concentrated on this possible effect.

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Rare Plant Seed Collecting for the California Plant Rescue Project in Northern California

The California Plant Rescue Project (CAPR, <https://www.caplantrescue.org>) comprises a dozen conservation organizations* working in partnership to collect seed from >1000 rare California plant taxa for ex situ storage. This effort emphasizes preserving population genetic diversity to maximize utility of the seed collections for research and conservation purposes. The second strategic goal of the CAPR project is to update rare plant observation data for the California Natural Diversity Database to which this project has contributed significant new information. Impacts from drought, wildfire and land ownership changes since previous observations have affected some northern California populations. The third strategic goal is to collect and deposit voucher specimens of the seed collections in California herbaria. We relate some of our experiences participating in this project. For example, in some of our target species, *Cryptantha spithamaea*, *Plagiobothrys hystriculus* and *Streptanthus brachiatus* subsp. *hoffmanii*, we found significant phenotypic variation within their populations, sparking taxonomic reviews. To conclude, we discuss the value of this project as a whole, and the success it has had in reaching its goals.

31. STICKROD, M.A.¹, PARKER, V.T.¹, GRAHAM-BRUNO, R.¹, and MILLER, J.E.D.²
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Processes Influencing Plant Zonation in a Brackish Tidal Wetland Under a Mediterranean Climate

Vegetation patterns in tidal wetlands are thought to be driven primarily by relative plant tolerance to abiotic stresses such as salinity and inundation. Simultaneously, other processes and interactions become important on different temporal and physical scales along environmental stress gradients. Modes of dispersal are dynamic in tidal wetlands, with different life history strategies being important under varying environmental conditions. We sought to quantify dispersal dynamics and vegetation patterns of brackish tidal marsh habitat in the Suisun Marsh, part of the greater San Francisco Bay Estuary, California, USA, in the context of California's Mediterranean-type climate. The tidal wetlands of the Suisun also house several

rare and threatened taxa, such as *Cirsium hydrophilum* var. *hydrophilum* (“Suisun Thistle”; Asteraceae). Our questions were: 1) Is hydrochory an important mechanism of dispersal for plant species in Suisun Marsh? 2) Are there specific species associated with the low marsh, mid marsh and high marsh vegetation zones? 3) What processes are driving recruitment and zonation patterns throughout the marsh? 4) What is the dispersal potential for *Cirsium hydrophilum* and how well is it represented in the soil seed bank? In considering dispersal, we examined soil seed banks over multiple seasons, seed rain, and potential for hydrochorous dispersal via seed flotation experiments. The abiotic context for our study sites was assessed through measurements of soil salinity, light-level and inundation regime over different temporal scales. Vegetation cover was assessed through vegetation transects. We found that all species sampled are capable of hydrochorous dispersal to varying degrees. Although seed banks were well mixed, specific guilds of species were strongly associated with each of the three zones. In the low marsh, inundation is significant in driving zonation patterns, while salinity, and on certain scales light, are significant for high marsh vegetation. Competition becomes significant under the more benign conditions of the intermediate mid marsh. The Suisun Thistle is capable of long distance, hydrochorous dispersal, but is poorly represented in the seed bank. Disturbance regimes and phenology may be significant in considering long term management strategies for the thistle.

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Range Decline and Ecological Resilience of a Paleoendemic Plant, *Dirca occidentalis*

Dirca occidentalis, western leatherwood or dirca, is a rare plant endemic to the San Francisco Bay Area and the only member of the family Thymelaeaceae native to California. It is one of the earliest blooming native plants, flowering in late winter. On the San Francisco Peninsula it has been documented that the species is in decline in abundance and geographical range. A survey of dirca in the Rancho San Antonio Open Space Preserve in Los Altos revealed a substantial 20-year contraction in range extent. The causes of this decline are unknown, but climate change is implicated. In spite of this overall trend of decline, dirca has demonstrated physiological and life history adaptations that appear to provide some resilience to stress and disturbance. These adaptive traits include: flexibility in time of flowering in relation to current weather; time of deciduation in relation to soil moisture; ability to regenerate from rhizomes and root-stalks after disturbance; and perhaps some ability to germinate out of season. These ecophysiological and life history traits may help extend the presence of this rare paleoendemic species in the Bay Area in spite of the effects of climate-related stress and other types of disturbances.

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Reference Genomes for Three Vernal Pool Grass Species of the Orcuttieae Tribe

The Orcuttieae grass tribe represents an ancient monophyletic group of grasses within the grass family (Poaceae) and consists of nine species in three genera. These unique amphibious grass species are entirely restricted to vernal pool habitats across the California Floristic Province, of which nearly 95% has been destroyed. Occurrences of each species are sparsely distributed throughout the extant habitat, and the eight species that occur in California have state and federal level threatened/endorsed protection status. Here, we report new chromosome-level reference genomes for *Neostapfia colusana*, *Tuctoria greenei*, and *Orcuttia inaequalis* as part of the California Conservation Genomics Project (CCGP). In collaboration with the CCGP, genomes were produced using PacBio HiFi long read and DoveTail Omni-C sequencing technology. The assemblies comprise 746, 599, and 518 scaffolds spanning 2.13, 2.5, and 1.6 billion base pairs, and have contig N50 of 10, 3 and 13 Mb, a scaffold N50 of 112, 216 and 75, Mb, and BUSCO scores of 98.1%, 96.8% and 98.4% for *N. colusana*, *T. greenei* and *O. inaequalis*, respectively. These reference genomes represent powerful new tools that can be used to test hypotheses of gene flow,

adaptation and comparative genomics between recently diverged species, and to assist in regional conservation priorities and restoration efforts.

34. **WHITE, A.¹, TOEWS, D.¹, BACCEI, J.², MALISH, A.³, and SEXTON, J.¹**

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Population Fluctuations of *Neostapfia colusana* and *Orcuttia inaequalis* Grasses in Response to Precipitation Variations in Merced County's Vernal Pool Reserve

This study investigates the relationship between two rare plant species, *Neostapfia colusana* (NECO) and *Orcuttia inaequalis* (ORIN), and precipitation patterns throughout the history of Merced County's vernal pool reserve. We collected current and historical data on NECO and ORIN grasses from the vernal pool data bank, and data on precipitation and temperature. While the precipitation data for the University of California, Merced's weather station goes back to 2017 and the grass population data goes back to 2015, we supplemented the precipitation data with other weather stations in Merced. Our expected results indicate a correlation between NECO and ORIN and precipitation, with a solid correlation between NECO and ORIN. Previous years have shown a decline in the population of these species. However, the winter of 2022 witnessed an increase in population, attributed to the amount of precipitation collected. Notably, this area lacks population data from past years and has shown some population growth in years, making this observation particularly significant. Although the observed impact is relatively small, the results demonstrate that precipitation does influence the population of NECO and ORIN grasses to some extent. This is important because the NECO and ORIN grass populations increase with more rainfall in the following years there is a likely chance that the NECO and ORIN populations can recover.

35. **WILLIAMS, B.R., HAYES, M.A., MILLER, J.J., BROWN, J.C., VALLE, D., and DETWILER, S.**

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Conservation and Recovery of Federally-listed Plant Species in the San Francisco Bay-Delta Area

The San Francisco Bay-Delta Fish and Wildlife Office (BDFWO; est. 2009) serves as a public partner in support of at-risk and federally listed plants, wildlife, and their habitats located in the San Francisco, San Pablo, and Suisun bays, Sacramento-San Joaquin River Delta, Yolo Bypass, and surrounding areas. BDFWO is the lead office overseeing the conservation and recovery of a total of nine threatened or endangered species, including four plant species (*Chloropyron molle* ssp. *molle* "soft bird's-beak," *Cirsium hydrophilum* var. *hydrophilum* "Suisun thistle," *Erysimum capitatum* var. *angustatum* "Contra Costa wallflower," *Oenothera deltoides* ssp. *howellii* "Antioch Dunes evening primrose"). Our team develops and implements recovery plans that provide actionable, measurable, and objective criteria unique to each species in order to track progress toward and accomplish their recovery. We collaborate with community members, partner agencies, nonprofit organizations, and other stakeholders to conserve and recover endangered species by working to establish sustainable populations for each, and restoring and enhancing their habitats which is critical to their survival. To achieve these goals, our plant recovery program employs *in situ* and *ex situ* conservation strategies such as, performing range wide surveys and demographic monitoring of wild populations to detect changes and enable adaptive management, conducting biological studies to learn more about endangered species' biology and ecology to develop targeted recovery actions for each species, seed collection and plant propagation for use in mitigation and restoration activities, and more. We welcome potentially interested partners to contact us for more information and to discuss new ideas for collaboration.

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Analyzing *Dudleya* Germination Rates on Quarry Soil Facilitated by Bryophytes: Can Mosses Improve *Dudleya* Germination on Degraded Mine Soils?

Dudleya, also known as the ‘live-forevers’ is a genus of succulent species native to California. *Dudleya* germination is an area that has been significantly understudied but is increasing in importance since many species within the genus are rare, threatened, or endangered due to poaching. There have been long standing theories that bryophytes (mosses) are facilitators for *Dudleya* germination based on qualitative observations, no official experiments have been conducted testing it. Additionally, more quarries are being reclaimed that due to mining practices contain rocky cliffs that create habitats suited for *Dudleya* though have nutrient poor soils. This study sets up germination trials using *Dudleya cymosa cymosa* as a test species. Treatments include bare potting soil, potting soil with moss species *Anacolia baueri* (A), potting soil with moss species *Homalothecium pinnatifidum* (B), bare quarry soil, quarry soil with moss *A. baueri* (A), and quarry soil with moss *H. pinnatifidum* (B). Each treatment has eleven replicates containing ten seeds per pot. Preliminary germinated rates have been collected showing *D. cymosa cymosa* having no significant differences between the quarry treatment types. However, for the potting soil treatments there is a significant difference between each individual moss species and potting soil with no moss. This study is still underway but, these findings imply that bryophytes are not significant facilitators for germination on quarry soil.

INDEX OF AUTHORS

Talk abstract page numbers in **bold**; poster abstract page numbers in *italics*

Adelstein, E.....	24	Grabe, D.	23
Aigner, P.A.	18	Graham-Bruno, R.	35
Allen, A.....	23	Grossenbacher, D.L.	9
Applequist, E.	34	Guill, K.E.....	11
Avila, D.....	23	Guilliams, C.M.	14, 15
Baccei, J.	15, 37	Hamm, L.	25
Benterou, C.D.	24	Hanofee, S.	28
Bento, S.....	23	Hanson, L.	9
Beyerl, T.	26	Harbert, B.	12
Bibbo, M.	13	Hasenstab-Lehman, K.E.	14
Bilodeau, C.	24, 34	Hayes, M.A.....	37
Biscoe, A.....	25	Haynes, T.....	23
Bishop, C.	9	Heckel, A.....	20
Bishop, J.....	9	Heine, M.	28
Blackman, B.....	25	Henifin, K.	19
Bolinas, T.....	23	Hernandez-Mena	29
Boynton, R.....	25	Hoefl, A.	28
Brandy, S.	25	Holl, K.D.	16, 26
Brillante, P.	26	Holt, S.....	25
Brinda, J.C.	11	Hom, J.....	23
Boul, R.....	12, 23	Hubner, A.	13
Brown, J.C.	37	Hunter, S.....	23
Budesilich, M.....	26, 30	Ivey, C.T.....	10
Butler, N.....	24	Jáuregui-Lazo, J.A.....	11
Carter, B.....	11, 27	Jones, C.....	29
Cashman, G.....	26, 30	Jurjavic, N.....	24
Cobián, G.M.	23	Kang, H.....	30
Colwell, A.E.L.....	35	Kato, K.	24
Comendant, T.....	19	Kawa, D.....	25
Conrad, K.....	29	Keever, M.	24, 34
Constantz, B.....	26	Keil, D.J.....	19
Corelli, T.....	19	Kieffer, C.....	30
Dawson, A.	19	Kooyers, N.....	25
Delgado, B.	20	Kramer, N.	21
Detwiler, S.	37	Lambrecht, S.....	27
Donatello, R.A.	10	Lampe, L.A.....	10
Dritz, S.	18	Lamphear, D.	26, 30
Ekwealor, J.T.B.	11	Lazar, K.	16
Eldridge, L.	16, 27	León-Osper, M.....	29
Escalona, M.	36	Lindstrand III, L.	15
Evens, J.E.....	13	Loik, M.	33
Frank, A.	27	Luong, J.	16, 33
Franko, D.	13	Macdonald, R.....	31
Friesen, R.E.....	9	Mackey, H.E.....	16, 31
Fuller, A.	29	Magney, D.L.....	18
Fuller, T.	17	Malish, A.	37
Gardner, L.....	34	Matsuda, E.....	32
Geary, M.	28	McLaughlin, J.....	11
Gosejohan, M.....	10	Mejia, J.F.	10

Northern California Botanists

Melcer, R.	34	Ruygt, J.A.	19
Merriam, K.E.	10	Saito, L.	10
Meyer, R.	33, 36	Segarra, L.	34
Michaels, J.	32	Sexton, J.	25, 34, 36, 37
Micheli, L.	19	Shacoski, S.L.	35
Miller III, D.G.	32	Shedlock, A.	26, 30
Miller, J.E.D.	35	Shevock, J.R.	14
Miller, J.J.	37	Stasiewicz, A.	24
Miranda, C.	33	Stella, J.	26
Mishler, B.D.	11	Stern, M.	25
Misiewicz, T.	27	Stickrod, M.A.	35
Montrone, A.	10	Tator, M.	23
Morgan, C.	15	Teves, N.	23
Narbona, E.	29	Thomas, D.	36
Nasif, S.	23	Thorne, J.	19, 25
Nelson, R.A.	18	Toews, D.	36, 37
Nguyen, P.	33	Tukman, M.	13, 19
Nosratinia, S.	11	Tydlaska, M.	23
O'Brien, J.	15	Uhler, M.	16
Oliver, M.J.	11	Valdovinos, F.S.	18
Pagel, J.	16	Valle, D.	37
Parker, V.T.	35	Vargas, O.	29
Patten, M.	34	Verschoor, A.L.	35
Pennington, L.	36	Violet, S.	26
Picardat, J.	27	Vollmar, J.	16
Press, D.M.	16	Weinmann, S.	27
Principe, Z.	21	Weisberg, P.G.	10
Puentes, S.	15	White, A.	37
Ratchford, J.	12	Whittall, J.	29
Reeber, L.	11	Whittington, T.	26
Reyes, T.	28	Wilkin, K.	24
Robertson, D.	13	Williams, B.R.	37
Rodriguez, K.	24, 34	Wolf, E.W.	17
Rogner, M.	20	Worrell, K.	38
Rossi, V.	29	Yoldaş, F.	32
Rothfels, C.J.	11	York, D.A.	15
Roy, S.W.	11		
Runcie, D.	25		
Russell, W.	24		

EXHIBITORS

Ascent

Representatives: Pam Brillante and Sara Violet

Website: www.ascent.com • Email: info@ascent.inc • (916) 444-7301

Ascent offers a diverse staff of botanists, wetland ecologists, soil scientists, regulatory specialists, hydrologists, biologists, natural resources planners, and California Environmental Quality Act/National Environmental Policy Act (CEQA/NEPA) experts to guide your project from planning to completion. Our permitting and regulatory compliance capabilities include obtaining federal and state wetland, water quality, and streambed alteration permits and assisting with compliance, monitoring, and reporting requirements during project execution. We integrate planning and environmental review with years of experience in project implementation to develop an effective approach to regulatory compliance for a wide variety of public and private projects.

Bureau of Land Management

Representative: CA BLM Botanists

Website: www.blm.gov/programs/natural-resources/native-plant-communities

The Bureau of Land Management (BLM) manages 15.2 million acres of public lands in California (nearly 15% of the state's land area) and 1.6 million acres in northwestern Nevada. It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations. Among its many programs and policies, BLM works to conserve and/or recover ESA-listed species and the ecosystems on which they depend so that ESA protections are no longer needed for these species.

California Botanical Society

Representative: Justen Whittall

Website: <https://calbotsoc.org/>

The California Botanical Society was founded by Willis Linn Jepson in 1913 and serves a major role in advancing Western American botany in five ways.

- **Scientific Publications.** The Society publishes the peer-reviewed, scientific journal *Madroño*, the leading source of research articles on the ecology, systematics, floristics, restoration, and conservation biology of Western American flora, including plants of Mexico, Central and South America.
- **Annual Banquet.** The Society's 2024 Annual Banquet and lecture will be held at the Fullerton Arboretum on April 13, 2024.
- **Research Support.** The Society supports botanical research on plants of Baja California through grants under the Annetta Carter Memorial Fund and supports graduate and undergraduate students undertaking botanical research in western North America through Paul Silva Student Research Grants.
- **Student Support.** Every other year (odd years), in conjunction with our annual banquet, the Society sponsors a student-organized symposium where graduate and undergraduate students come together to present their research and participate in a diverse community of botanists.
- **Community Outreach.** The CalBotSoc Botany Speaker Series showcases and promotes the work of early career botanists.

The Society welcomes membership by all individuals interested in Western American botany. Membership dues support the publication of *Madroño*, student research grants, and community outreach programs. Join us at <https://calbotsoc.org/>.

California Invasive Plant Council

Representative: Cal-IPC Staff

Website: www.cal-ipc.org • Email: info@cal-ipc.org • (510) 843-3902

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

Representatives: Emily Allen and Chad Aakre

Website: www.cnga.org • Email: admin@cnga.org • (530) 902-6009

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 through our events, student scholarship program, our website and our quarterly journal, *Grasslands*. We offer a variety of workshops on topics such as grass identification, grazing practices that promote native grassland diversity, and appropriate practices and techniques to evaluate, prepare, and plant native grasses and other grassland plants. Our conservation committee members strive to ensure that threatened native grasslands are protected from conversion or degradation. Our Grassland Research Awards for Student Scholarship (GRASS) program offers funding for students researching California's grasslands. Stop by the CNGA exhibitor booth to pick up a brochure and chat with our representatives.

California Native Plant Society – State Office

Representatives: CNPS staff

Website: www.cnps.org • Email: cnps@cnps.org • (916) 447-2677

The California Native Plant Society (CNPS) has been the leading native plant conservation, advocacy, and education organization in California since 1965. A grassroots organization, CNPS has 35 chapters serving 10,000 members all over the state of California and Baja California, Mexico. CNPS maintains an online *Inventory of Rare and Endangered Plants* as well as *A Manual of California Vegetation*, the standard vegetation classification reference. CNPS also has an active horticulture program, supporting chapter native plant sales and demonstration gardens.

ECORP Consulting, Inc.

Representative: Krissy Walker-Berry

Website: www.ecorpconsulting.com • Email: kwalker@ecorpconsulting.com

ECORP is a full-service environmental consulting firm serving clients across California and adjoining states. We have an experienced multidisciplinary team of CEQA and NEPA specialists, environmental permitting specialists, terrestrial and aquatic biologists, wetland specialists and water resource analysts, air quality and greenhouse gas analysts, noise and groundborne vibration analysts, archaeologists, cultural resource specialists, architectural historians, paleontologists, geographic information system (GIS) specialists, unmanned aerial systems (UAS) specialists, and other technical and support staff. Our comprehensive environmental knowledge and experience enables us to support your project from inception, through environmental permit application and mitigation planning, to post-construction compliance monitoring.

Elliott Environmental Consulting

Representative: Brian Elliott

Website: elliottconsultingusa.com • Email: brianelliott.eec@gmail.com

Elliott Environmental Consulting (EEC) is dedicated to the project planning process for land owners and land managers. Our goal is to integrate species conservation in project planning. We achieve this goal by providing accurate and relevant biological data to project planners in a timely and cost effective manner. We provide a variety of services related to biological issues, including wildlife and rare plants, federally listed species, invasive species and noxious weeds, and vegetation and construction monitoring. We also provide regulatory assistance with the Endangered Species Act (ESA), National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA), biological assessments, biological evaluations, noxious weed risk assessments, and timber harvest plans. We have worked on a wide range of projects throughout the western United States as well as in forests of the southeastern coastal plain.

F.M. Roberts Publications

Representative: Fred Roberts

Website: www.FMRPublications.com • Email: FMRPublications@gmail.com

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 water color and acrylic paintings rendered by Fred M. Roberts. Display will include my Tree and Scrub Oak (*Quercus*) shirts, California lilies (*Lilium*) design, and new design focused on northern or central California, likely either a mariposa lily (*Calochortus*) or monkey flower shirt (*Erythranthe & Diplacus*).

Friends of the Ahart Herbarium

Representative: Emily Doe

Website: www.friendsoftheahartherbarium.org • Email: friendsoftheherbarium@gmail.com

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 Ahart Herbarium at Chico State and demonstrate and publicize the value of the Herbarium to the community.

Hedgerow Farms

Representatives: Joshua Scoggin and Julia Michaels

Website: www.hedgerowfarms.com • Email: joshuas@hedgerowfarms.com

Hedgerow Farms is a California native seed producer based in Winters, CA. Our team of farmers, ecologists and botanists have been working for nearly 30 years to grow a supply of thousands of California native plant species. These species grown at our 300-acre farm help restore areas devastated by fires, flooding, and other disruptive events.

Hedgerow Farms has an inventory of 6,000 California native species readily available for any project to make use of.

Kleinfelder

Representatives: Susan Dewar and Nicole Carpenter

Website: www.kleinfelder.com • Email: sdewar@kleinfelder.com

Founded in 1961, Kleinfelder is a professional services firm with over 150 biologists, botanists, ecologists, archaeologists, architectural historians, paleontologists, historians, environmental planners, geo-spatial specialists, graphic designers, hydrologists, geologists, and hazardous materials experts. These subject matter experts (SMEs) provide solutions to improve our clients' utility, transportation, water, energy, and private infrastructure projects.

Nomad Ecology

Representative: Heath Bartosh

Website: www.nomadecology.com • Email: hbartosh@nomadecology.com

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's 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.

River Partners / Heritage Growers

Representatives: Pat Reynolds and Michele Ranieri

Website: www.heritagegrowers.com

Email: preynolds@heritagegrowers.com, mranieri@heritagegrowers.com

Heritage Growers (www.heritagegrowers.com) is a sourced-identified native seed and plant supplier providing plant materials to support habitat restoration in California. It is a fully integrated operation capable of providing all of the services and products necessary to support high value, resilient habitat restoration projects including wildland seed collection, native seed amplification, native seed cleaning, native straw, native plants, and habitat restoration consultation services. As a venture River Partners, Heritage Growers is a non-profit organization with any profits generated going back into River Partners' mission of restoring habitat for the benefit of people and the environment. The mission of Heritage Growers is to significantly expand the species and ecotypes of commercially available native seed and plants to improve restoration outcomes. A tour of Heritage Growers' operation in Colusa is one of the conference field trips.

Santa Barbara Botanic Garden

Representative: Matt Guilliams

Website: www.SBBotanicGarden.org • Email: mguilliams@SBBotanicGarden.org

Description: Our mission is to conserve native plants and habitats for the health and well-being of people and our planet. We believe that native plants are one of the most direct solutions to our biodiversity & climate change crises. We envision a world where society understands the interdependency between people and plants, and acts to preserve the natural world.

Stillwater Sciences

Representatives: Megan Keever and Nicole Jurjavec

Website: www.stillwatersci.com • (510) 848-8098

Email: megan@stillwatersci.com, nicole@stillwatersci.com

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, and spatial analysis/GIS. 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 and Section 404 permitting.

The Big Chico Creek Ecological Reserve

Representatives: Mitchell Bamford and Claire Monahan

Website: www.csuchico.edu/bccer/index.shtml • Email: bccer@csuchico.edu

To promote the good use of prescribed fire in the foothills of the Sierra Nevada and Cascade Mountain ranges in California, the Big Chico Creek Ecological Reserve (BCCER) will partner with CAL FIRE to co-create a robust prescribed fire research program.

This work seeks to build on BCCER's long history of active fire management and is designed to promote a suite of prescribed fire research and monitoring opportunities for students at Chico State and for new partnerships with outside researchers. This work will focus on the many roles of prescribed fire in oak woodlands, chaparral, and blue oak savanna environments – each generally underrepresented in the field of fire ecology, but of great significance to California.

WRA, Inc.

Representatives: Rhiannon Korhummel, Scott Batiuk, and Maya Avendano

Website: www.Wra-ca.com • Email: opportunities@wra-ca.com

WRA, Inc. provides professional consulting services in plant, wildlife, and wetland ecology, regulatory compliance, mitigation banking, CEQA/NEPA, GIS, and landscape architecture. Formed in 1981, we are a certified small business (OSBCR ref. #13333) with more than 90 professionals who have completed projects for public agencies, non-profit, and private organizations. WRA has a wide range of project experience in a variety of region-specific habitats throughout California. Botanical surveys of sensitive plant species and vegetation communities for use in project initiation and planning is a core WRA service. Our team of botanists has extensive experience conducting plant surveys according to protocols required by state and federal agencies: we prepare Biological Resources Assessments, Mitigation and Monitoring Plans, and Long-term Management Plans for the U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, and California Department of Fish and Wildlife in compliance with state and federal Endangered Species Acts. Our team works in a variety of protected habitats across California including native needlegrass grassland, riparian, oak woodland, coastal scrub, tidal marsh, and more.

