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UC SANTA BARBARA
Cheadle Center for Biodiversity & Ecological Restoration

# Restoration Register

May 2024

California Poppy (*Eschscholzia californica*) and Bush Lupine (*Lupinus arboreus*) on Lagoon Island.

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## Updates

### *Ellwood Bioblitz*


Staff member Andy Lanes showing a gopher snake to young students.

The Cheadle Center kicks off its partnership with the City of Goleta's restoration of the Monarch Groves at Ellwood with a bioblitz! Community members found everything from snakes to tiny mushrooms, but mostly invasive plants during their exploration of the site's biology. You can find out what they saw by joining the project here, and you can contribute your observations from the site and then participate in the transformation of the site over the next few years.

## *Ellwood Marine Terminal*

The restoration of the highest point on Ellwood Mesa has begun! This view of the tanks will be fleeting, as they are scheduled for removal by the end of summer. During this summer, you'll also have an opportunity to participate in visioning for public access to the site. Visiting the site will help you develop a sense of the views and connections between the islands and the mountains that the site will provide for the community. If you wish to participate, please contact ncos@ccber.ucsb.edu. We have a list of those who have already RSVP'd and will be sending out additional public invitations.

## *Spring Weeding Efforts at NCOS*

Two heavy rain years have resulted in an explosion of invasive plants at the North Campus Open Space, particularly Bur Clover (*Medicago polymorpha*). We've had all hands on deck over the past couple of months to help deal with this invasive plant. Our weeding strategy has focused first on halo weeding, which involves groups of student workers, interns, and volunteers removing all invasive plants in an approximately 1-foot buffer around native species that staff have identified. Following this, staff can come back through these areas and remove all the remaining invasive plants using electric string trimmers. Additionally, we have been removing the trimmed plant material in order to prevent it from stifling native plant growth. You can see the results right now along the eastern arm of the NCOS Marsh Trail where we've been hard at work over the past couple of weeks.

We're even getting a little help from the wildlife - this California Ground squirrel is feeding on a Bur Clover seed pod.

## *Wildflowers*

As spring nears its end, native wildflowers continue to provide a colorful show at Cheadle Center management areas. At Henley Gate, you can see Miniature Lupine (*Lupinus bicolor*) and California Poppy (*Eschscholzia californica*) in abundance.

Miniature Lupine (*Lupinus bicolor*)

California Poppy (*Eschscholzia californica*)

The show continues on Lagoon Island, where the burn plots are still displaying a variety of native wildflowers. In addition to the aforementioned species, you can see common Popcorn Flower (*Cryptantha clevelandii*), Miniature Suncups (*Camissoniopsis micrantha*), Blue Toadflax (*Nuttallanthus texanus*), Nuttal's Snapdragon (*Antirrhinum nuttallianum*), and Common Phacelia (*Phacelia distans*), among others.

California Poppy (*Eschscholzia californica*), Common Phacelia (*Phacelia distans*), and Bush Lupine (*Lupinus arboreus*)

At the North Campus Open Space, we've observed several new species germinating in the Mesa Grassland area, including Cluster Lily (*Brodiaea jolonensis*), Common Goldenstar (*Bloomeria crocea*), and Common Popcorn Flower (*Cryptantha clevelandii*). These species were among those in the native wildflower mix that was spread after the cultural burn that took place in Fall 2023, which we believe assisted in their germination.

Cluster Lily (*Brodiaea jolonensis*)

Common Goldenstar (*Bloomeria crocea*)

Blue Dicks (*Dipterostemon capitatum*)

Owl's Clover (*Castilleja exserta*)

Winecup Clarkia (*Clarkia purpurea*)

Common Popcorn Flower (*Cryptantha clevelandii*)

## *Rare Plants*

Some of the rarest plants at NCOS are germinating and re-sprouting. Salt marsh bird's beak (*Chloropyron maritimum ssp. maritimum)* is a state and federally endangered annual plant in the Orobanchaceae, or broomrape family. A hemiparasitic plant, it derives most of its nutritional needs from the roots of host plants such as saltgrass, which it steals through structures that wrap around the host's roots called haustoria. Salt marsh bird's-beak occurs naturally in Southern California salt marshes from Carpinteria down into Northern Baja, but oddly was never observed or collected in the Goleta or Devereaux sloughs. Since all the distinct wetlands in Southern California that support salt marsh bird's-beak bear different local forms of the plant, the seed we introduced to NCOS was from the nearest occurrence to campus, the Carpinteria salt marsh.

In the spring of 2023 these seeds were introduced into numerous experimental sites around the newly restored marsh in collaboration with Tidal Influence and the USFWS. This experimental trial with 5,000 seeds allowed us to identify the sandy zone on NCOS as the most successful. Based on those results we experimentally distributed more than 50,000 seeds in the winter and spring of 2024 and are monitoring natural and augmented seed regeneration this year and finding thousands of seedlings that will develop their classic purple/pink flowers this summer. Check out our new Rare Plant sign on Venoco Road and look into NCOS for the blooming flowers in the next 3 to 6 months.

Salt Marsh Bird's Beak (*Chloropyron maritimum ssp. maritimum)* growing alongside Saltgrass (*Distichlis spicata*) in the southeast salt marsh at NCOS.

NCOS is also home to one of the world's largest populations of the endangered Ventura marsh milk-vetch (*Astragalus pycnostachyus var. lanosissimus*), once thought to have gone extinct in the 1960s and rediscovered in 1997. This short-lived perennial shrub in the Pea family (Fabaceae) is a disturbance follower that makes its home in coastal wetlands. Beginning in March 2019, we began work on the outplanting and propagating of Ventura marsh milk-vetch at NCOS. The largest population is currently in the sandy area of the eastern salt marsh.

We are about to embark on researching a phenomenon we have observed: dense colonization of invasive rabbit's foot grass (*Polypogon monspeliensis*) in areas previously inhabited by Ventura Marsh Milk Vetch. We hypothesize that this colonization may be attributed to the Fabaceae family's capacity to fix nitrogen from the air and deposit it in both the plant and the soil. This nutrient pulse could potentially create a feedback loop that does not benefit this endangered plant.

Ventura marsh milk-vetch (*Astragalus pycnostachyus var. lanosissimus*) in the southeast salt marsh transition.

## *Ocean Meadows Housing Project*

The grading occurring on the eastern edge of NCOS is part of a new private housing development that will include student housing for approximately 300+ students. Additionally, there will be 6 affordable units built in the fenced-off area next to the ROOST parking lot. These projects are due to be finished at the

end of 2024 for the affordable housing and at the end of 2025 for the student housing.

This area directly east of NCOS will be developed into the student housing project.

# Feature Story

## *Unveiling Insights: Cheadle Center Presentations and Projects*

Cheadle Center staff members and student researchers have been diligently conducting research across various fields and are currently showcasing their work at conferences, symposiums, and science fairs. This week, several staff members from the Cheadle Center will present at the California Society for Ecological Restoration (SERCAL) conference in Redlands, California. SERCAL, a non-profit membership-based organization, is dedicated to facilitating the recovery of damaged California ecosystems through conferences, field tours, workshops, and more. Chris Berry, Wayne Chapman, and Claire Wilhelm-Safian will share the unique insights they've gained from their various projects during the conference.

Chris Berry's presentation focuses on the integration of prescribed fire and grass-specific herbicides in annual wildflower restoration on Lagoon Island. The practice of prescribed fire on Lagoon Island began in 2006, following the research conducted by graduate student Alice Levine. Her findings revealed that an intense, hot fire burning at 200 degrees Celsius could reduce the Ripgut Brome (*Bromus diandrus*) seed bank by an impressive 99%. Furthermore, it was determined

that the addition of supplemental woody fuel is essential to attain a fire hot enough for effective reduction. Subsequent weeding and planting of native shrubs were identified as crucial steps for the successful transformation of invasive grassland into native-dominated shrubland.

Pre-burn area dominated by Ripgut Brome (*Bromus diandrus*).

Post-burn area with native shrubs such as Bush Sunflower (*Encelia californica*)

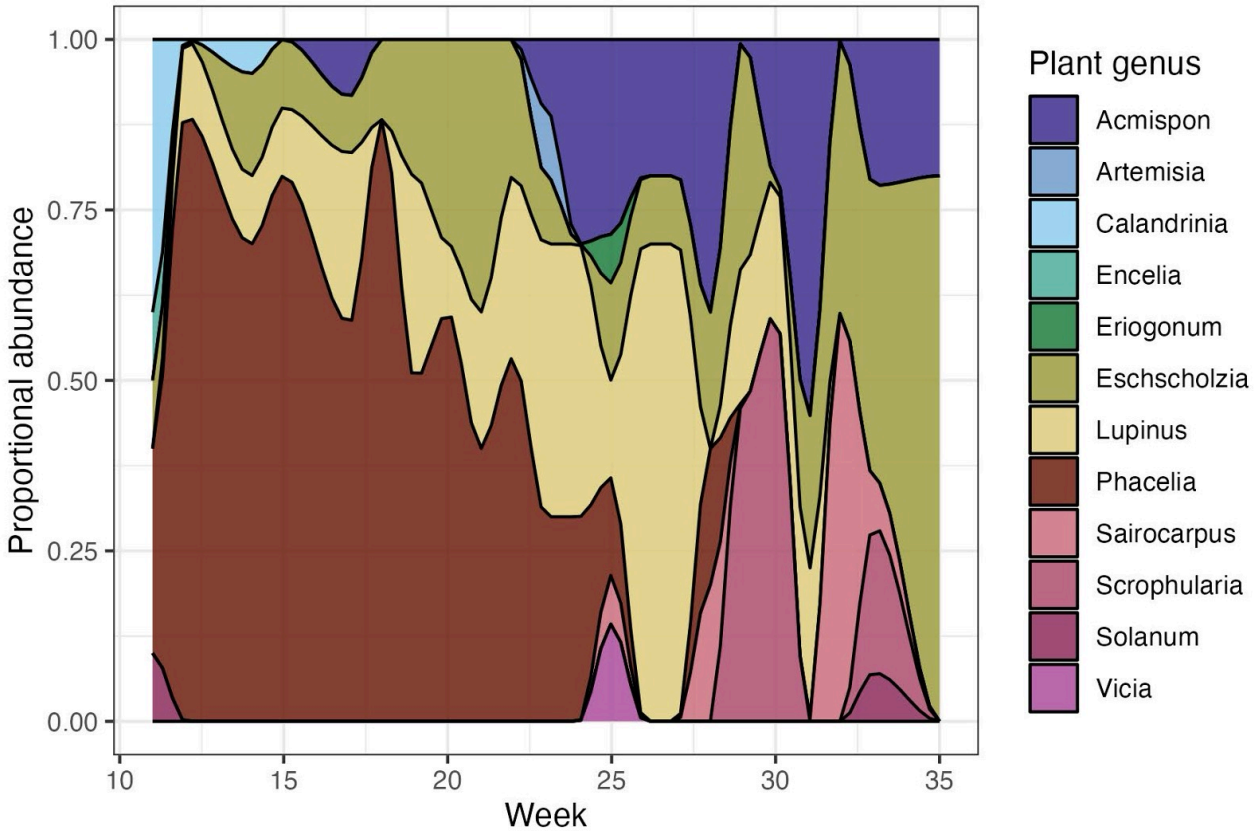
Chris discusses a shift in restoration tactics in 2016, moving from planting California Sage Scrub species after fires to spreading thousands of seeds of locally sourced wildflower species and

allowing shrub species to naturally fill in over time. This approach, involving meticulous seed collection and bulking, resulted in the creation of impressive wildflower fields, showcasing native forbs that bloomed for multiple years post-burn. Various wildflower species were included in this seeding strategy, such as *Calandrinia menziesii, Camissoniopsis micrantha, Nuttallanthus texanus, Cryptantha clevelandii, Eschscholzia californica, Acmispon strigosus,* and *Antirrhinum nuttallianum.* The establishment of this diverse native plant communities not only enhances the aesthetic appeal but also provides resources for native fauna throughout the year, supporting numerous native pollinators.

Burn area immediately following the fire.

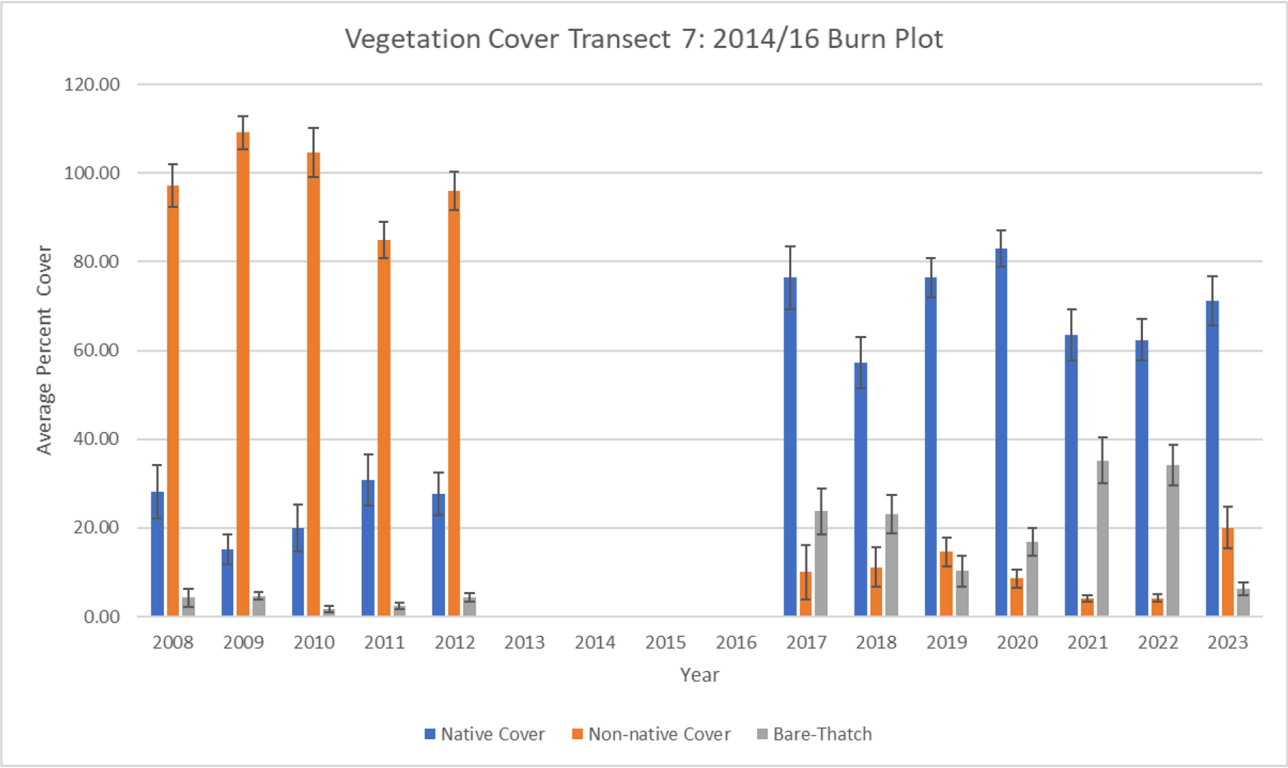
Post-burn area that was seeded with native wildflower mix.

These wildflowers zones on Lagoon Island support ongoing research activities, including monitoring the timing of blooming species and studying native pollinator behavior. Currently, students are monitoring the timing of blooming species on a weekly basis and observing the foraging preferences of Yellow-face bumblebees (*Bombus vosnesenskii*). In addition to these observations, they are actively capturing bees, collecting their pollen sacks, and testing the DNA within to determine precisely which groups of plants these native, generalist pollinators are choosing to visit.

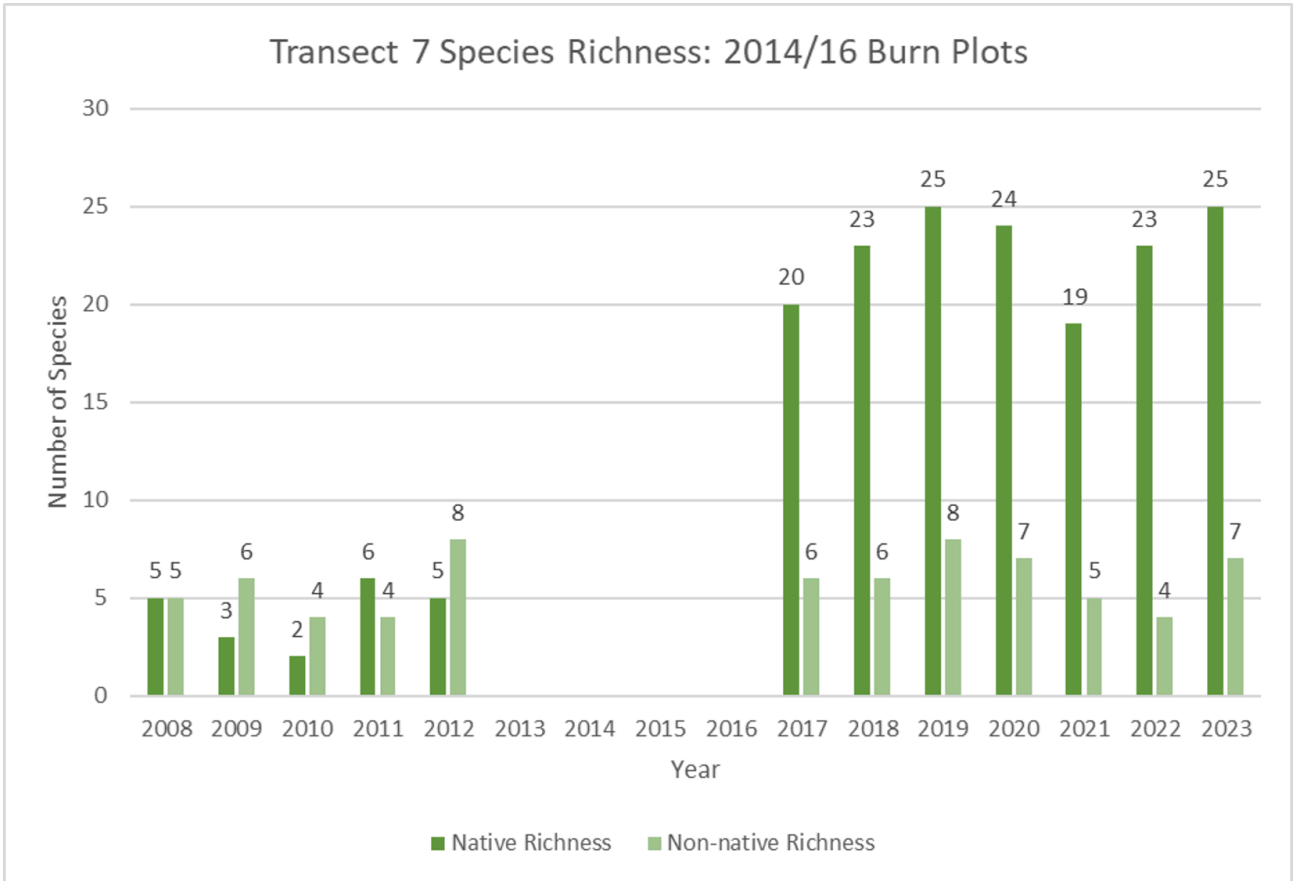



This graph shows the proportional abundance of plant genera detected in the collected pollen sacks of Yellow-face bumblebees (*Bombus vosnesenskii*).

Challenges such as managing remaining grasses and controlling invasive forbs are acknowledged, with the use of grass-specific herbicide Clethodim identified as a valuable tool in managing invasive grasses without harming native plants.The restoration efforts on Lagoon Island have burned approximately 3.5 acres to date, with plans for further burns in the future. The island serves as a living laboratory for students and faculty, providing opportunities for hands-on learning and research in native ecosystems and habitat restoration.




This graph shows the increasing native cover in the 2014/2016 burn plot from 2008-2023.




This graph shows the increasing diversity of native plants in the 2014/2014 burn plot from 2008-2023.

Wayne Chapman's SERCAL presentation emphasizes the importance of maximizing restoration opportunities and promoting objectivity in environmental management efforts. He focuses on the need to consider the existing biodiversity in natural areas when implementing restoration strategies,

advocating for a place-based approach that accounts for genetic and taxonomic diversity. Wayne also addresses the potential risks associated with subjective citizen involvement in restoration projects, such as the unintended consequences of planting non-native species like Mexican milkweed for monarch butterflies or feeding wildlife. He suggests viewing restoration sites through the lens of the area's rarest organisms and identifying micro-sites or subtle niches that can support these rare taxa, both plants and animals.

Ventura marsh milk-vetch (*Astragalus pycnostachyus var. lanosissimus*) is an example of an exceedingly rare species that occupies a very specific niche.

Highlighting the significance of small-scale impacts, Wayne explains how even tiny micro-sites, no larger than a king-sized bed, can play a crucial role in conserving rare plants. He also discusses innovative approaches, such as pioneering artificial burrows for burrowing owls, to address the specific needs of rare organisms in the area. Overall, Wayne advocates for nuanced and tailored restoration efforts that go beyond generic messages, like "plant more trees," to address the unique challenges and opportunities presented by each ecosystem.

This burrowing owl is taking shelter in an artificial burrow built by Wayne Chapman on the NCOS Mesa.

Claire Wilhelm-Safian's presentation dives deep into the collaborative research and conservation endeavors focused on the endangered Nipomo Lupine (*Lupinus nipomensis*). The Nipomo Lupine, a small annual herbaceous plant endemic to a small portion of the Guadalupe-Nipomo Sand Dune Complex in San Luis Obispo County, faces an array of threats that have led to its decline and endangerment. Collaborative efforts involving multiple organizations, including the Cheadle Center, California State Parks, the Land Conservancy of San Luis Obispo County, and research affiliates such as Dr. Justin Luong, have been pivotal in studying and conserving the Nipomo Lupine. These initiatives have spanned over a decade and encompassed various aspects, including habitat restoration, population monitoring, and research on ecological interactions.

Nipomo Lupine (*Lupinus nipomensis*)

A primary concern highlighted is the encroachment of perennial veldt grass (*Ehrharta calycina*), which has aggressively invaded the lupine's habitat. Originating from its introduction as cattle feed, veldt grass has proliferated, transforming the once open sandy dunes into dense grasslands. This invasion has altered the landscape but also poses challenges such as outcompeting native vegetation, altering microclimate conditions, and increasing the risk of wildfires. Claire also delves into the impacts of drought and climate change on the lupine population. The Nipomo Lupine relies on cool, wet winters for germination and survival, making it particularly vulnerable to changes in climate patterns. With projections indicating potential increases in drought severity and frequency due to climate change, the lupine's habitat faces further jeopardy.

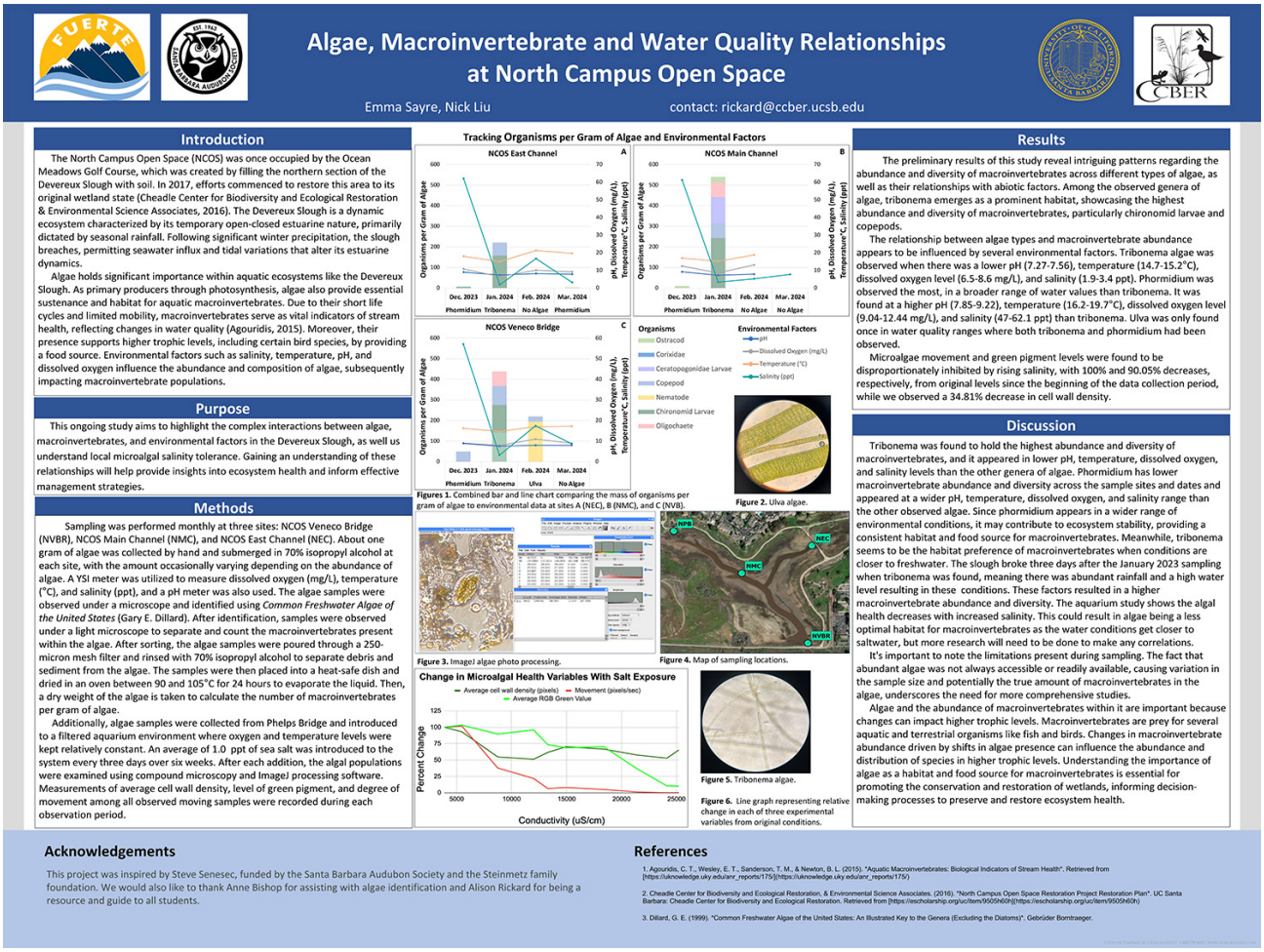
Perennial Veldt Grass (*Ehrharta calycina*)

Detailed studies have revealed the lupine's habitat preferences, with swales and north facing slopes identified as consistently preferred microhabitats. Furthermore, protective measures such as the use of cages to mitigate herbivory have been implemented and shown to be effective in safeguarding lupine populations. Recent endeavors have included the establishment of augmentation plots seeded with lupine to bolster population numbers. These efforts have yielded promising results, with significant increases in lupine populations observed in recent years.

A 10'x10' augmentation plot containing 500 Nipomo Lupine seeds.

However, challenges such as predation by granivorous birds and rodents persist, necessitating ongoing research and management efforts. Claire's presentation underscores the importance of continued collaboration and the contributions of various partners and funding agencies, emphasizing the collective commitment to conserving this endangered species and its unique habitat. While the Nipomo Lupine faces daunting threats, the collaborative research and conservation initiatives outlined in the presentation offer hope for its preservation.

In addition to providing research opportunities for staff members, Cheadle Center management areas are an invaluable resource for UCSB students interested in ecological research. Last month, UCSB student researchers presented multiple research projects at the EEMB symposium on April 20th.

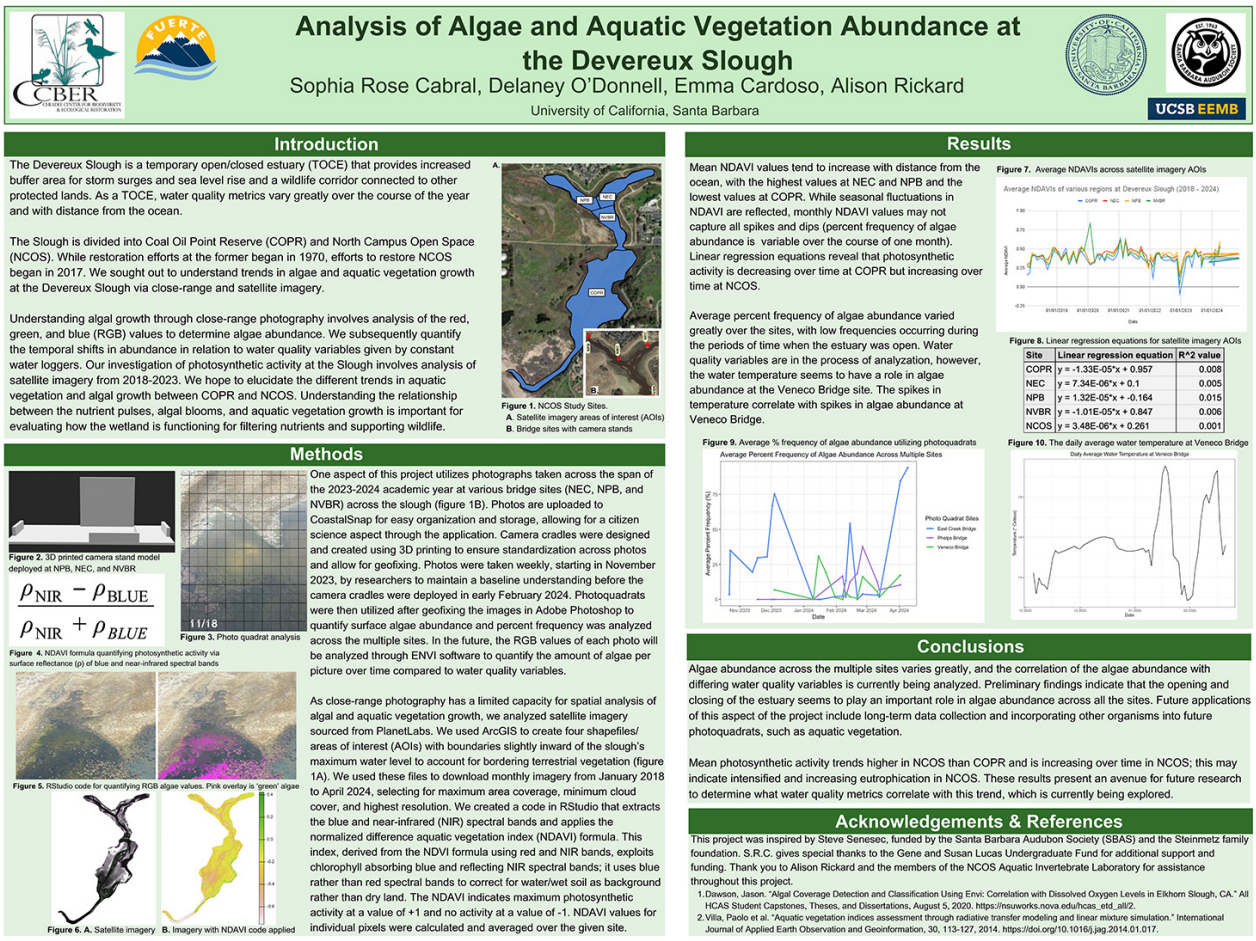



Click on the poster above to access the full size version on eScholarship.

Students Emma Sayre and Nick Liu were interested in researching the complex interactions between algae, macroinvertebrates, and environmental factors in the Devereux Slough at NCOS, as well as local microalgal salinity tolerance. By gaining an understanding of these relationships, they hope to provide insights into ecosystem health and inform effective management strategies. Their methods involved monthly sampling at three sites: Venoco Bridge, the NCOS Main Channel, and the East Channel. Algae samples, approximately one gram each, were collected by hand and preserved in 70% isopropyl alcohol. Measurements of dissolved oxygen, temperature, and salinity were taken using a YSI meter, while pH was measured separately. Algae samples were identified using microscopy and a reference book, followed by sorting and counting of macroinvertebrates. Debris and sediment were removed from the samples using a mesh filter and alcohol rinse, then dried in an oven for 24 hours for dry weight determination.

Additionally, algae samples from Phelps Bridge were studied in a controlled aquarium environment with regular additions of sea salt. Algal populations were monitored using microscopy and ImageJ software, recording parameters like cell wall density, pigment levels, and movement over six weeks. They found that among the observed genera of algae, *Tribonema* stood out as a significant habitat, displaying the highest abundance and diversity of macroinvertebrates, notably chironomid larvae and copepods. When asked about the project, Emma Sayre expressed her thankfulness for NCOS, saying, "I have had an incredible time working on my research project about macroinvertebrates and algae at the North Campus Open Space. It has taught me so much about our local ecosystems and the process of lab work, fieldwork, and restoration. Everyone involved with the Cheadle Center

has been a great source of support for me during this process!"

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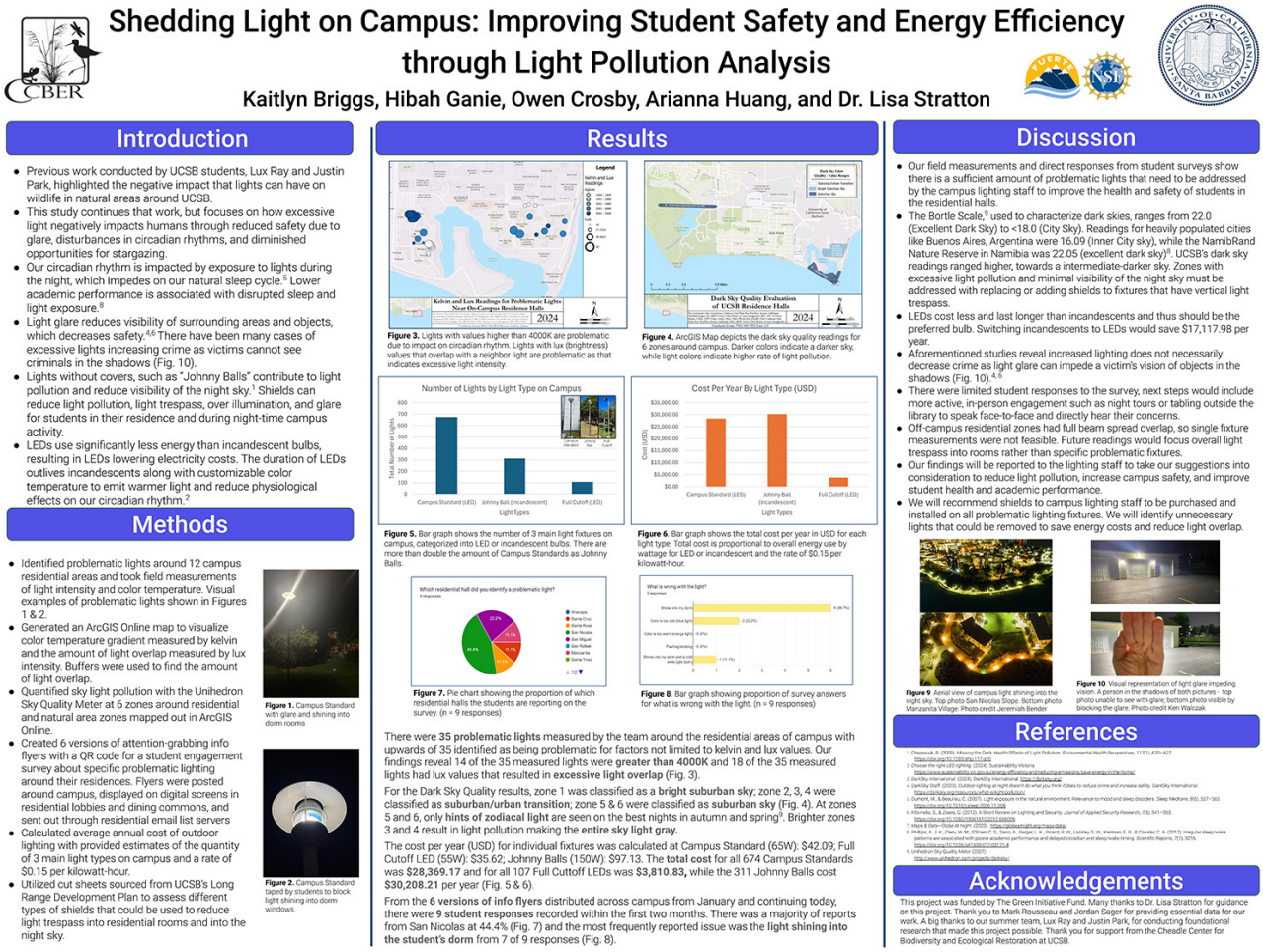
Students Sophia Rose Cabral, Delaney O'Donnell, Emma Cardoso and staff member Alison Rickard conducted research on the abundance of algae and aquatic vegetation in the Devereux Slough. They utilized close-range and satellite imagery to analyze trends in algae and aquatic vegetation growth. Their findings revealed significant variability in the average percent frequency of algae abundance across different sites, with lower frequencies observed during periods when the estuary was open. While water quality variables are still being analyzed, preliminary observations suggest that water temperature may play a role in algae abundance, particularly at the Venoco Bridge site, where spikes in temperature correspond to spikes in algae abundance.

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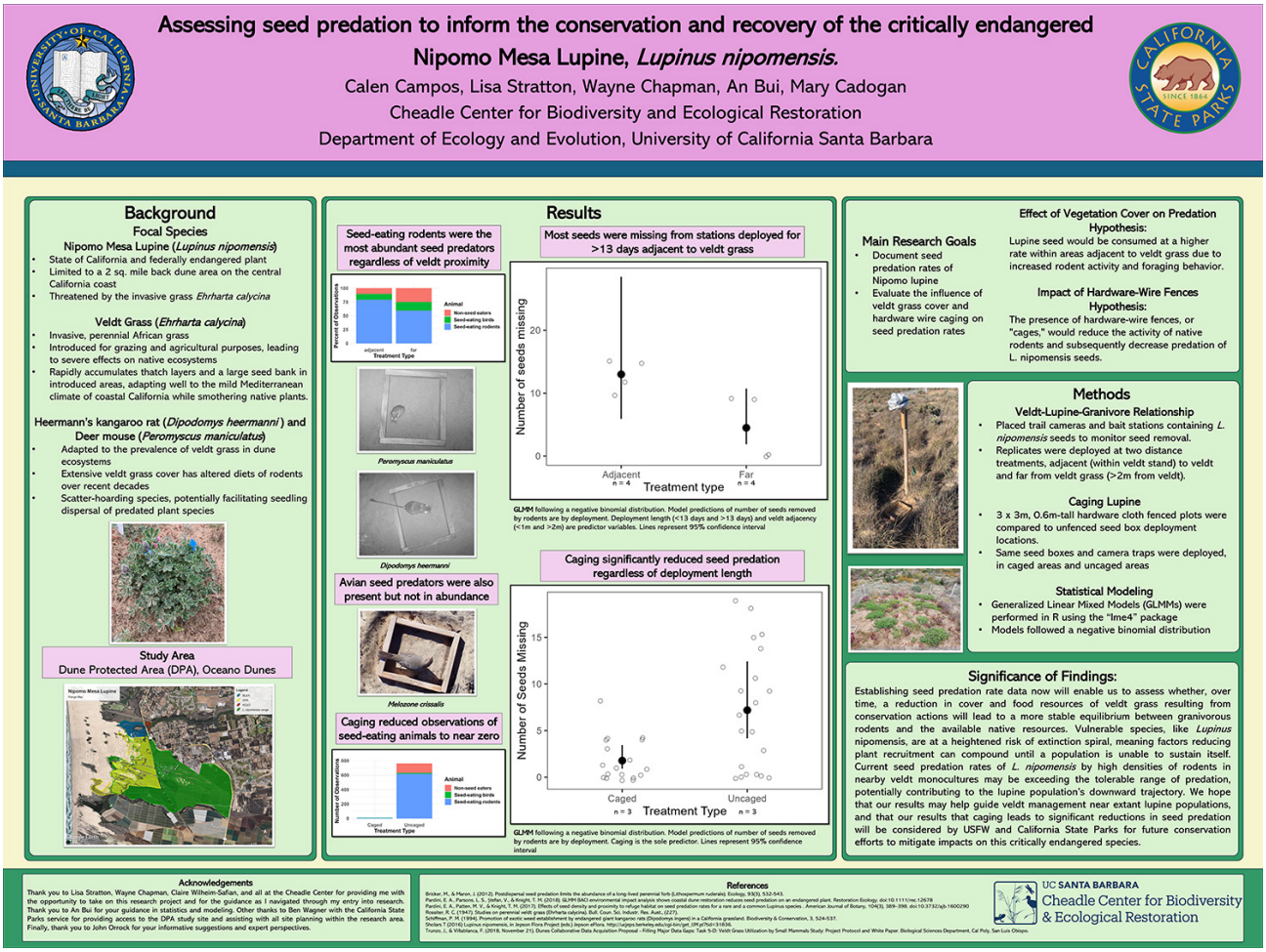
Students Kaitlyn Briggs, Hibah Ganie, Owen Crosby, Arianna Huang and Director of Ecosystem Management Lisa Stratton researched the effects of campus lighting on humans, specifically how excessive light negatively impacts humans through reduced safety due to glare, disturbances in circadian rhythms, and diminished opportunities for stargazing. The team identified problematic lights near 12 campus residential areas and conducted field measurements of light intensity and color temperature. They then visualized the data using ArcGIS Online maps, illustrating color temperature gradients and light overlap. Sky light pollution was quantified using the Unihedron Sky Quality Meter at 6 zones, and attention-grabbing info flyers with QR codes for a student engagement survey were created and distributed.

The students found that there were 35 problematic lights around the residential areas of campus. Of these 35, 14 measured lights had color temperature values greater than 4000K, which can impact circadian rhythms. Additionally, 18 of the 35 measured lights had lux values that resulted in excessive light overlap, indicating excessive light intensity. They will recommend shields to campus lighting staff for purchase and installation on all problematic lighting fixtures, and will identify unnecessary lights that could be removed to save energy costs and reduce light overlap. When discussing the project, Kaitlyn Briggs stated "Collaborating with my team at the Cheadle Center and the campus lighting staff, our efforts towards mitigating light pollution on campus highlighted the importance of a community effort on a topic that impacts us all on a daily, or nightly, level. As this project will continue to evolve, it illuminates the significance of sustainable lighting practices, benefiting both students and the surrounding natural habitats, ensuring harmony with our

cherished native wildlife."

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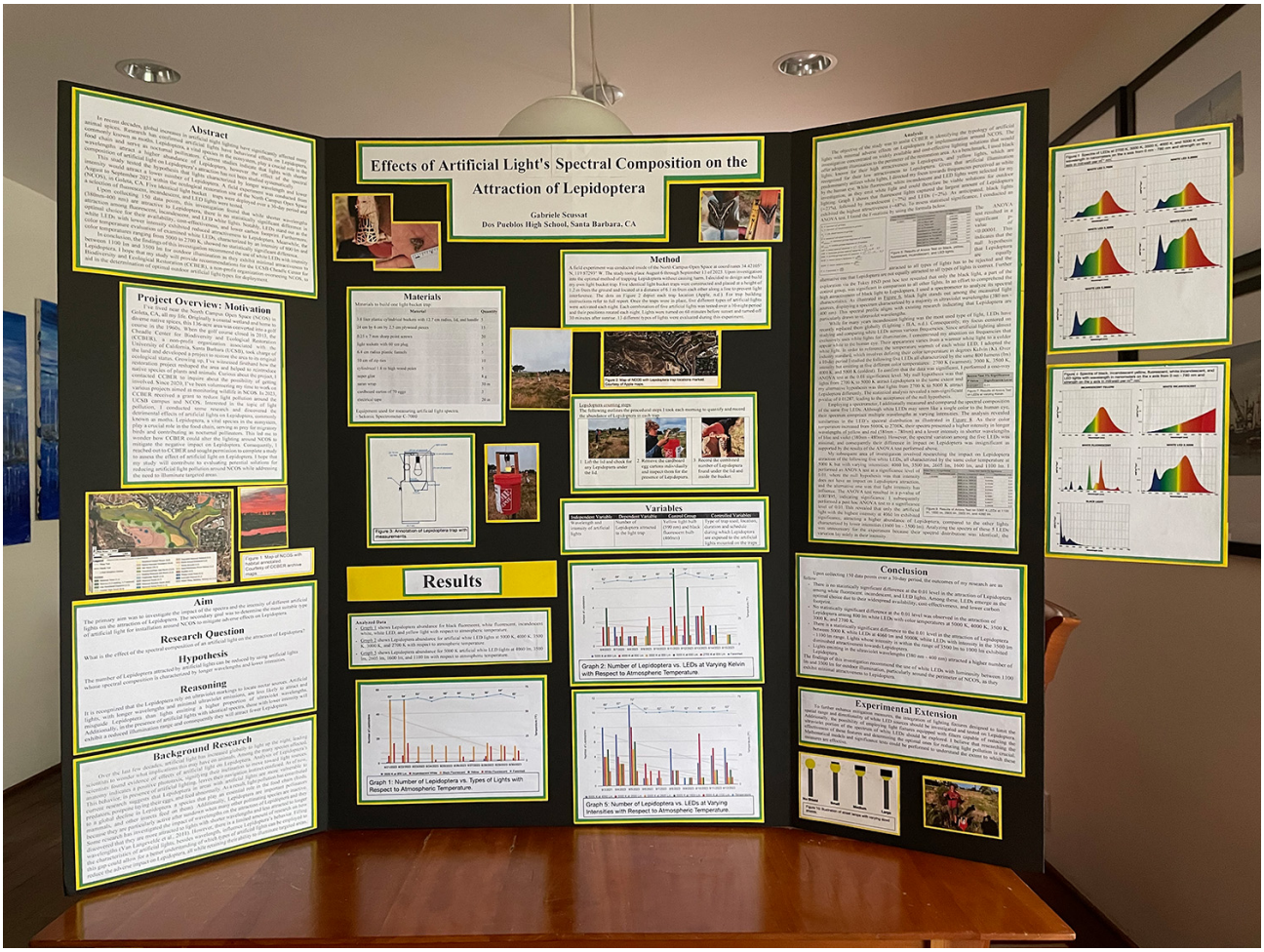
Students Calen Campos, An Bui, and Mary Cadogan, along with staff members Lisa Stratton and Wayne Chapman, focused their research on Nipomo Lupine (*Lupinus nipomensis*) seed predation. They placed trail cameras and bait stations containing *L. nipomensis* seeds to monitor seed removal. To assess the impact of invasive Veldt Grass (*Ehrharta calycina*) on seed predation, replicates were deployed adjacent to veldt stands and also far from veldt grass. Additionally, they deployed hardwire cages to assess the impact of fencing on predation of *L. nipomensis* seeds by native rodents. Their findings indicate that seed-eating rodents were the most abundant predators regardless of proximity to Veldt grass, and that caging significantly reduced seed predation.




Gabriele Scussat's science fair poster.

In addition to the abundance of collegiate research, Dos Pueblos High School student Gabriele Scussat conducted his own independent research on the effect of artificial light on Lepidoptera at NCOS. The primary aim of his study was to investigate the impact of both the spectra and the intensity of different artificial lights on the attraction of Lepidoptera, with a secondary goal of determining the most suitable type of artificial light for installation around NCOS to mitigate their adverse effects on Lepidoptera. He utilized five identical light bucket traps with five different types of artificial lights that were activated each night. Each combination of five artificial lights was tested over a 10-night period, and their positions were rotated each night, with a total of 13 different types of lights evaluated during this experiment. Each morning, he would remove the traps and record the combined number of Lepidoptera found under the lid and inside the bucket.

Gabriele found that white LEDs with intensities between 1100 lm and 3500 lm exhibited minimal attractiveness to Lepidoptera and recommends their use in areas surrounding NCOS. After completing the research, he competed in the Ventura County Science Fair and won 1st place in the Environmental Science category. He then advanced to the California State Science Fair, where he was awarded 3rd place in the Environmental Science category. Congratulations, Gabriele!

## Volunteer Opportunities

### "Second Saturdays" at NCOS

**May 11th, 9:00 - 12:00**

Please RSVP to ncos@ccber.ucsb.edu

Help us restore and create NCOS with plants and more! Meet at 6969 Whittier Drive at 9am. Bring water, sunscreen, and wear a hat, clothes and shoes that are suitable for outdoor work

### Thursdays - Greenhouse Associates

**Thursdays 9:00 - 12:00**

Come help transplant seedlings of native plants with the CCBER team. To join, please send an email to ncos@ccber.ucsb.edu.

### Nature Guide Tour

**May 18th, 9:30 - 11:00**

Come take a walk around NCOS and learn about native plants and animals with a trained Nature Guide.

## Community Photos

We are interested in any observations of wildlife activity on NCOS, as well as plants and landscapes. Please send your observations, with or without photos, to ncos@ccber.ucsb.edu. Thank you!

Hooded Mergansers in Phelps Creek. Photo by Daniel Forseth.

Western Pond Turtles in Phelps Creek. Photo by Frank DiMarco.

Raccoon at the Campus Lagoon. Photo by Sally Colman.

Lesser Scaup at the Campus Lagoon. Photo by Sally Colman.

Red-breasted Merganser at the Campus Lagoon. Photo by Sally Colman.

Mallard with ducklings at NCOS. Photo by Jeremiah Bender.

Red-winged Blackbird at NCOS. Photo by Jeremiah Bender.

A Caspian Tern flies low over the slough at NCOS. Photo by Jeremiah Bender.

Ruddy Ducks at NCOS. Photo by Jeremiah Bender.

A Belted Kingfisher trails a thin piece of algae after a dive into the Devereux Slough at NCOS. Photo by Jeremiah Bender.

A tiny spider balances on top of Sand Spikerush (*Eleocharis montevidensis*) at the NCOS Visitor Plaza. Photo by Jeremiah Bender.

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