Symposium Program
47th Annual Southern California Botanists Symposium

Islands: Isolated but not Desolate

Saturday, November 5, 2022

Pomona College—Seaver Auditorium

Seaver North, 645 N College Ave Claremont, CA 91711

8:00-9:00 am. **Registration**
9:00-9:10 am. **Annual SCB Business Meeting**
9:10-9:15 am. **Opening Remarks**

9:15-9:40 am. **Plant diversification in a California sky island archipelago: the story of the rock daisies (Perityleae; Compositae); Isaac Lichter Marck,** Post-doctoral researcher, University of California, Los Angeles and Jepson herbarium, University of California, Berkeley.

9:40-10:20 am. **Archaeobotany as Historical Ecology: Island Chumash Plant Foods and Ecosystem Management throughout the Holocene on California's Northern Channel Islands; Kristina M. Gill,** Research Associate, University of Oregon's Museum of Natural and Cultural History.

10:20-10:50 am**. BREAK**

10:50-11:15 am. **Restoration of plant communities on Guadalupe Island, México; Luciana Luna Mendoza**, Directora de Ecología, Grupo de Ecología y Conservación de Islas.

11:15-11:55 am. **Conservation of Groundwater Dependent Ecosystems in the Amargosa Basin; Patrick Donnelly**, Great Basin Director, Center for Biological Diversity.

11:55-1:20 pm. **LUNCH**

1:20-2:00 pm. **GLORIA Great Basin: monitoring sky island plant communities long-term, and having a great time while doing it; Brian Smithers**, GLORIA Great Basin Director and Research Assistant Professor at Montana State University,

2:00-2:25 pm. **Patterns of Colonization and divergence in Acmispon (Fabaceae) endemic to the California Channel Islands; Mitchell McGlaughlin**, Department of Biological Sciences, University of Northern Colorado.

2:25-2:50 pm. **Floristic patterns and conservation values of Mojave and Sonoran desert springs in California; Fraga Naomi**. B.S. Cohen, A. Zdon, M. Palacios Mejia, S.S. Parker.

2:50-3:20 pm. **BREAK**

3:20-3:45 pm. **Recruitment limitations of the northern island mallow (Malva assurgentiflora subsp. assurgentiflora) on Anacapa Island; Stephanie Calloway**, Botanist, Eldorado National Forest.

3:45-4:25 pm. **Applying contemporary and traditional tools in biodiversity research to understand and conserve the California Channel Islands Flora in the Anthropocene: case studies in Malacothrix, Galium, and Malva; Kristen Hasenstab-Lehman**, Conservation Geneticist & Lab Manager, Santa Barbara Botanic Garden.

4:25-4:55 pm. **Rare Plant Conservation on Catalina Island; Kevin Alison**, Rare Plant Ecologist, Catalina Island Conservancy.

Evening events continue at the California Botanic Garden
Location: 1500 College Ave Claremont, CA 91711

5:00-8:00 pm. **Mixer at California Botanic Garden,** open to everyone
5:30-6:30pm **Poster Session,** Sycamore Room, California Botanic Garden
5:30-7:30pm **Dinner Service:** As You Like It Events & Catering ($32 meal ticket required)
7:00-8:00pm **Sage Against the Machine**. Johnson's Oval, Californai Botanic Garden

Speaker Abstracts

9:15-9:40 am. **Plant diversification in a California sky island archipelago: the story of the rock daisies (Perityleae; Compositae); Isaac Lichter Marck.**

The mountains of eastern California are known as sky islands because their cool summits provide refuge for plants unable to survive in the inhospitable deserts below. In this talk, I draw on my experience studying sky islands to tell the story of the rock daises (Perityleae), a fascinating tribe of sunflowers (Compositae) that is one of the most compelling examples of plant diversification in desert mountains.

Rock daisies are a diverse group found throughout the southwest U.S. and northern Mexico with a high proportion of narrowly endemic taxa, including many single mountain endemics. They are remarkable for their extreme ability to grow directly out of steep, rocky cliffs on arid mountain ranges. Eastern California is full of rocky cliffs and is therefore a major center of diversity for the rock daisies. This is especially true in the Death Valley region, where lack of access has historically limited understanding of rock daisy diversity. In the first part of this talk, I introduce the California rock daisies in their natural community context and detail how rough terrain field work has led to new discoveries and successes for conservation in "the land of little rain."

Shifting to a broader perspective, I explain how recent research on the rock daisies has led to an improved understanding of their evolutionary origins. Herbarium study, field work, whole genome sequencing, and phylogenetic analysis have all been useful tools for clarifying rock daisy relationships, leading to their re-classification into 9 genera. The reinstated genus *Laphamia*, stands out in the tribe, as it contains ~60 species of rock daisies found in isolated sky islands. Evidence amassed to-date suggests that *Laphamia* constitutes a striking example of plant diversification in sky islands that rivals iconic plant adaptive radiations on oceanic islands.

9:40-10:20 am. **Island Chumash (Ayetlimuw) Plant Use: Subsistence, Resilience, and Ecosystem Management pre-European Contact on California's Northern Channel Islands; Kristina M. Gill,** Museum of Natural and Cultural History, University of Oregon.

While not a traditional botanist, I present my research on botanical remains recovered from archaeological contexts (i.e., archaeobotany) on the Northern Channel Islands. Primarily using macro-botanical carbonized plant remains, this talk focuses on ancient plant use, subsistence, and settlement patterns among the Island Chumash and their ancestors. For more than 13,000 years, the Islanders flourished in the region, and were ultimately recognized as one of the most populous and complex societies in pre-contact California by European settlers. The Islanders, as seen elsewhere in California, actively managed their environment and relationships with marine and terrestrial ecosystems, plants, animals, marine algae, etc. These ecosystems on and around California's islands co-evolved with Indigenous people for millennia and were significantly altered under European colonialism. I will discuss the traditional importance of geophytes (Themidaceae) to subsistence; regional exchange and translocations; Indigenous regenerative harvesting practices evidenced in the archaeobotanical record;

and traditional land management practices that shaped vegetation communities on the islands and adjacent mainland. Further, I draw from a detailed archaeobotanical study of western Limuw (Santa Cruz Island), highlighting the practice and importance of maintaining Chumash coastal prairie communities that are threatened today. I deconstruct prevailing archaeological narratives of an impoverished island flora as a primary driver in regional exchange networks and socio-political complexity, laying out evidence for a regional foundation of abundance and long-term patterns of resilience. Historical ecological data derived from floral and faunal archaeological remains, combined with Traditional Ecological Knowledge held by Indigenous communities, can and should inform modern land management and restoration practices, especially in the face of climate change.

10:50-11:15 am. **Restoration of plant communities on Guadalupe Island, México; Luna Mendoza, Luciana, Sergio Luvianos Colín, Alfonso Aguirre Muñoz, and Federico Méndez Sánchez;** Grupo de Ecología y Conservación de Islas, A.C. Moctezuma 836, Zona Centro, Ensenada, Baja California, México 22800. *Corresponding author: luciana.luna@islas.org.mx

The islands off the western coast of the Baja California Peninsula host a vast array of unique flora and fauna and many have been impacted by invasive species, particularly herbivores, resulting in the extirpation and extinction of native species. On Guadalupe Island after completing the goat eradication in 2007, the vegetation, and therefore the habitat for native species, started to recover. The endemic Pinus radiata recovered from 220 individuals to several thousands; some plant species considered extinct or extirpated have been found as well as new records for the island. However, actions such as the active restoration of degraded vegetation are needed to achieve the island's full recovery. The Grupo de Ecología y Conservación de Islas, A.C. (GECI), in collaboration with the Mexican National Forestry Commission (CONAFOR), the National Commission for Natural Protected Areas (CONANP) and Franklinia Fondation, has been implementing a project since 2014 to promote the recovery of native vegetation. This project involved the establishment of a nursery on-site, plus reforestation, and soil restoration on distinct vegetation communities that range from forests, composed by pine, cypress (Cupressus guadalupensis) and island oak (Quercus tomentella), to maritime desert scrub. Chaparral elements such as *Ceanothus* spp. are also considered. These restoration actions are shared within the California and Baja California ecoregion or "The/Las Californias". Much effort is being devoted to island ecosystem recovery on both sides of the border and has been an opportunity for a partnership through the "Islands of the Californias/Islas de las Californias Collaborative".

11:15-11:55 am. **Conservation of Groundwater Dependent Ecosystems in the Amargosa Basin; Patrick Donnelly**, Great Basin Director, Center for Biological Diversity.

The Amargosa Basin of California and Nevada is one of the most significant epicenters of groundwater-dependent endemic species in North America, with over 60 taxa of plants and animals endemic to the basin. Along the Amargosa River, a discontinuous set of spring-fed

desert oases, water emerges to the surface in various locations along the 184-mile course of the river: Oasis Valley, Ash Meadows, Shoshone/Tecopa, and springs in Death Valley. Each of these oases form an island of biodiversity in an ocean of the hottest and most arid landscape in North America.

Due to this isolation, organisms separated from their closest relatives readily speciated. Endemic taxa of the Amargosa Basin include plants, fishes, springsnails and other aquatic invertebrates, two small mammals, and an amphibian. At least seven extinctions or extirpations have occurred in the Amargosa Basin since European colonization, including five fishes, a small mammal, and one springsnail.

Two primary threats to the Amargosa are groundwater drawdown and climate change. Groundwater pumping in Amargosa Valley, Nevada for alfalfa production and a dairy, in Pahrump Valley, Nevada for residential sprawl, and in Beatty, Nevada for gold mining, threatens to draw down the aquifer which the Amargosa Basin's endemic species rely on for survival. Catastrophic drought due to climate change is also causing significant stress on ecosystems. This talk will discuss the conservation of groundwater-dependent ecosystems and the aquifers that sustain them, and efforts to prevent the extinction of endemic species in the Amargosa Basin. Endangered Species Act petitions, environmental review interventions, water rights administrative protests, lobbying, and litigation are primary tools being used to defend biodiversity in the Amargosa. Only through focused legal and political effort can we stop the extinction crisis.

1:20-2:00 pm. **GLORIA Great Basin: monitoring sky island plant communities long-term, and having a great time while doing it; Brian Smithers**, Research Assistant Professor, GLORIA Great Basin Director, Department of Ecology, Montana State University.

With nowhere to go in a warming world, plant communities at the tops of mountains are likely to be the first entire ecosystems lost to climate change. Monitoring changes in these sky islands now is vital to conserving these gems of botanical gaudiness. The GLORIA network is an international methodology for surveying alpine summits that was developed by a central group in Austria. The objective of this collaboration is to assess global distributional shifts of alpine species in response to climate change using a simple repeat sampling method for comparisons across time and place. In 2004, CIRMOUNT established a North American GLORIA chapter and sponsored the establishment of the first GLORIA sites in North America in the White Mountains of California. Since then, 29 GLORIA summits in 8 target regions have been added in the Great Basin and Sierra Nevada regions and in 2016, a group of us created the non-profit GLORIA Great Basin to support this work. We resurvey a rotating number of peaks in each mountain range every 5 years with a focus on collecting presence, abundance, and phenology data of alpine plants along with climate data. We partner with local citizen scientists, research institutions, federal agencies, and the larger GLORIA community to assess changes in the distribution of alpine floras, as well as changes in other important components of mountain systems. And we have a real good time while we do it! Long-term monitoring has its share of difficulties, but we have been doing this every year since 2004 with the support of botany enthusiasts such as yourselves. In this talk, I will share some of our findings as well as some of our greatest successes and failures. Mostly, I promise pretty pictures of amazing plants!

2:00-2:25 pm. **Patterns of Colonization and divergence in Acmispon (Fabaceae) endemic to the California Channel Islands; Mitchell McGlaughlin**, Department of Biological Sciences, University of Northern Colorado.

The California Channel Islands are unique due to their close proximity to the California mainland and the fact that individual islands, or groups of islands, are closer to the mainland than they are to other islands. This orientation raises questions about whether island taxa with widespread distributions form a cohesive unit, or if they may actually be composed of several distinct evolutionary entities derived from independent mainland-to-island colonization events. The question of taxonomic and evolutionary cohesion is particularly acute for sedentary plants, because biogeographic theory suggests that colonization should follow the shortest path from source to newly established populations. We used genetic tools to examine if *Acmispon dendroideus* (varieties endemic to Santa Rosa, Santa Cruz, Anacapa, and Santa Catalina; San Clemente; and San Miguel islands) or *A. argophyllus* (varieties endemic to Santa Cruz; San Nicolas, Santa Barbara, Santa Catalina, and San Clemente; and San Clemente) form cohesive evolutionary groups. Our results demonstrate that island *Acmispon* varieties show substantial differentiation among islands and within named species, with some populations having a greater genetic affinity for mainland relatives than island con-specifics. Although we often treat the California Channel Islands as a single cohesive entity, this study demonstrates that there has been complicated evolutionary interactions between individual islands and the mainland, impacting our taxonomic treatments.

2:25-2:50 pm. **Floristic patterns and conservation values of Mojave and Sonoran desert springs in California; Naomi Fraga**. B.S. Cohen, A. Zdon, M. Palacios Mejia, S.S. Parker.

3:20-3:45 pm. **Recruitment limitations of the northern island mallow (Malva assurgentiflora subsp. assurgentiflora) on Anacapa Island.**
Stephanie Calloway 1 , C. Matt Guilliams 2 , Kristen Hasenstaab-lehman 2 , Matt Ritter 1 , and Jenn Yost 1

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The northern island mallow, *Malva assurgentiflora* subsp. *assurgentiflora*, is a rare shrub endemic to Anacapa and San Miguel Islands – two of California's Channel Islands located off the coast of southern California. Grazing by introduced herbivores drastically degraded Channel Island ecosystems. While introduced herbivores were removed from seven of the eight Channel Islands nearly two decades ago, many species have failed to recover, including *Malva*. On Anacapa Island, naturally occurring Malva are presumed extirpated. Fortunately, prior to extirpation, seeds were collected from the last remaining plants and used to create a new population on East Anacapa Island, where ~1,000 individuals were planted in a restoration site managed by the National Park Service. In the years following restoration, however, the new population has failed to produce recruits. This alarming lack of recruitment puts *Malva* at risk of future declines. The overall goal of our research was to investigate *Malva*'s recruitment

dynamics on Anacapa Island and the potential impact of the Anacapa deer mouse – an endemic subspecies, and a known seed predator of *Malva*.
In 2020, we began research on Anacapa Island to track the fate of Malva fruits, seeds, and seedlings during several early life history stages (pre-dispersal, post-dispersal, seedling emergence, and seedling survival/establishment) under conditions where deer mice were either included or excluded. Deer mice removed ~70% of non-dispersed fruits from reproductive *Malva* before they were able to mature to viable fruits, compared to treatments that excluded deer mice from fruits, where 100% of fruits matured to viable fruits. Deer mice removed ~50% of dispersed fruits during spring trials compare to 100% in fall trials as deer mouse densities increased. Seedling emergence only occurred in treatments where deer mice were completely excluded from sewed seeds. However, ~95% of seedlings died from a lack of water, regardless of deer mouse exposure, indicating that water availability may be more important for seedling survival and recruitment than deer mouse predation. Our findings show that continued active conservation (seed banking, outplanting) is needed to ensure the northern island mallow's continued persistence on Anacapa Island into the future.

3:45-4:25 pm. **Applying contemporary and traditional tools in biodiversity research to understand and conserve the California Channel Islands Flora in the Anthropocene: case studies in Malacothrix, Galium, and Malva; Kristen Hasenstab-Lehman**, Conservation Geneticist & Lab Manager, Santa Barbara Botanic Garden; **C. Matt Guilliams,** Plant Systematist & Curator of the Clifton Smith Herbarium, Santa Barbara Botanic Garden.

Island systems throughout the world offer an opportunity to understand evolutionary processes that lead to speciation and subsequent diversification. They also act as refugia for taxa once widespread on continental settings. This combination of old and new branches of the tree of life often lead to a high levels of endemic taxa in a relatively small geographic area when compared to proximal continental land masses. Worldwide analyses have linked evolution of island morphological traits to increased vulnerability and risk of extinction due to anthropogenic effects.
Studies of island floras also create a constrained geographic area to document how conservation efforts might preserve biodiversity in areas harboring unique species. Our California Channel Islands are no exception, with approximately ten percent of the flora represented by island endemic taxa. Some of the insular species exhibiting morphological syndromes such as woodiness compared to their continental relatives have been suspected to represent island radiations in this island system. In this talk we will discuss three case studies in the genera *Malacothrix, Galium,* and *Malva* in which molecular tools, coupled with careful morphological study have increased our understanding of island species radiations on the California Channel Islands. We will highlight how these ongoing multifaceted biodiversity studies help identify conservation challenges and priorities for endemic taxa. We will also discuss how collective conservation action can lead to recovery of these unique species despite the challenges species encounter in the Anthropocene.

4:25-4:55 pm. **Rare Plant Conservation on Catalina Island; Kevin Alison**, Rare Plant Ecologist, Catalina Island Conservancy, **Lauren Dennhardt,** Invasive Plant Program Manager, Catalina Island Conservancy.

Catalina Island is a major biodiversity hotspot and our responsibility is to ensure that no plant is ever threatened with extinction. We will discuss the 2022 upscaling of conservation actions to detect, protect and propagate ten rare and charismatic plant species on the Island, including Island Rush Rose (*Crocanthemum greenei*), Catalina Island Mountain Mahogany (*Cercocarpus traskiae*), Southern Island Mallow (*Lavatera assurgentiflora* ssp. *glabra*), Catalina nightshade (*Solanum wallacei*), Catalina grass (*Dissanthelium californicum*), Santa Cruz Rock cress (*Sibara filifolia*), Catalina Island Ironwood (*Lyonothamnus floribundus* ssp. *floribundus*), Cliff spurge (*Euphorbia misera*), and Island oak (*Quercus tomentella*).

Poster Abstracts

Preliminary morphometric analyses reveal lack of differentiation between subspecies of Parry's mallow (Eremalche parryi; Malvaceae). Persephone Adler, C. Matt Guilliams, **Daniel Cisneros**, A. Ayers, K. Hasenstab-Lehman, S. Carson, K. Mason, H. Schneider

Eremalche parryi (Greene) Greene is an annual herb endemic to Central California. It has two subspecies – *parryi* and *kernensis* – which are reported to differ in breeding system and morphology. The circumscriptions of the *E. parryi* subspp. have never been quantified and tested, which is critical as subsp. *kernensis* is listed as Endangered under the Federal Endangered Species Act. Here, we present the results of a study aimed at examining the morphological differences between the *E. parryi* subspp. We gathered morphometric and color data from ca. 200 samples of *E. parryi*, focusing on taxonomically important flower features. Preliminary analyses suggest that plants assigned to the two *E. parryi* subspp. are not morphologically different from one another. However, it does seem clear that the pistillate flowers produced by some *E. parryi* plants are distinctive, with perianths smaller in all measured dimensions. Furthermore, plants of *E. parryi* subsp. *kernensis* with bisexual flowers are statistically different from subsp. *parryi* and pistillate-flowered subsp. *kernensis* in having fewer carpels. A similar pattern was reported by Bates (1992), who suggested that plants of subsp. *kernensis* with bisexual flowers may have undergone a reduction in carpel number to allocate greater resources to anther/pollen production. This hypothesis – then limited to subsp. *kernensis* – may work equally well at the species rank in explaining the evolution of gynodioecy in *E. parryi*. Our future work will assess the genetic distinctiveness of the *E. parryi* subspp., as well as landscape genomic patterns that may correlate with gynodioecy in nature.

Analysis of Post-Eradication Transitions and Dynamics of Santa Cruz Island Vegetation Communities. A. Meeder.

My long-term project is to analyze vegetation dynamics on Santa Cruz Island (SCI), California over a 32 year period (1991 – 2023). The island has experienced two major animal grazing events (sheep and pigs) that had a large effect on vegetation dynamics. Subsequent removal of these herbivores resulted in a recovery period for native species, and an expansion of the invasive plants.Along with historical disturbances, the island is also expected to be subjected to longer term changes in climate. There are going to be pronounced as well as subtle changes in the vegetation. In the 1990s one hundred plots were established to monitor changes in vegetation cover over time. For my research, I resampled these plots in spring 2022. With these data, I will look at changes in diversity, composition, and structure of the plant communities. Beyond SCI, I anticipate that my approach can be used as a model for assessing vegetation dynamics and management strategies in island systems in many parts of the world, as well as mainland areas where vegetation has undergone alteration from overgrazing.

Systematics and conservation of the genus *Malacothamnus* (Malvaceae)
Keir Morse *(California Botanic Garden, Claremont Graduate University)*

Malacothamnus (bushmallows) is a genus of fire-following shrubs mostly limited to the

California Floristic Province. Taxonomy within the genus is controversial with different treatments recognizing between 11 and 28 taxa. This is problematic from a conservation standpoint as 16 taxa have a California rare plant rank but six of these are not recognized in the most recent Jepson treatment and 10 are not recognized in the Flora of North America treatment. To clarify which taxa should be recognized, I used a total evidence approach considering results of both morphometric and phylogenetic analyses as well as potential reproductive barriers. As a result, I will recognize 30 taxa in a new treatment of the genus, which will include baseline conservation information related to the full genus and to each included taxon.

***Three New* Dudleya *Taxa (Crassulaceae) From Coastal Northwestern Baja California, Mexico,* T. W. Mulroy**, C. M. Guilliams, K. E. Hasenstab-Lehman

Dudleya brittonii Johans. (Crassulaceae) is a large succulent rosette-plant endemic to coastal northwestern Baja California, Mexico, long considered to include both glaucous and green forms. In this study, we determine that the green forms are distinct from *D. brittonii* and propose three new taxa based on extensive field measurements of fresh specimens coupled with quantitative morphometric and multivariate statistical analyses. We also demonstrate classical character displacement (exaggerated divergence in sympatry) between glaucous *D. brittonii* and co-occurring green plants. Populations of Taxon B that are intermingled with or immediately adjacent to *D. brittonii* show a 6-week to 3-month delay in mean flowering initiation and termination dates compared to populations nearby but not intermingled with *D. brittonii*, a critical prezygotic isolating mechanism in these otherwise highly interfertile plants. A limited common garden study replicated the geographic pattern of differences in flowering time and supports a genetic basis for the observed pattern. Proposed Taxa B and C flower in summer whereas proposed Taxon A and glaucous *D. brittonii* have spring flowering periods. The flowering period differences may serve to attract different suites of primary pollinators (e.g., hummingbirds vs. insects). Adaptations to hummingbird pollination, including nodding inflorescences and pendent flowers, are associated with summer flowering in both Taxa B and C compared to adaptations favoring insect pollination in the spring-flowering *D. brittonii* and Taxon A. Recognition of these taxa in this well-traveled and rapidly developing area provides yet another indicator of the unusually high botanical diversity and endemism in Mediterranean-climate northwestern Baja California.

Black Holes, White Gold: A Flora of the Silver Peak Range, NV, P.L. Pipkin

The Silver Peak Range sits in a remote corner of Esmeralda County, Nevada, just 5 km from the California border. It is a transition zone between the Great Basin and Mojave deserts, and contains several specialized habitats including alkali wetlands, canyons, riparian areas, Joshua Trees, and subalpine peaks that reach 2,856 meters in elevation. These peaks descend into a colorful palate of diverse geology that is home to edaphically restricted and imperiled endemics such as Eriogonum tiehmii and Chloropyron tecopense. Plants such as these face multiple existential threats, including lithium and geothermal resource extraction endeavors for green energy. The range is known to have floristic influences from the White Mountains and Death Valley, and could provide further biogeographical context to both of these unique plant communities. Geographically, it appears to be an extension of California biogeography, indicated

not only by topology, but by the presence of multiple species that are representative of the unique plant communities of California. These include Cryptantha hoffmanni (listed as endemic to California) and Pinus longaeva populations that are geographically more closely clustered to the California populations, and presumably more species yet to be uncovered. An exploration into the flora could provide further information about the ranges of rare California plants and could provide insight on species yet to be observed in Nevada. It would also help to clarify biogeographical and floristic boundaries of California's flora and offer some detangling of the plant community transition zones, while providing data towards critical land management decisions.

Invasives Driving Wildfire: Collaborative Undergraduate Data Collection Reinforces Native And Invasive Post-Wildfire Succession Dynamics, **Richard Rachman**, Joey Curti, Casey Terhorst, Brad Shaffer

Anthropogenic disturbances are driving the spread of invasive plant species. These invasives have been shown to increase the frequency of wildfires but decrease the burn severity in shrublands in Southern California. The Santa Monica Mountains underwent the largest wildfire in its history in November 2018. This event created an opportunity to study the succession of native and non-native plants and their relationship to various aspects of wildfire. In the month of February, average remaining limb thickness in the burned area, our proxy for burn severity, indicated lower burn severity in habitats with more non-native and species ranked as invasive by the California-Invasive Plant Council (Cal-IPC) abundance and indicated higher burn severity in habitats with fewer non-native and invasive individuals. The most recently burned areas had the highest abundance of non-native species. Species richness was highest in areas with the most frequent burns and shortest average fire return interval. Examining plant phenology from February to May, native plants only weakly changed in abundance over time. Non-natives, annual grass, and Cal-IPC ranked invasive abundance significantly changed over time in the four-month period, increasing from February to March, then decreasing into May. Plots differed significantly from one another spatially in terms of species abundances, but no species or month of sampling were driving differentiation. Management of invasives in already degraded habitats during the first and second growing season months of a wildfire could be an important way to reduce the seedbank of invasive plants and minimize the impacts of future wildfires.

A Vascular Flora of the Sacatar Trail Wilderness, K. Schaefer

Background: The Sacatar Trail Wilderness (STW) occupies a unique ecological transition zone in the southeast Sierra Nevada at the interface of the Mojave Desert, Great Basin Floristic Province, and highly diverse California Floristic Province. This 88mi^2 area encompasses a significant elevational gradient from 3,500 to nearly 9,000 feet, and supports a diverse array of vegetation communities, from creosote scrub to montane meadows. The majority of the landscape is dry, suffering from California’s current drought, but the absence of weather stations within the STW make it difficult to understand the precise microclimates its plants are subject to, especially considering that conditions vary within such a wide elevational range. This region of the eastern Sierra, if more thoroughly studied, could potentially serve as a setting for future research on plant migration in response to climate change. The STW is also a “botanical black-

hole," an area with little to no documentation of the plants that occur there. The most notable collector in the area had been botanist Ernest C. Twisselmann, who made 36 collections from 1958 to 1971. The STW's heterogeneity coupled with insufficient documentation suggest possibilities for discovering new rare plant occurrences, and even new (undescribed) taxa. The objectives of this study are (1) to produce a comprehensive inventory and annotated species checklist to document all vascular plants within the STW, (2) to generate more precise weather data from the site, and (3) to characterize the vegetation communities through quantitative surveys.

Does decreased pollen fertility explain regional lack of seed production in the paleoendemic shrub* Pickeringia montana *Nutt. (Fabaceae)? **J. Thompson**, C. M. Guilliams, K. Hasenstab-Lehman, B. Baldwin, S. Fawcett, and P. H. Raven

The maintenance of reproductive fitness is critical to the perpetuation of life on the planet. The loss of the ability to effectively reproduce, termed the multi-generational, attritional loss of reproductive fitness, has recently been framed as one the primary mechanisms of extinction. Partial loss of reproductive fitness may affect the chaparral pea, *Pickeringia montana* Nutt. (Fabaceae) in portions of its range. Although *Pickeringia* flowers abundantly, many stands do not produce fruit with viable seed. Plants are capable of resprouting from underground vegetative structures however, and some populations may persist solely through resprouting. Here we use herbarium specimens to examine the hypothesis that declining pollen fertilities explain lack of fruit production in *Pickeringia*. Overall, 16,988 pollen grains from 45 specimens were assessed for pollen fertility. Specimens examined spanned the range of the species. Percentage fertile pollen varied from 0% to 99%. The average pollen fertility within the non-fruiting portion of the range of *P. montana* was 22.61%, while the average pollen fertility within the fruiting portion of its range was 71.29%. The difference in pollen fertilities inside and outside of the fruiting range is statistically significant ($p=2.46 \times 10^{-6}$). Although preliminary, the finding of an apparent relationship between pollen fertility and fruit/seed production supports the hypothesis that low pollen fertility may be responsible for lack of fruit production in *P. montana*. If these early results are corroborated by future investigations, then *P. montana* may be an additional example from the California flora of multi-generational, attritional loss of reproductive fitness.

Biogeographic and Morphometric analyses of the California Channel Island endemic* Cryptantha *(Boraginaceae) **J. Thompson,** K. Hasenstab-Lehman, C. M.Guilliams

The islands off the Pacific Coast of Alta and Baja California represent a diverse range of ecosystems across a wide latitudinal gradient, and are well known for their endemic flora. Among these are a number of taxa in Cryptantha (Boraginaceae). The genus comprises 102 species and is restricted to western North and South America. The six minimum rank taxa that are endemic to the Channel Islands have never been the focus of phylogenetic study. We know little about the number and timing of colonization events in the genus, or morphological features associated with island endemism. For this study, we sequenced nrITS for two missing taxa, and combined it with existing data from previous studies in this clade to assess history of dispersal to and possible radiation across the islands. Additionally, the loss of features commonly associated

with dispersal such as texture and size, a phenomenon noted in other island systems, was tested for Channel Island Cryptantha. To examine the relationship between presence on an island and loss of traits potentially associated with dispersal, we performed comparative phylogenetic analyses of fruit features using our best maximum likelihood tree. Images of nutlet features were obtained using light microscopy and measured with ImageJ software. We then place the evolution of morphological features of Channel Island Cryptantha into context of the patterns noted in other groups endemic to the archipelago.