NORTHERN CALIFORNIA BOTANISTS

BOTANICAL LEAFLETS

ISSUE 33 FALL 2024

PRESIDENT'S MESSAGE

It is fall and hopefully everyone is finishing their field work for the season. We again had a large wildfire in northeastern California. And we had fires in other parts of California, too. It seems to be the new norm! My extended family lost our cabin in the Dixie Fire in 2021. We now have a new two story cabin with a roof and siding on the outside and finished walls on the inside. The outbuildings will be completed next summer. We have a patio which our contractor says we will be able to sit and stare at the lake!

NCB is planning our next symposium in January 2025. Our theme is "Collaboration, Diversity and Partnerships in Northern California Botany." Our keynote talk will be by Patrick Reynolds of Heritage Growers and River Partners on "Production of Native Seed Ecotypes to Support Diverse Large-scale Conservation Efforts in California." A lunch discussion on collaboration and inclusion will be held. There will also be a field trip to habitat restoration sites along the Sacramento River and two workshops following two days of talks on various botanical subjects. More information about the symposium can be found in this newsletter.

Take care and see you in January 2025 at our symposium.

Linnea Hanson
NCB President

NCB 2025 SYMPOSIUM

Northern California Botanists will host our 13th botanical symposium on **January 13-14, 2025** on the campus of California State University in Chico. The sessions will again also be available online. Optional workshops will be held on Wednesday, January 15. A 2-day schedule of presentations by working botanists will include sessions on Collaboration and Partnerships, Coastal Botany, Oaks, New Discoveries, Landscape Level Fire, Pollinators, Now the Good News, a session of Lightning Talks, and a Poster Session. The Keynote Address, by Patrick Reynolds of Heritage Growers and River Partners, will follow the banquet on Monday evening, January 13. See page 2 for more information about the symposium.

MYSTERY PLANT

This native annual, endemic to California, is extremely rare and is only found in Solano and Yolo counties. The herbage is hairy and there is no leaf sheath collar. The leaf blades and the sheath are continuous. The inflorescence is partly enclosed by the upper sheath and the florets are spirally arranged.

Answer on Page 2

INSIDE THIS ISSUE:

NCB 2025 Symposium — Registration is Open!

Northern California Botanists will host our 13th botanical symposium on **January 13-14, 2025** on the campus of California State University in Chico: **Collaboration, Diversity and Partnerships in Northern California Botany**. The sessions will again also be available online. Optional workshops will be held on Wednesday, January 15. A 2-day schedule of presentations by working botanists will include sessions on Collaboration and Partnerships, Coastal Botany, Oaks, New Discoveries, Landscape Level Fire, Pollinators, Now the Good News, a session of Lightning Talks, and a Poster Session. The Keynote Address, by **Patrick Reynolds** of Heritage Growers and River Partners, will follow the banquet on Monday evening, January 13. Although the banquet requires a paid ticket, the Keynote Address is open to all.

NCB 2025 Symposium Sponsorships

Please help make the 2025 Symposium a success! Northern California Botanists invites sponsorship for our 13th Symposium to be held on 13-14 January 2025 at California State University, Chico.

Your help is very important and allows us to keep our registration rates low, support student attendance, and keep our important programs moving forward.

All Sponsors of $100 or more will receive recognition in the Symposium Program, on our website, and in the Spring 2025 Newsletter. Sponsorships of $200 or more receive additional benefits including an Exhibitor Booth space if requested. There is a limit of 16 Exhibitor Booth spaces available (includes both complimentary booths for sponsors and paid Exhibitors) and they will be offered on a first come, first served basis. If you want a booth space, please fill out the Exhibitor Booth form and get it in early. All Exhibitor requests and forms must be submitted by December 15.

If you or your company would like to partner with us in this event or if you have questions about sponsorship, you may contact us at ncbotanists@gmail.com or visit our website at www.norcalbotanists.org.

NCB 2025 Lightning Talks

This year we are again offering a session of 5 minute lightning talks. Consider giving a talk if you: are working on a project about Northern California and want to give us a quick update, are aware of an issue of concern or growing need in the botanical community, want to promote something exciting, need to hire people for an upcoming botanical project, have discovered something novel and interesting while working on a project, know of new laws or regulations that the community should know about, or want give an update about what your organization is doing in Northern California. If you are interested in giving a lightning talk contact kkaczynski@csuchico.edu by November 15. More information will be available on our website soon.

NCB 2025 Call for Posters

The NCB symposium planning committee invites you to bring a poster to share your work and knowledge of the biology, ecology, conservation or management of our Northern California plant life with others. Please forward this invitation to botanists and others with related interests from Northern California agencies, conservation organizations, consulting firms and academia. This will be a great opportunity for continuing education and networking.

For the 2025 Symposium, Tuesday morning's first session has been specially set aside as a dedicated, scheduled poster session. Poster abstracts are due by December 15 and space is limited to 40 posters. More information will be available on our website soon.

STUDENT POSTER CONTEST
Students, come present a poster to highlight your research and compete for this award! Northern California Botanists will be holding a contest for the best student poster presentations at the 2025 Symposium. Participating student posters will be evaluated by a panel of judges during the poster session on the second day of the Symposium. Three cash awards will be given to the top ranked posters. Winners will be announced at the Symposium and featured in the next issue of this Newsletter.

Answer to "Mystery Plant":
Tuctoria mucronata (Poaceae – Grass family) – Solano grass or Crampton's tuctoria. This extremely rare grass is Federally Endangered and State Listed as Endangered. It is said to be "hovering on the edge of extinction." Photo by Russ Huddleston, 11 August 2024, at the Jepson Prairie, Solano County, California.

Northern California Botanists in Action

Joanna Clines is Forest Botanist on the Sierra National Forest. In her early 20's she took a field biology class, fell in love with botany, and followed her new-found passion. Joanna worked as a Sierra NF botany seasonal for 2 years before taking her current position in 1990. In 1988, as a new seasonal, she stumbled upon a yellow *Erythronium* on Shuteye Peak during a survey. This turned out to be a new species, *E. pluriflorum*! From 1989–1991, she studied reproductive and fire ecology of the endemic shrub *Carpenteria californica* for her master's thesis. Early in Joanna's career, botanists were hired primarily to provide rare plant input for NEPA projects led by timber, silviculture, recreation, etc. The job has changed a lot over the years since then, expanding to invasive weed control, ecological restoration, working with tribes to revive gathering sites, and more. In 1998 invasive plants became a major part of her job and an additional passion. Joanna and photographer Stephen Sharnoff will soon publish a highly anticipated field guide to Sierra Nevada flowering plants featuring photos of 950+ species, expected in 2025!

Elena Gregg is Senior Botanist, Wetlands Specialist, ISA Certified Arborist at Gallaway Enterprises. She began her professional career as a botanist working seasonally for the Forest Service on the Truckee Ranger District before moving into the private environmental consulting field where she has gained over 18 years of experience working as a botanist and wetland delineator. Her time spent working as a consulting botanist in Chico introduced her to vernal pool complexes of the northern central valley. These unique systems and the endemic species that live therein encompass her primary passions, which particularly includes surveying for fairy shrimp and the endangered Butte County Meadowfoam. Elena takes great joy in leading tours of vernal pool ecosystems in the area, such as TNC's Vina Plains Preserve, and making time for other volunteer opportunities including conducting bumblebee surveys for the Xerces Society California Bumble Bee Atlas and serving on the Chico State Friends of the Ahart Herbarium Board.

Mia Ingolia is a Senior Biologist with the San Francisco Public Utilities Commission. In her role at the SFPUC, she establishes and implements natural resource management policies and research and monitoring projects associated with operations, environmental compliance, and stewardship on over 60,000 acres of SFPUC-owned watershed lands in the Natural Resources & Lands Management Division. Her recent work has focused on the design, planning, and construction of the SFPUC's Alameda Creek Watershed Center Discovery Garden and the Sunol Native Plant Nursery. She also directs the SFPUC-USDA Forest Service Research Partnership, a multidisciplinary ecological science program that creates and supports research projects focused on enhancing biodiversity and improving the success of restoration activities on SFPUC watershed lands. Mia has more than 20 years of experience as a botanist and plant ecologist working in habitat restoration, native plant conservation, rare plant species management, and environmental compliance and she holds a Master of Science from UC Davis.

Roger Stephens is a consulting botanist with Applied Technology and Science, based in the San Francisco Bay Area. While working as a botanical consultant, Roger has had the opportunity to work on restoration projects, rare plant surveys, ground truthing vegetation communities, and floristic inventories throughout western and central California. Prior to consulting work, he worked at the Cosumnes River Preserve as a Veg Tech for TNC, and shortly after at UC Davis with the Vegetation Community Ecology lab, surveying serpentine plant communities throughout the California Floristic Province and southern Oregon. He also worked with the CSTARS lab at UC Davis, helping collect field data for many remote sensing vegetation-based projects throughout the Central Valley and Sierra Nevada. Roger hails from Humboldt County, where he earned a B.S. degree in Environmental Science. He loves to explore new areas and encounter new species (to him), and whenever he travels, he enjoys photographing and documenting plants from different countries.

2024-2025 Barbara Castro Student Research Scholarship Awards

Northern California Botanists is pleased to announce the recipients of this year's research scholarship awards. As in the past, we received many worthy applications. This year we awarded 12 scholarships of $1,000 each. The Sacramento Valley and Shasta chapters of the California Native Plant Society have teamed up with NCB and are each funding one of the scholarships.

Dawson Bell, Sonoma State University
Assessing aboveground biomass of *Umbellularia californica* basal resprouts post-wildfire using terrestrial LiDAR scanning

California bay laurel (*Umbellularia californica*) has shown evidence of increasing density over the past 50 years in mixed hardwood forests in northern California, as a result of climate change and historic fire suppression (Dawson et al 2023). Since this species demonstrates prolific basal resprouting post-wildfire (Ackerly et al 2019), land managers are interested in quantifying aboveground biomass (AGB) of resprouts to determine implications for future forest species composition shifts, fuel loads, and wildfire behavior (Halbur et al 2023).For my project, I destructively harvested *U. californica* resprouts from Pepperwood and Saddle Mountain Open Space Preserves in the Mayacamas Mountains of Sonoma County. Both preserves have recent wildfire history and substantial resprouting *U. californica*. After drying and weighing the samples, I was able to develop predictive equations for resprout AGB using LiDAR-derived volume estimates and field measurements (maximum resprout height and stem count). I am now able to use these equations to analyze existing LiDAR and field data to examine the drivers of resprouting biomass. Based on preliminary analysis, tree diameter and fire-severity (as derived from satellite imagery) both play an important role in driving resprouting response.

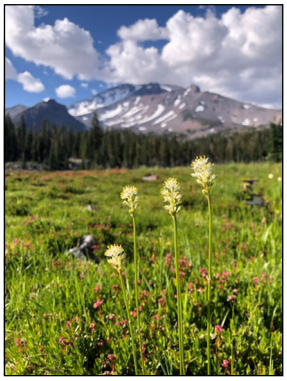
Katherine Brafford, University of California, Davis
Drivers of seed germination and seedling success in medusahead (*Elymus caput-medusae*) dominated grasslands

The trait-based filtering framework proposes that species which occur at a site are filtered from the regional species pool by abiotic, biotic, and dispersal factors according to their traits. Some non-native species, especially non-native annual grasses, change the abiotic (via thatch), biotic (via competition), and dispersal (via decreasing plant and insect diversity) filters. These changed filters usually negatively affect native plants, especially during germination and seedling establishment, in northern California grasslands and throughout the western US. Medusahead (*Elymus caput-medusae)*, is an example of one of these common and problematic non-native annual grasses in continental and Mediterranean climates in northern California. With this project, I investigate two questions: **1**. How do medusahead stands and thatch alter the soil and ground level environment (what are the filters)? **2**. What seed and seedling traits allow for germination and growth in medusahead stands and thatch (what traits allow plant growth given these filters)? I have created and installed sensors in control, thatch-only, bare ground, and native vegetation plots. I will compare these readings to the more limited measurements reported by Evans and Young, 1970. I will learn which traits allow species to co-occur in areas highly invaded by medusahead in the western US by analyzing vegetation cover data from Bureau of Land Management Assessment, Inventory, and Monitoring (BLM AIM) terrestrial datasets. At a site with a continental climate and at a site with a Mediterranean climate, I will plant species with hypothesized "beneficial" traits and hypothesized "non-beneficial" traits into control, bare ground, and thatch-only plots and monitor emergence and growth. My study will inform on how traits relate to community assembly, clarify mechanisms underlying grassland restoration management outcomes, and inform future restoration efforts.

2024-2025 Student Research Scholarship Awards (Cont.)

Gunner Michaelson, California State University, Chico
Examining prescribed fire: blue oak woodlands and the soil seedbank

Fire is an essential ecological process in California, and oak woodlands within the state have been subjected to fire for millennia from ignition sources such as lightning strikes or ember wash. Oak woodlands share an extensive history of burning with indigenous peoples of the state, and were primarily shaped by their land-use practices. However, roadblocks to prescribed burning, cultural burning, and a historical emphasis on fire suppression have developed a shift in fire regime and a disconnection from the use of fire within California oak woodlands. This has created ecological knowledge gaps that should be explored. As large wildfires burn across these ecosystems, it is more important than ever to understand its ecological effects and uses relating to vegetation. This project examines the effects of the Park Fire (2024) in Butte County on the soil seed bank of blue oak (*Quercus douglasii*) woodland stands located at Big Chico Creek Ecological Reserve (BCCER). Understanding the relationship between fire, the soil seed bank, and the resulting vegetation community is critical for gaining insight into the eventual post-fire ecosystem that will come to be, which can inform restoration efforts. Soil seed bank samples were collected at BCCER prior to the Park Fire in January of 2024 and after the Park Fire in September of 2024. As samples were collected shortly post-fire, this proposed research focuses on differences between the existing pre-fire plant communities and resulting post-fire plant communities that arise from the seed bank, primarily excluding resprouts or freshly deposited seeds. This type of research is underrepresented for the extensive Blue oak woodlands in Northern California, and so to increase knowledge on this subject, my research examines differences in species presence, species richness, seed traits, and total dry biomass of pre- and post-burn soil seed bank communities via experiment in a greenhouse setting.



Philippa Stone, University of British Columbia
Systematics and morphology of western false asphodel (*Triantha occidentalis*; Tofieldiaceae) in Northern California

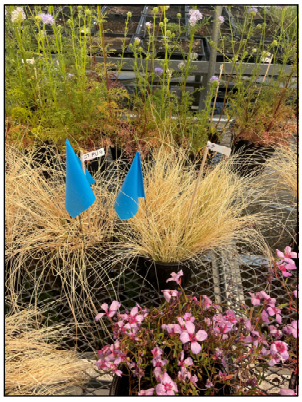
Triantha occidentalis (western false asphodel) was recently discovered to be carnivorous, using sticky hairs found directly below the inflorescence to trap insects. *Triantha occidentalis* is found down the west coast of North America from Alaska to California, and the genetic diversity of *T. occidentalis* is highest in Northern California. The current treatment of *Triantha* by Packer states that there are three subspecies of *T. occidentalis*, but initial genetic data from chloroplast DNA suggests that there may be an additional subspecies native to Northern California. As part of my PhD I am using nuclear genetic markers and morphology to try and tease apart the different subspecies of *T. occidentalis* found in Northern California. I am particularly interested in using seeds to differentiate between different subspecies of *T. occidentalis*, as seed characters have proven useful to differentiate between species and subspecies in other areas of North America. Using my collections from Northern California. I will be using scanning electron microscopy to look in detail at the seed morphology of the different subspecies, and hopefully identify useful discriminating characters. I hope that I can use my findings to create an updated classification and key to the genus as a whole.

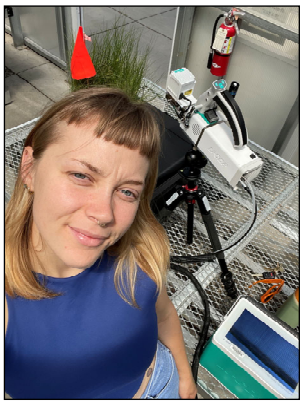
2024-2025 Student Research Scholarship Awards (Cont.)

Cameron Jones, Cal Poly Humboldt
Species boundaries of the rare Menzies' wallflower (Brassicaceae: *Erysimum menziesii*, an endemic of the northern California coast

The California Floristic Province (CFP) is a global biodiversity hotspot, with 42% of its 6,143 native vascular plants endemic to the region. Despite recent approaches aiming to explain the origin of this diversity, little is known about the microevolutionary processes driving speciation in rare endemics. *Erysimum menziesii*, a rare, endangered plant found in coastal dune environments between Monterey and Humboldt counties, California, is one such species. It shares its range with *E. concinnum*, and both are hypothesized to be descendants of *E. capitatum* due to their distinctive chromosome count (2n = 18), a rare feature among *Erysimum* species. However, this relationship has not been tested phylogenetically.

The genus *Erysimum* is taxonomically complex, with unclear species boundaries, especially between *E. menziesii* and *E. concinnum*. These species share overlapping traits, such as leaf and petal size, and their ranges extend from Monterey to Del Norte County. One ambiguous population, the Tolowa wallflower, is currently classified as *E. concinnum* but exhibits traits associated with *E. menziesii* and is found in dune systems. This taxonomic uncertainty impacts conservation, as *E. menziesii* benefits from federal endangered status while *E. concinnum* does not. To resolve these ambiguities, I have collected 214 samples of *E. menziesii*, *E. concinnum*, and *E. capitatum* and will use ddRAD sequencing to clarify species boundaries and determine the progenitor of *E. menziesii*.





Anna Krause, California State University, Chico
Characterizing drought survival of CA native coastal grassland species

Restoration of grasslands in California (CA) presents an important opportunity for combatting atmospheric carbon emissions and mitigating species loss. CA grasslands provide characteristic belowground carbon storage, demonstrated to be more resilient to extreme heat, wildfire, and drought than carbon stored by tree-dominated ecosystems by vegetation and climate modeling. Coastal grasslands are also global biodiversity hotspots, supporting over 6000 plant species including 2000 conservation-priority species. High levels of abiotic stress and competition are huge barriers to establishment of native species in CA grassland. With limited funding and resources, most practitioners across the state are forced to consistently rely on the same seven "high-success" perennial species, representing a very small proportion of possible functional and species diversity. In this study, we set out to characterize 17 additional native species' responses to water stress using a novel Lethal Drought Index (LDI). We conducted a greenhouse drought experiment to assess and compare physiological drought survival for 17 previously-uncharacterized native species alongside 5 of the "high success" species most frequently used in grassland restoration. We imposed a lethal drought treatment to quantify lethal drought index (LD_{50}), the intensity of drought associated with 50% population mortality (sensu Barkaoui and Volaire 2023). Using multivariate and linear statistical approaches, we assessed whether LD_{50} was associated with plant functional traits and other physiological thresholds linked to drought tolerance: leaf turgor loss point (π_{tlp}), meristematic water content (LMWC), specific leaf area (SLA), leaf dry matter content (LDMC), and leaf nitrogen content (LNC). Our findings, alongside field-based measurements of these same traits at three coastal grassland restoration sites across the state, will be used to develop a trait-based restoration toolbox to inform species selection and optimize drought resilient restoration.

2024-2025 Student Research Scholarship Awards (Cont.)

Rachel Tageant, Claremont Graduate University
A Vascular Flora of The Owens River Headwater Area, Mono County, California

The Sierra Nevada occupies ~20% of California's landmass yet contains more than half of the state's plant diversity. However, many areas in the Sierra Nevada need further research and the Owens River Headwater Area (ORHA) is one such area. A total of 1,157 historic vascular plant collections have been made since 1895, 997 of the collections were made by Helen M Constantine. The study area is approximately 52 mi^2 and includes the Owens River Headwater designated wilderness area in the Inyo National Forest. The study area is unique, located at a transition zone between the California Floristic Province and the Great Basin Floristic Province. The elevational range of the OHRA is 7,200-11,520 ft and is characterized by pumice flats, volcanic outcrops, forested mountain slopes, high-elevation meadows, creeks, and alpine summits. Over the course of two field seasons (2023-2024,) a comprehensive floristic inventory will document the vascular flora of this biogeographically unique area and culminate in an annotated species checklist. Voucher specimens will be collected and distributed to several herbaria, including RSA, CAS, and JEPS. To date, two seasons of fieldwork have been completed with a total of 1,322 vouchered specimens representing 54 families and over 124 genera. These numbers will change as I continue to identify my collections. In addition to my floristic research. This study will establish important baseline data on the floristic diversity of the OHRA, which will in turn facilitate a greater understanding of the diversity and distribution of California's native plants, assess future change in light of potential threats, such as climate change and OHV activity, and contribute to conservation management strategies for the ORHA.

Garrett Goodrich, Claremont Graduate University
Flora of the Boulder Creek watershed, Jennie Lakes Wilderness and Evans Grove Complex, Fresno and Tulare counties, California

The Sierra Nevada mountain range in California features globally significant levels of plant diversity, including a disproportionately high number of taxa from the California Floristic Province. Floristic sampling within the Sierra Nevada range has been extremely uneven, however, and undersampled areas remain. Floristic inventories in these sampling gaps frequently reveal new rare taxa and range extensions of known taxa. During the 2024 and 2025 field seasons a floristic inventory of one understudied portion of the range in the vicinity of Big Meadows and Boulder Creek (Fresno and Tulare counties) is being conducted to search for novel taxa, document range extensions, and provide a comprehensive understanding of the local plant communities. Sampling for this research covers more than 200 km^2 of land and focus especially on areas with known occurrences of rare species, no historical collections, and unique features associated with endemism. Approximately 1,400 specimens will be collected, identified, and deposited to herbaria including RSA, CAS, and FSC to support the resulting voucher-based annotated species checklist and inventory. To date, over 720 specimens have been collected including at least 10species with California rare plant ranks. High-intensity fire, invasive species, recreation, and climate change all represent significant threats to the plants of this study area, so conducting a thorough botanical inventory is essential to the conservation of plant biodiversity in this understudied portion of the Sierra Nevada mountain range.

2024-2025 Student Research Scholarship Awards (Cont.)

Sierra Jaeger, University of South Carolina
Reproductive ecology of a charismatic northern California coastal dune wildflower (*Abronia latifolia*)

Plant-animal interactions play a central role in angiosperm reproduction, where plants provide necessary resources to pollinators and herbivores in exchange for reproductive services. These interactions can be incredibly complex and susceptible to challenges associated with ecological change, creating vulnerability of one species to factors that influence another (e.g., mismatching flowering and pollinator flight periods). Insight into such dynamics may be especially crucial in ecosystems where both native annual plants and pollinators are in decline and where invasive species alter these networks, such as California coasts. To improve our understanding of plant-insect interactions in this sensitive region, I am investigating the reproductive biology of *Abronia latifolia* (yellow sand verbena), a charismatic and understudied native wildflower of Northern California beaches and dunes. Because *A. latifolia* specializes on open sand spits and sparsely vegetated dunes which are increasingly invaded by non-native ice plant and grasses, it may be declining throughout its range. *Abronia latifolia* is a known host to various insects (several of which are specialists and some of which are rare and declining) and provides crucial shoreline breeding habitat for endangered birds. Through a pollinator exclusion experiment and quantification of tissue damage by herbivores, I am determining the contributions of diurnal and nocturnal pollinators, as well as florivores and leaf herbivores, to *A. latifolia* fitness. These results will provide insight into the ecology of this emblematic California coast species and will inform its potential in conservation of many interacting species (as a nectar and vegetative resource to pollinators and herbivores) and use in coastal dune restoration seeding or transplanting.

Matthew Yamamoto, Claremont Graduate University
A Flora of the McGee Creek Watershed, Mono County, California

Conserving California's globally-renowned plant diversity and understanding the drivers of plant distributions is challenging because the diversity of California plants and their distributions are far from fully documented. Lack of documentation is especially true in alpine environments which can be difficult to access but are vulnerable to climate warming. Moreover, it has been suggested that models of the effect of climate change on plants can perform poorly in places like California because they lack data on how edaphic conditions relate to plant distributions. To address this, I am carrying out a floristic inventory of all vascular and non-vascular plants in the McGee Creek watershed (Mono County), a site with both edaphic diversity and extensive alpine habitats. The first of two seasons of fieldwork in the 25.13-square-milearea has resulted in the discovery of several species not previously known from Mono County and has increased the number of known rare plants from the watershed from four taxa to 25. In addition, new populations of certain plants rare in California (e.g. *Trichophorum pumilum* and *Kobresia myosuroides*) were found exclusively on carbonate substrates, supporting the hypothesis that geology is an important reason these plants are able to grow in California, far from the main portions of their ranges in North America. This research will inform conservation efforts for the rare taxa documented and will provide a baseline dataset to understand the impacts of climate change on biodiversity in environments like these.

2024-2025 Student Research Scholarship Awards (Cont.)

Ryan Li, University of California, Davis
How Patch Context Impacts Yellow Starthistle Invasion into Serpentine Ecosystems

Serpentine ecosystems, characterized by the harsh soil chemistry present, host 10% of plant species unique to California (Kruckeberg 1984, Kruckeberg 1991). One of these is the annual serpentine sunflower (*Helianthus exilis*), which thrives in seeps and ravines within serpentine outcrops. The serpentine sunflower has formed many close relationships with both native and nonnative bees (Wolf 1998).

Invasive plants growing around biodiverse serpentine ecosystems can influence native plant survival. A prime example of this has been the arrival of the annual yellow starthistle (*Centaurea solstitialis*), which has become the most widespread exotic weed within California (Pitcairn et al. 2006). However, the effect that serpentine plant community composition has on the successful propagation of invasive plants into the serpentine plant community has been understudied.

At the Donald and Sylvia McLaughlin Natural Reserve, I analyzed how serpentine patch context can impact pollinator visitation to introduced yellow starthistle. I set up an array of yellow starthistle flowerhead cuttings next to each of the five different patches (serpentine sunflower, serpentine sunflower and yellow starthistle, yellow starthistle, alkali centaury, and dry grass) that were all in one area. I then conducted fourteen 15 minute pollinator observations for each patch, measuring both the number and type of pollinators within the yellow starthistle arrays and in each surrounding patch. From this data, I hope to determine whether there is a certain serpentine patch context that facilitates the pollination of introduced yellow starthistle, guiding future conservation efforts focused on limiting yellow starthistle spread and preserving biodiverse serpentine ecosystems.

David Mitchell, University of California, Davis
Improving native tree and shrub restoration by amending degraded soils, enhancing mycorrhizal symbioses, and suppressing soil-borne *Phytophthora* disease

In Northern California's low-elevation rangelands, many riparian zones have lost tree and shrub cover. Efforts to restore native woody species to these systems are often limited by low seedling survival. Degraded soil conditions, scarcity of mycorrhizal partners, and soil-borne *Phytophthora* pathogens can all limit woody seedling establishment in these systems. I hypothesize that two types of soil treatments - organic amendments and inoculation with soil from mature woody stands - can increase restoration success of native woody species. I established a field experiment at a riparian site in Marin County, CA, and a greenhouse experiment on the campus of UC Davis. The field experiment includes two native woody species: *Quercus agrifolia* (coast live oak) and *Frangula californica* (coffeeberry). Biochar and compost amendments and soil inoculum were applied to restoration plantings at this site in winter 2022-23. In summer 2024, seedling survival and growth were measured, and root samples were collected to measure mycorrhizal colonization. Sample processing and data analysis are ongoing. The greenhouse experiment was designed to test how these treatments affect *Phytophthora cactorum* disease severity for native woody seedlings. Acorns of *Q. agrifolia* and *Q. lobata* (valley oak) were collected in fall 2023 and planted in treated containers. Live culture of *P. cactorum* was added in spring 2024. Seedling survival, biomass, and *P. cactorum* infection will be measured in fall 2024. This research will determine whether inexpensive soil management practices can improve efforts to restore wooded riparian zones and the ecosystem services they provide.

NORTHERN CALIFORNIA BOTANISTS

P. O. Box 8042
Chico, CA 95927-8042

Check our Website for information about the 2025 Symposium!

If you haven't already, please renew your membership for 2025!

Please send address changes to:

ncbotanists@gmail.com

A cooperative association of Federal, State, Academic, Consulting, and other Botanists in the Northern California region, **NORTHERN CALIFORNIA BOTANISTS** is an organization with the purpose of increasing knowledge about botanical issues concerning science, conservation, education, and professional development. Our primary objectives are to establish a communication forum via occasional meetings, scholarship funds for student research and special projects related to botanical problems and exploration in northern California, a job forum, and symposia that focus on the botany of northern California.

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MEMBERSHIP DUES:

_____ Individual $25.00 _____ Student/Limited Income $15.00

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In addition, I would like to donate $_____ to Northern California Botanists to help fund NCB programs and student research scholarships.

Make checks payable to "Northern California Botanists" and mail to:

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