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## **Holistic Restoration:** Restoring and Reconnecting People to Place *aka The Whole Shebang*

*8-10 May 2024 at the University of Redlands*

# Many thanks to our generous community!

It takes a village. Truly it does!

First, Lindsay Teunis (SWCA) and Sonya Vargas (ESA) have worked tirelessly and creatively to achieve their vision of a conference that not only buoys your work with fresh ideas and faces, but also gives you the space to relax into a pace that leaves you energized when you head back to your homes and your work.

Second, our Leadership Team: Cassie Pinnell (President, Poster Session Chair, and all around amazing human being), our Mentorship Matcher Joanna Tang, the Conference Advising Committee (Ashley Zavagno, Brian Bartell, Mando Valencia, Mauricio Gomez, Nina Omomo, Thor Anderson, and Will Spangler), the Budget & Finance Committee (Geoff Smick, Cassie Pinnell, Isaiah Thalmeyer, and Rob Hobbs), and last but certainly not least, the Diversity Team who have brought focus to how we create a community that supports “Restoration for All” (Sonya Vargas, Lindsay Teunis, Chelsea Palisoc, Jeannine Ross, Nina Omomo, and Taraneh Eman).

Third, all the conference volunteers, too numerous to share EVERYONE who’s pitching in, but especial thanks to our Session Moderators (Katy Chappaz, Brian Bartell, Luma Fowler, Joanna Tang, Ryan Lopez, Clancy McConnell, Eric Piehel, Christina Schaefer, Justin Valliere, Tim Krantz, Dave Shaw, and Julia Michaels) and Fieldtrip Leaders (Pete Tomsovic, Lisa Underwood, Lisa Stamer, Milan Mitrovich, and Tim Krantz)!

Finally, huge props to our first Torchbearers who sponsored the NextGen in a big way: Ross Taylor & Associates, Ecological Concerns, H. T. Harvey and Associates, and HRS/Dudek each donated \$500. Many of our members and conference attendees also donated everything from \$25 to \$100 for travel stipends and no-cost registration for our NextGen attendees.

*THANK YOU, ALL!*

## Our Annual Sponsors

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**SERCAL, the California Society for Ecological Restoration, is a non-profit membership-based organization dedicated to advancing the science, art, and practice of restoring native California habitats.**

See what's new at [www.sercal.org](http://www.sercal.org).

# ***Thank you for being a part of The Whole Shebang and we hope to see you next year... in Northern CA!***

## **SERCAL Safe Space Contract**

SERCAL is first and foremost an organization that leads by advancing equal opportunities to all audiences that are engaged in restoring native California ecosystems and reaffirms our commitment regardless of race, gender, sexual orientation, ability, economic or cultural background, or level of educational or professional experience. To promote and uplift diversity within the organization and during SERCAL events, the Board of Directors feels that it is important to define what a safe space is and how we can create safe spaces for our membership. Establishing and maintaining a community in which our members are at ease is our highest priority. We have established a contract of behavior we request all to follow in SERCAL activities and engagement.

*Our commitment and agreement is to:*

- \* Come as I am and be myself,
- \* Be a positive influence,
- \* Listen when others are speaking,
- \* Be respectful of the opinions of others,
- \* Keep an open mind,
- \* Speak and think for the benefit of our community rather than just for myself,
- \* Share my opinions and experiences in a non-derogatory and non-confrontational manner,
- \* Allow the opportunity for others to speak and not speak over them,
- \* Seek out knowledge and training, so that we may better communicate,
- \* Hold each other accountable,
- \* Be honest and self aware about the power and privilege we each hold, and its impact on others
- \* Recognize and honor individuals' gifts, goals, and ways of participating.

Although we are open to all perspectives and opinions, those that create a sense of hostility or pointed aggression will not be tolerated. Board members will provide support and counsel to any member that feels their safe space is violated. We invite the entire community to join us in maintaining a safe space.

## SERCAL 2024 Leadership Team

Cassie Pinnell, President  
Lindsay Teunis, President-Elect  
Geoff Smick, Treasurer  
Will Spangler, Secretary  
Alison Pollack  
Allegra Bukojemsky  
Ashley Zavagno  
Brian Bartell  
Chelsea Palisoc  
Isaiah Thalmayer  
Jake Marcon  
Jeannine Ross  
Joanna Tang  
Lindsay Teunis  
Mando Valencia  
Mauricio Gomez  
Nina Omomo  
Rob Hobbs  
Sonya Vargas  
Thor Anderson

---

*(your name here)*

*Please consider this your invitation to join us! Volunteer in a committee, help organize next year's conference, JOIN THE MENTORSHIP PROGRAM, contribute to the Ecesis News Journal... What do you see in our field's future? Help us make it happen. Thank you!*

# Keynote Speakers

## Nalleli Cobo

Nalleli, 21, grew up in South Los Angeles and launched her activism as a 9-year-old after noticing foul smells emanating from the oil well across the street from her home. Over the years, she endured headaches, nosebleeds, and heart palpitations caused by pollution from the well. She began attending meetings and rallies with her mother and, at the age of 9, gave her first public speech on the issue. Even as a child, her skills as an orator caught others' attention and paved the way for her to eventually become the leading spokesperson for banning oil extraction in Los Angeles. She co-founded People not Pozos, which aims to secure safe and healthy neighborhoods, and the South Central Youth Leadership Coalition, which focuses on environmental racism in the community. She is also a member of STAND-LA, a coalition of community groups seeking to end urban oil extraction and protect the health and safety of Los Angeles residents. In March 2020, she led a coalition to permanently shut down a toxic oil-drilling site in her Los Angeles community, yielding major policy movement within both the Los Angeles City Council and Los Angeles County Board of Supervisors, which voted unanimously to ban new oil exploration and phase out of existing sites.



## Kat Superfisky

Kat Superfisky is an urban ecologist, designer and educator who devotes their days, nights and dreams to transforming urban areas into more inhabitable places for people, plants, and other animals. After obtaining a Master of Landscape Architecture, Master of Science in Conservation Ecology and Teaching Certificate from the University of Michigan, they moved 2,300 miles across the country for the Los Angeles River. Superfisky sees LA—and its river—as the perfect laboratory to explore how to (re)design urban areas into more “symbiotic cities”. In LA, they have spearheaded ecological planning and design efforts at Studio-MLA—a landscape architecture and urban



design firm; founded Grown in LA—a nonprofit that aims to plant seeds, power people, and transform a city; and they currently serve as the City of Los Angeles' first Urban Ecologist.

## Octavio Lopez

Nacion Verde has planted millions of trees inside the Nucleus Zone of the Monarch Butterfly in Michoacan, near Nevado de Toluca in the State of Mexico, in state parks in Baja California, *ejidos* in Queretaro, and in Mexico City. Nacion Verde's mission is two-fold: helping the sites in which they work to recover or develop into their maximum splendor, and securing more resources for the local communities in exchange for their ecosystem services — allowing them secure jobs and income sources, and ultimately combating the forced migration many of them face due to the lack of opportunities. General Director Octavio Lopez will dispel the common belief that we should wait for species to evolve and populations to adapt to environmental changes associate with climate change as they did with glaciation.



## Geneva E.B. Thompson

Geneva E.B. Thompson (she/her/hers) joined the California Natural Resources Agency in June 2021 as the Deputy Secretary for Tribal Affairs. In this role, Geneva works to cultivate and ensure the participation and inclusion of tribal governments and communities within the work of the California Natural Resources Agency. She recently served as Associate General Counsel for the Yurok Tribe, where she practiced environmental and cultural resource law and represented the Yurok Tribe in tribal, state, and federal forums. Geneva graduated from the University of California, Los Angeles School of Law, with specializations in Critical Race Studies and Public Interest Law and Policy. Geneva is a citizen of the Cherokee Nation and enjoys beading, gardening, and hiking with her spouse in state and national parks.



# Panel Sessions

## Pick up the Pace: How Can We Clear Funding Hurdles to Improve the Restoration Project Timeline?

Orton — Thursday 01:45p-02:45p Panel Moderator: Lindsay Teunis

Come discuss creative strategies to maximize funding sources to get projects in the ground. Here's who will be on deck: Megan Cooper (California Coastal Conservancy), Sara Johnson (CA Ecological Restoration Business Association), Carl Jensen (Mitigation Investment Holdings), Lindsay Teunis (SWCA), Geary Hund (Mojave Desert Land Trust), Kirsten Hodgson (Blue Forest), Merideth Clement (Kennedy Jenks), and Kai Palenscar (San Bernardino Municipal Water District).

## Guidebook on Non-Tribal Organizations Working More Successfully with Tribes on Restoration Projects

Casa Loma — Thursday 04:15-05:15p  
Panel Moderator: Brook Thompson

Brook will share feedback from a focus group she conducted for her Environmental Studies Ph.D. Dissertation:

Think back to a time that you had a successful time working with a tribe. What worked well? If you are from a tribal background, what did the restoration organization do that worked well? \* Now think back to a time there was a conflict with a tribe or restoration org. What went wrong? \* When there was a conflict what was the result and what was learned from that conflict or what would you do differently next time? \* What do you see as current barriers to more mutual restoration projects between tribes and non tribal restoration organizations? \* And more!

## Making the Grade: Developing Restoration Education for Emerging Professionals Without a Cheat Sheet

Orton — Friday 09:30-10:00a  
Panel Moderators: Matt Yurko and Trina Ming

Ecological restoration, as a relatively new science, has historically not had much traction in the formal education system. A trend of increased student access to traditional higher education programs focusing on ecological restoration — whether it be a stand-alone class, certificate, or degree program — has emerged in recent years. However, this leaves the educators in a unique challenge of developing a curriculum for this new and ever changing discipline from the ground up. This presentation aims to compare and contrast our experiences as practitioners and educators with two different backgrounds and experience levels. as restoration practitioners while working towards bridging the gap between education and employment. The emphasis for this panel will be to develop an open dialogue about the future of ecological restoration education.



**Who are all these people with the special nametags and why are they so important to our conference?**

**SERCAL's Leadership Team (Blue Star)**  
Growing our organization's capacity and envisioning new ways of supporting our members & industry

**Annual Sponsoring Members (Green Star)** For their generosity and commitment, for helping us stay nimble and resilient

**Session Leads & Fieldtrip Leads & Presenters (Gold Star)** For their vision, leadership, and good will

**Mentors and Mentees (Purple Star)** For sharing their perspectives and experience, for creating a more robust future for all of us

**Volunteers (Pink Star)** For keeping the engine humming and the way smooth

**The Next Generation (Orange Star)** For putting themselves out there and making it happen. We already owe you big time.



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# Holistic Connections: People to Place May 9 @ Orton

urban and community restoration \* outreach and education \* public access connectivity

## Youth Engagement —

12:30p–1:30p Session Moderator:  
**Justin Valliere UC Davis**

### Justin Valliere **Empowering the next generation of restoration ecologists through plant-soil research**

Training the next generation of restoration ecologists is imperative for conserving California's unique and biodiverse ecosystems into the future. Opportunities for hands-on training in the field are also critical for meeting the growing demand for qualified professionals in the ecological restoration economy. Unfortunately, relatively few undergraduate programs are explicitly focused on restoration ecology, making such opportunities limited for many students. To fill this gap and adequately prepare students for future careers in restoration, educators may incorporate lessons on the science and practice of restoration into the curricula of broader ecology courses. Course-based research aimed at solving local restoration problems is one powerful way to enhance students' ecological literacy and professional development as well as promote diversity in the field. To this end, I designed a student-led, course-based research project for an undergraduate ecology course at California State University Dominguez Hills. Students conducted their own experiments evaluating the effects of different soil amendments on the performance of native plant species that are targets for restoration on the campus nature preserve. Students worked in groups to independently design and execute experiments, analyze data, and communicate their results in formal reports and presentations. Student projects represent useful case studies that highlight the influence of biotic and abiotic soil conditions on plant performance. Assessment surveys also illustrated the tremendous benefits of engaging in authentic research on students' scientific skills, learning experiences, and appreciation for restoration ecology.

A greater emphasis on restoration and inquiry-based learning in undergraduate ecology courses will ensure students pursuing careers in applied ecology have the training necessary to meet the complex challenges of such endeavors.

Justin Valliere, Assistant Professor of Cooperative Extension, University of California, Davis. [jmvalliere@ucdavis.edu](mailto:jmvalliere@ucdavis.edu)

### David Flores and Matt Yurko **Project Grow: The Evolution of a Community-Based Habitat Restoration Program**

Restoration and conservation of our most vulnerable habitats in Southern California are vital in combating the myriad of anthropogenic stressors destroying these natural spaces. As a non-profit organization focused on habitat restoration and education at the Upper Newport Bay Preserve, Project Grow has relied on the community to help achieve our goals for restoring Riparian, Salt Marsh, and Coastal Sage Scrub ecosystems. Since 2002, we have worked with volunteers, interns, and partners, to promote biodiversity through restoration—providing habitat for many federally listed species.

Alongside our connection to the community, Project Grow has had a longstanding relationship with many local colleges from which we have recruited interns. These internships give students the opportunity to combine their academic knowledge with hands-on engagement in our restoration sites. Project Grow's dedication to educating our community and the next generation of professionals in the field is the ideal foundation for developing leaders. Every aspect of our program is accessible to students/interns, such as: social media development, preparing and leading events, and contributing to the continued development of our program.

Project Grow is an example of how community-based habitat restoration groups can be successful in fulfilling grant driven mitigation projects, while also working with the community to develop

engaged stewards of our natural spaces. Many of our former interns have gone on to work in different areas of ecology: private sector, non-profits, etc. We strongly believe that our program approach can work in other areas where habitat restoration is needed and community involvement is available.

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Matt Yurko [myurko@projectgrowca.org](mailto:myurko@projectgrowca.org)  
#restorationecology #projectgrowca  
#backbaysciencecenter  
#habitatconservation

### Jessica Flester **Otay River Restoration Project: Initiating Youth Outreach**

The Otay River Restoration Project (Otay, The Project) is located in south San Diego County, in the Lower Otay River Watershed, downstream of Savage Dam and Otay Lakes. The Project is a mitigation bank sponsored by HomeFed, and provides restoration for over 300 acres, including the restoration of hydrology and fluvial processes to the river valley by reestablishing a low flow channel and floodplain terrace, seasonal ponds, as well as invasive species removal and enhancement of a large upland buffer. Enhancement and creation for a variety of sensitive species and habitats including least Bell's vireo, San Diego fairy shrimp, vernal pools, maritime succulent scrub, and native grassland are also provided in these restoration efforts. SWCA Environmental Consultants (SWCA) coordinates and implements the restoration.

In Fall 2023, SWCA hosted an on-site outreach event with local third-grade students. Three activities connected students to the land with different learning styles in mind: 1) an I-Spy-style scavenger hunt, 2) a fauna discussion with specimens borrowed from the San Diego Natural History Museum, and 3) a hands-on planting activity where students installed native plants with the guidance of the SWCA restoration team. This was the first youth education and outreach event

native seed partnerships \* public lands partnership \* community scientists

implemented at Otay — SWCA will collect feedback from students, teachers, parents, and the restoration team to improve outreach efforts as the Otay education and outreach program matures.

Jessica Flester [jessica.flester@swca.com](mailto:jessica.flester@swca.com)  
Lindsay Teunis [lindsay.teunis@swca.com](mailto:lindsay.teunis@swca.com)  
#Education #Outreach #SanDiego #Otay

## Engaging Collaboration —

03:00p–04:00p Session Moderator:  
**Joanna Tang** *UC Santa Barbara*

Olivia Jenkins **Cracking the Coastal Cactus Wren code: Community scientists help solve *Campylorhynchus brunneicapillus* population decline on the Palos Verdes Peninsula**

Since 2009, the Palos Verdes Peninsula Land Conservancy's (Conservancy) restoration of coastal sage scrub habitat has focused on supporting the special-status species found in the Palos Verdes Nature Preserve, including the coastal cactus wren (*Campylorhynchus brunneicapillus*), coastal California gnatcatcher (*Polioptila californica californica*) (FT), Palos Verdes blue butterfly (*Glaucopsyche lygdamus palosverdesensis*) (FE), and El Segundo blue butterfly (*Euphilotes battoides allyni*) (FE). This presentation will explore how the Conservancy engages the local urban community and works with diverse partners to inform active restoration methods and overcome challenges in protecting these sensitive species.

The Conservancy's Cactus Wren Monitoring Program was established in 2014 to investigate habitat use by one of the few remaining coastal cactus wren populations in Southern California. Program volunteers are invaluable, surveying cactus wren territories during breeding season throughout the 1,700-acre Nature Preserve. In 2023, over 30 participants contributed a total of 250 surveys over 5 months! New mobile survey

methods streamline the survey process, facilitating the inclusion of both casual and expert community scientists of all ages. The study adaptively documents the frequency of cactus wren inhabitation within individual patches of cactus, allowing for fine scale management. Exciting results of the 2023 study include cactus wren observed in two new locations in the Nature Preserve, and nesting success in multiple territories. The program exemplifies the invaluable contributions of community scientists, especially for a small non-profit organization. The presentation will demonstrate how community-based research can both positively impact species recovery and participants' relationship with their local habitat.

Olivia Jenkins [ojenkins@pvplc.org](mailto:ojenkins@pvplc.org)  
Cris Sarabia [csarabia@pvplc.org](mailto:csarabia@pvplc.org)  
Johnny Perez [jperez@pvplc.org](mailto:jperez@pvplc.org)  
#activerestoration #cactuswren  
#communityscience #coastal

Lisa Underwood and Drew Farr **US Forest Service and So Cal Non-Profit: A Restoration Partnership Story**

The Southern California Mountains Foundation (SCMF), a non-profit, has partnered with the US Forest Service (FS) on the San Bernardino National Forest for 30 years. SCMF folks work in FS interpretive programs, fire lookouts, trails, the off-highway vehicle program and our restoration program. We also have our own conservation corp: the Inland Empire Urban Conservation Corp.

SCMF and the USFS share the goals of improving habitat continuity and resiliency by monitoring, protecting, and implementing ecological restoration activities. Restoration activities include: collecting native seed, removing invasive weeds, growing plants in FS nurseries, planting and maintaining restoration sites. SCMF and FS restoration teams enjoy working with volunteers on restoration projects to attain these goals. Restoring the land with volunteer help encourages

community investment and ownership in the health of their public lands.

In prior years, we have held our volunteer events separately, assisting each other with staff on volunteer days. This past year we combined our volunteer calendar and marketed our events together. While we have separately nurtured our volunteer communities, by combining our efforts, our volunteers have more choices of dates and activities in which to volunteer. It has been successful and participation for our individual programs has grown.

Lisa Underwood  
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#forestservicepartnership  
#restorationvolunteers  
#socialvolunteering  
#sanbernardinonationalforest

Pat Reynolds **Providing Source Identified Native Seed for CARCD's Climate Resilient Restoration Project**

The Wildland Conservation Board (WCB) awarded a block grant to the CARCD to support climate resilient habitat restoration projects throughout California. A key element of the block grant involves individual Resource Conservation Districts (RCDs) working closely with native seed producers to provide source identified seed for their projects. Heritage Growers ([www.heritagegrowers.com](http://www.heritagegrowers.com)), a non-profit supplier of source identified native seed and plants is working with RCDs in the Bay Area, Sacramento – San Joaquin Bay Delta and areas north to acquire wildland stock seed collected by RCDs. Heritage Growers consults with individual RCDs, cleans and tests the seed provided, amplifies the seed produced and returns the amplified seed to RCDs for their use on restoration projects. To help ensure a successful amplification, Heritage Growers assists RCDs with species selection, seed collection strategies, methods for seed drying and proper seed shipping. The Gold River RCD has been a particularly active participant in the project. They have



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urban and community restoration \* outreach and education \* public access connectivity

mobilized conservation organizations and habitat friendly landowners in the North Bay to assist with this effort. This work is now coalescing into what may eventually become a North Bay Native Seed Partnership. The presentation will describe the project, how it is serving as a catalyst in the development of source identified native seed in California and how efforts like this have the potential to spur the development of regional seed partnerships.

Pat Reynolds  
[preynolds@heritagegrowers.com](mailto:preynolds@heritagegrowers.com)

**Connecting People to Place —**  
004:15p–05:15p Session Moderator:  
**Joanna Tang UC Santa Barbara**

Kirstin Weeks and Ildiko Polony  
**Restoring Woodland Canyon Creek: A Collaborative Vision for a Thriving, Welcoming Urban Watershed**

Ildiko Polony of Sutro Stewards and Kirstin Weeks of Bio Studio will share their recently completed vision for the restoration of Mt. Sutro's Woodland Canyon Creek and Watershed in San Francisco. The talk will highlight a mix of restoration science and inclusive process. We will share conceptual design for hydrological interventions to reduce downstream flooding and diversify riparian habitat, and touch upon Sutro Stewards' lessons learned from over a decade transitioning this Eucalyptus-Ivy-Blackberry-dominated mountain slope to a more native landscape. We will describe an inclusive process centered around a workshop convening land custodians, community members, local nature organizations and government agencies to vision together for the future of Woodland Canyon Creek. We will then share progress on funding and design achieved to date, hopefully following the award of an Urban Streams Restoration Program Grant.

The restoration of Woodland Canyon Watershed is grounded in technical analysis and restoration science, centers community and indigenous voices in the planning and

design, and aims to restore hydrological function and biodiversity, creating creek vistas and welcoming interpretive signage and programming. We will use as little heavy machinery as possible, engage community volunteers, and plan for continued stewardship into perpetuity.

Kirstin Weeks, Bio Studio [kirstin@bio.studio](mailto:kirstin@bio.studio)  
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#restorationvision #urbanstreams  
#invasivetonative #communitystewardship  
#inclusiveprocess

Brooke Wainwright and Alana Luzzio  
**Hands on the Land: Re-imagining land stewardship at a local scale**

Hands on the Land is a student-run organization founded in 2021 and based in Davis, CA that currently serves Yolo and Lake counties. The goals of this organization are to cultivate a sense of place by engaging in hands-on projects on the local landscape, ultimately striving to reconnect all people with the land, restore ecosystems and their functions, and honor not only the indigenous people who first stewarded this land but also the land itself. Currently, our efforts are focused on McLaughlin Natural Reserve and Stebbins Cold Canyon Reserve. We organize monthly trips to these reserves for students and affiliates, made free by an ever-growing patchwork of funding sources. There, we assist with restoration efforts, plan and collaborate for future projects, and spend time learning about the ecosystem. We hope to host workshops with invited speakers (e.g., restoration ecologists, TEK practitioners, artists, environmental educators). We envision designing and leading free activities for the local community including bird watching, nature journaling for kids, and leading activities that combine art and nature. Additionally, we plan to devise and test innovative solutions for restoring ecosystems, which will require inclusive conversations among diverse groups of people. We will harness

the power of people to restore the local landscape by removing barriers to connecting to the natural world and creating space for people to come together. At its core, our organization is committed to being actively anti-racist, promoting diversity within the fields of restoration, ecology, and environmental education, and creating equitable outdoor access. We are eager to learn from and collaborate with those who have experience in, and big ideas for any of these fields while welcoming those who might simply want to learn more and get their hands dirty.

Brooke Wainwright  
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Alana Luzzio [aluzzio@ucdavis.edu](mailto:aluzzio@ucdavis.edu)

Lauren Stoneburner and Jennifer Symonds  
**Reconnecting Riverside with its River: Integrating historical and urban ecology for a healthier future**

The Santa Ana River's course through dense cityscapes presents an opportunity to provide a wide variety of benefits to millions of Californians. As the connective tissue of the region's largest watershed, the River and its tributaries hold immense potential to provide critical ecological habitat, functions, and linkages while also supporting recreation, human health, heat mitigation, and countless other outcomes. However, much of this potential has not been realized, as many cityscapes have segregated the river from the urban fabric, altered and constrained its flows, and limited its potential for fostering enjoyment and placemaking.

In the City of Riverside, local planners and communities, working with the California State Coastal Conservancy, identified a need for science-based design guidance to inform habitat restoration and management efforts within the Santa Ana River Parkway and its surroundings. "Reconnecting Riverside with its River" applies historical ecology and urban ecology insights to guide restoration planning for a

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pilot portion of the Santa Ana River. A “habitat zones” mapping framework identifies where to target strategies across the landscape. These strategies envision the Santa Ana River as the regional hub for both biodiversity and human health, with restored arroyos serving as the multimodal arteries that invite the city to the River, and low-impact land uses softening the gradient between sensitive habitat and the urban realm. This pilot study spotlights the immense capacity for the Santa Ana River and its surrounding landscape to support thriving ecosystems and healthy communities sustained by a revived connection to nature and its benefits.

San Francisco Estuary Institute  
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#historicalecology #urbanecology,  
#SantaAnaRiver #landscapevisioning  
#landscapechange #urbanbiodiversity  
#multiplebenefits



## Meet our Team of SERCAL Attendees

*Come see us at our booth!*



**James Jackson**  
Engineer

**Christine French**  
Biologist

**Terah Donovan**  
Regional Business  
Group Director

**Sonya Vargas**  
Biologist

**Scott Holbrook**  
Biologist

[esassoc.com](http://esassoc.com)

# Restoring Resiliency: Focus on Species May 9 @ Valencia

protecting pollinators \* large-scale restoration \* plant-pollinator interactions

## Protecting Pollinators —

12:30p–1:30p Session Moderator:  
Eric Piehel *AECOM*

### Helen Payne **Conservation and Restoration Practices for North American Native Bee Species: Current understanding and recommendations for the future**

Habitat loss is a primary driver of global biodiversity decline, negatively impacting many species, including native bees. Along with climate change, pesticides, invasive species, and pathogens, habitat degradation and loss put native bee species at risk for population decline and possible extinction. These challenges are particularly relevant for solitary bees, which account for over 90% of bee diversity in North America and are especially vulnerable to global change due to their non-social behavior, relatively small body sizes, and unique foraging and nesting behaviors. Studies that examine the requirements for native bee conservation – especially solitary bees – are limited, creating challenges for the implementation of site-specific bee-centric restoration initiatives. Here we review the current state of knowledge of native bee habitat restoration, including best practices, recommendations for land managers, and future research priorities. We delineate essential steps and applicable tools throughout various stages of habitat restoration projects, categorizing them into pre-, during-, and post-restoration stages. We emphasize the importance of species- and site-specific strategies to determine which floral host plants and abiotic features to include in a restoration plan, and to determine the need for both plant and pollinator focused approaches. Finally, we highlight research priorities for bee conservation and habitat restoration for native bees. These include the use and effects of herbicides during or following restoration efforts, the need for species-specific research (especially for rare and specialized bees), and the impacts of climate

change on bee biology. By identifying promising restoration practices, indicators of success, and priorities for future research, our study outlines a comprehensive framework for restoration managers, policy makers, and funding agencies in a time of urgency for bee conservation.

Helen E. Payne, Susan J. Mazer, Katja C. Seltmann

#solitary bees #Hymenoptera(Anthophila)  
#pollinatorconservation  
#pollinatorrestoration #ground-nesting bees #floral resource availability  
#plant-pollinator interactions

### Claudia Delgado **Large-scale Habitat Restoration for the Monarch and Other Pollinators**

The western monarch population has exhibited rapid declines in recent years. To increase habitat availability for monarch butterflies and other pollinator populations, River Partners implemented large-scale restoration of over 600 acres of habitat across 8 sites in California in 2020. Milkweed was planted in plots at each site. Each plot was designed to have multiple nectar-rich species with varying phenology either from the original restoration project's planting or a newly seeded forb mix. Sites differed in how milkweed was planted (seed, rhizomes, plugs), irrigation (drip, flood, none), and level of weed maintenance. A subset of sites had the additional factor of shade vs sun. We evaluated success of milkweed establishment with a census within the first year of establishment and with percent cover of all species in subsequent years. Pollinator monitoring was conducted on all sites using a modified version of Xerces' Streamlined Pollinator Monitoring protocol. Monarch monitoring was conducted on sites with milkweed present, searching for eggs and larvae. We found the biggest challenges to milkweed establishment included weed maintenance, insufficient water or extended inundation, and timing of planting. In 2022, restoration successfully created monarch breeding

habitat — milkweed was found at 6 of the 8 sites, and monarchs observed at 4 sites. Lessons learned from this project will help guide future experiments to continually improve habitat restoration for the monarch. A summary of outcomes, techniques and management recommendations will be shared.

Anna Talken, Sarah Gaffney, Erin Hagen, Michael Rogner, Claudia Delgado  
#monarch #pollinator #largescalerestoration

### Rei Scampavia **Opportunities and Challenges for Creating Pollinator Habitat on Solar Farms** (Virtual)

As legislators and the public demand renewable energy sources to replace fossil fuel use, the footprint of solar farms is on the rise nationwide. Solar energy is often considered to be a "green infrastructure." However, historic management of the lands beneath solar panel arrays has not focused on providing ecological value. Efforts to design and monitor pollinator habitat in conjunction with solar arrays has been increasing in popularity throughout the U.S., and multiple states have enacted legislation to promote pollinator-friendly habitat on solar farms. In 2020, Marin Clean Energy (MCE) became the first power purchaser in California to enact a pollinator habitat program. Participating solar farms must plant pollinator habitat, which is monitored and scored for three years following installation. In addition to providing habitat for pollinators and other invertebrates, properly managed pollinator habitat can also improve water quality, decrease erosion, and provide ecological value for other native wildlife. Concerns around the physical properties of arrays, as well as fire safety and pest control, impose unique restrictions upon habitat design and management. This presentation focuses on opportunities for and potential benefits of pollinator-friendly habitat on solar farms, as well as challenges related to design and monitoring of habitat.



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urban and community restoration \* species-focused restoration \* methods

Rei Scampavia, PhD

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#renewableenergy #solar #pollinatorhabitat  
#habitatmonitoring

## Species-Focused Restoration

— 01:45p–02:45p Session

Moderator: **Christina Schaefer**  
*Schaefer Ecological Solutions*

### Laura Drake Schultheis **Finding Healing through Fire Mitigation: Returning a Eucalyptus Fuel Corridor to Native Oak Woodland**

Invaded wildlands can provide corridors for increased fire risk, both in terms of ignitability and spread. Such was the case in the Tea Fire, which erupted in the hills above Santa Barbara, California in November 2008. Aided by strong downer winds, it quickly spread through canopies of non-native eucalyptus and palms that occupied historical coast live oak woodlands and riparian corridors in and around Westmont College, ultimately destroying 210 homes. In November 2023, we began an oak restoration project in one of these fire scars along the Westmont Creek watershed that was identified as a high priority for fire mitigation. Approximately 40 locally-sourced *Quercus agrifolia* seedlings were planted with protective cages across a 0.57 acre plot with varying slopes. The project brings together multiple partners, including the Montecito Fire Department, the Spatial Informatics Group – Natural Assets Laboratory, and the Regional Wildfire Mitigation Program. In collaboration with these agencies, the goals for this project are to mitigate fire risk to Westmont College and surrounding neighborhoods, enhance ecological functioning and resiliency of a native riparian zone and oak woodland, and establish a sustainable native habitat that can serve Westmont and neighboring communities through ongoing student research, education, and recreation. This

project also represents healing, security, and reconnection to the land for those whose lives were changed forever in the Tea Fire. We hope it serves as a template and inspiration for future projects in the region.

Laura Drake Schultheis

[ldrake11@gmail.com](mailto:ldrake11@gmail.com)

#oakwoodlands #firemitigation  
#quercusagrifolia #eucalyptusremoval

### Danielle Sublett **Cortinarius and Conservation: Ectomycorrhizal diversity in Quercus foothill habitats**

*Quercus* species occupy much of the California landscape, creating critical habitats for several plant and vertebrate species. Fungi serve integral roles in these ecosystems, facilitating nutrient uptake via ectomycorrhizal (EcM) associations. Despite these beneficial symbiotic relationships, fungi remain understudied in Central California. Investigating the fungal symbionts of *Quercus* can serve as a metric for understanding if foothill *Quercus* species distribution shifts to higher elevational ranges in response to climate change. In this study, we surveyed the ectomycorrhizal community composition surrounding *Quercus* species in the Sierra Nevada foothills, focusing on the widespread ectomycorrhizal genus *Cortinarius*. We collected 120 samples of *Cortinarius* and 42 soil libraries of *Q. douglasii*, *Q. lobata*, and *Q. wislizeni* spanning an elevation gradient. Using high-throughput sequencing, we documented 3,207 operational taxonomic units (OTUs) of fungal species in the soil, including 272 Ectomycorrhizal OTUs, and 28 OTUs of *Cortinarius*. Sporocarp collections and soil OTUs identified 64 unique *Cortinarius* species. In these foothill habitats, while *Cortinarius* species are generalists in tree host association, *Quercus* tree host does play a significant role in species richness and diversity among ectomycorrhizal species. In particular, *Q. douglasii* harbored greater ectomycorrhizal diversity than *Q. lobata* or *Q. wislizeni*. The dry conditions under the

canopies of *Q. douglasii* may create selective pressure on EcM species, increasing genetic diversity and sculpting the genetic landscape of fungal populations, making *Q. douglasii* a species of interest for future applications for oak conservation research and land management strategies in these ecosystems.

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Alija Mujic [amujic@mail.fresnostate.edu](mailto:amujic@mail.fresnostate.edu)  
#Quercus #Foothills #Conservation #Fungi

### Ryan Hegstad **Restoring Sycamore Alluvial Woodland Using California Sycamore (*Platanus racemosa*) Stakes and Container Plants Grown from Cuttings**

Sycamore alluvial woodland (SAW), a rare habitat dominated by California sycamore (*Platanus racemosa*) and adapted to California's intermittent streams and Mediterranean climate, has significantly declined due to changes in hydrologic, geomorphic, and ecological process. Hybridization with London plane tree (*Platanus hispanica*), a commonly planted landscape tree, further complicates conservation and restoration efforts. In 2023, using a conceptual recruitment model we implemented a pilot study in Livermore, California, to assess the efficacy of establishing California sycamore using California sycamore stakes and container plants grown from cuttings. Planting areas at two sites included a range of geomorphic features. In Year 1, overall survival was 6.4%, with three out of 100 cuttings and four out of nine container plants surviving. Survival rates were highest near the edge of the active channel and inner floodplain for stakes and on the inner and outer floodplains for container plantings. Many plantings were scoured or buried during large winter floods. Remarkably, approximately 100 naturally recruited California sycamore seedlings were observed in the active channel at each site, indicating the potential for natural regeneration in the restoration

multi-species habitat restoration \* vernal pool \* western burrowing owl

process. These findings offer valuable insights and practical solutions for restoring SAW amidst ongoing threats to this unique ecosystem. Our talk will delve into the study's details and implications for the challenges facing SAW restoration.

Ryan Hegstad

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#SycamoreAlluvialWoodlands

#CaliforniaSycamore #SycamoreRestoration

#SAWrestoration

## Western Burrowing Owl —

03:00p–04:00p Session Moderator:

**Christina Schaefer Schaefer**

*Ecological Solutions*

Christina Schaefer and Meagan Olsonn  
**Restoration for Multi-Species Benefits:  
The restoration planning process for the  
MAP Vernal Pool and Burrowing Owl  
Mitigation Project**

The process for creating almost 100 vernal pools on a 40-acre site together with the establishment of burrowing owl breeding habitat required science-based planning and a finely tuned hydrological and hydraulic analysis. Meeting the compensatory mitigation targets of establishing viable and functional habitat for the federally endangered San Diego fairy shrimp (*Branchinecta sandiegonensis*) and San Diego button-celery (*Eryngium aristulatum parishii*) and breeding habitat for the western burrowing owl (*Athene cunicularia* ssp. *hypugaea*), in combination with the requirement to preserve sensitive species onsite, such as the federally endangered Otay tarplant (*Deinandra conjugens*), involved fine-tuned planning. This included the calculation of hydrological staying time to allow for the completion of at least one full breeding cycle for San Diego fairy shrimp. We also analyzed the historic vernal pool

configurations on Otay Mesa in San Diego, where the project is located, historic land use, and existing soil conditions. We then weighed these constraints against burrowing owl breeding requirements in the context of future development planned for the area. Burrowing owl breeding habitat was carefully designed in consultation with the San Diego Zoo Wildlife Alliance, who has been researching this species for several years. The result was a complex multi-species habitat restoration approach that is currently in its first post-installation year.

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Meagan Olson

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Vernal pool restoration

Hydrological analysis

Restoration success targets

Christina Schaefer **Breeding Habitat  
Restoration Techniques for Western  
Burrowing Owl in San Diego, CA**

Tackling the documented regional habitat loss and decline of natural breeding nodes for the western burrowing owl (BUOW) in San Diego, we have been planning and implementing a comprehensive conservation and restoration effort for this species. Spurred by the Metropolitan Airpark Project that plans to develop Brown Field Airport in Otay Mesa, which is also one of the last remaining natural BUOW breeding nodes, we started a successful BUOW translocation effort in 2018 with five breeding pairs that resulted in the creation of an active new breeding node at the California Department of Fish and Wildlife's Rancho Jamul Ecological Reserve. We commenced the habitat restoration effort of 45 acres of BUOW breeding habitat north of Brown Field Airport in October 2022. The restoration effort included the creation of vernal pools, mima bounds, berms, artificial burrows, and BUOW foraging habitat. The project is being implemented in phases, with 15 artificial burrows installed in

January 2023, and 13 additional burrows installed in October 2023. BUOW moved in immediately, resulting in the completion of two successful breeding efforts. We will detail the artificial burrow and BUOW habitat restoration and monitoring techniques, including lessons learned.

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#vernalpools #burrowingowl

Meagan Olson and Frank McDermott  
**Restoration for Multi-Species Benefits:  
The MAP Vernal Pool and Burrowing  
Owl Mitigation Project**

Over 60 acres of native habitat are being restored as mitigation for the development of the Metropolitan Airpark at Brown Field in southern San Diego. The largest parcel of mitigation includes a 35-acre vernal pool and burrowing owl restoration site, where vernal pool basins, mima mounds, and berms for western burrowing owls have been created. Grading began in the winter of 2022, and while grading during a high rainfall year created challenges and endless needs for adaptive management, all required square footage of vernal pool basin were successfully installed. Data used to determine each pool's maximum ponding extent, depth, watershed, and ability to hold water for the required duration to support sensitive plant and animal species was captured and analyzed in-house using high-resolution drone imagery. Artificial burrows for burrowing owl have also been installed within the created berms. The uplands around the vernal pools are being restored to coastal sage and maritime succulent scrub habitats with the areas around the berms being restored with native grasses and low growing annual and perennial species to support owl foraging. On-going

# Restoring Resiliency: Focus on Species May 9 @ Valencia

western joshua tree ✨ rewilding ✨ watershed restoration

maintenance will continue to be conducted in a manner that gently shapes this previously degraded site into a viable and enduring habitat capable of supporting a wide range of species. Numerous sensitive species and species of special concern have already begun to move into and establish within the site, this presentation will discuss the actions and methods that were utilized during the first 1.5 years of this 7-year restoration project.

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#vernalpools #burrowingowl

## Safeguarding Special Species

— 04:15p–05:15p Session

Moderator: **Tim Krantz** *The Wildlands Conservancy*

Tim Krantz **Watershed Restoration and Rewilding Bluff Lake, San Bernardino County, California**

Although only comprising 80 acres, the Bluff Lake Reserve hosts one of the most biodiverse ecosystems in the continental United States for an area of its size, with more than 181 species of plants, 161 species of birds and 24 mammals. Many species are of very limited distribution and are rare or endangered, including three federal- and state-endangered plants and critically endangered southern mountain yellow-legged frogs (MYLF). Prior to The Wildlands Conservancy's acquisition of the property in 2000, the property had a history of grazing and horse corrals in the meadow. Siberia Creek was ditched and diverted from its natural course to de-water and dry the meadow for livestock. Subsequent owners graded berms and a roadway across the meadow east of the lake. In 2023, working with the San Diego Zoo Wildlife Alliance, state and federal resource agencies, a watershed restoration and rewilding project

was undertaken, reintroducing 74 MYLF and 220 endangered unarmored three-spine stickleback fish to the lake. Two large berms in the meadow were taken back down to grade and the creek diversion ditch was plugged and restored to its natural course toward the lake. Endangered checkerblooms, *Sidalcea pedata*, were removed from the area before grading and used, together with 550 plugs of native meadow vegetation, to revegetate the disturbed area afterward. Projects slated for 2024 include construction of a boardwalk across the meadow to replace the roadway/footpath and installation of a backup well below the dam to maintain water levels for frogs and fish during drought years.

Dr. Tim Krantz

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#restoration #rewilding

#endangeredspecies

Ryan Phaneuf and Anisha Malik **Habitat Conservation and Restoration Under the Western Joshua Tree Conservation Act**

The western Joshua tree is an iconic California species that has long been the subject of conservation efforts on the state and local level. The primary threat to the species is shrinking habitat — tied both to continued development and the effects of climate change. The western Joshua tree is currently protected under California state law as a candidate for listing as a threatened species under the California Endangered Species Act (CESA). The recently enacted Western Joshua Tree Conservation Act seeks to solidify protections for the species in California, offering a streamlined approach to conservation, impacts, and restoration and enhancement, as well as coordination between state and local authorities. In this presentation, Ryan Phaneuf and Anisha Malik will provide a profile of the species and its ecology, an explanation of the current protections, a summary of the Western Joshua Tree Conservation Act and

its implications and discuss next steps for navigating the regulatory framework and implementing conservation and restoration efforts surrounding this iconic species.

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#westernjoshuatree, #conservation,

#WJTCA, #CESA

Scott McMillan **Experimental Salvage and Translocation of the Western Joshua Tree**

The Western Joshua Tree (*Yucca brevifolia*) (WJT) is one California's most iconic desert species. With increased development pressures in California's deserts along with the impacts of climate change, concern for the species and its habitats has grown. The WJT has been a candidate for listing under California's Endangered Species Act since 2020. In 2023, the Western Joshua Tree Conservation Act (WJTCA) was passed to help conserve the species and its habitat while supporting the state's renewable energy and housing priorities. While the WJTCA provides measures to mitigate impacts with mitigation fees for the acquisition and conservation of WJT habitat, other methods of mitigation are being considered, including salvage and translocation of WJT from impact areas into conserved lands. AES's Baldy Mesa Solar Project is conducting an experimental program to translocate WJT to determine viability of this approach. This program, conducted by the Dudek/HRS team, includes the translocation of over 150 trees in different health and size classes, including trees from 2 feet in height to over 20 feet in height. With implementation in fall of 2022, excavation and planting with mechanized equipment has provided insights into the typical root ball size and depth, replanting methods, appropriate irrigation methods, and other factors. Active maintenance and



# Restoring Resiliency: Focus on Species May 9 @ Valencia

desert habitat restoration \* salvage and translocation \* western joshua tree

monitoring will continue into 2024, but results are encouraging with an average 66% survival rate across all categories after 18 months. These successful results demonstrate the viability of WJT salvage and translocation as part of the efforts to preserve and manage the WJT in the future.

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#WesternJoshuaTree

#DesertHabitatRestoration

#SalvageAndTranslocation



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## Going With the Flow —

12:30p–01:30p Session Moderator:  
**Virginia Matzek Santa Clara University**

### Melissa Lane **A Delicate Balance: The application of California Environmental Flows Framework (CEFF) to determine environmental flow recommendations for Los Angeles River**

The California Environmental Flow Framework (CEFF) provides the key next steps to quantifying environmental flow recommendations for the Los Angeles (LA) River that balance the needs of restoring the river with efforts to enhance the resilience of local water supplies. The LA River CEFF specifically integrates the range of ecological and non-ecological management goals for the river, scientific understanding of the ecosystem needs, and modeling tools like the LA River Environmental Flows Project toolkit to provide the foundation information needed for a structured decision-making process to determine environmental flow recommendations. The LA River CEFF is divided into three parts. LA River CEFF Section A analysis identified ecological management goals (EMGs) from established policies/plans and determined historical flows would not achieve the established EMGs due to significant alterations in the river. LA River CEFF Section B is currently underway developing conceptual models to link flow and ecological response required to achieve the EMGs and defining suitability criteria that must be met to support the EMGs. These tools will be broadly applicable to all watersheds in Southern California. In LA River CEFF Section C, environmental flow recommendations will be determined through a collaborative structured decision-making process with watershed stakeholders to balance the flow needs to support EMGs with the flow needs to support other non-ecological management goals within the watershed. Environmental flow recommendations developed through the

CEFF will support achieving EMGs for the LA River and assist decision-makers in evaluating how planned and future restoration projects align with established ecological management goals.

Melissa Lane and Nate Butler  
#LARiver #CEFF #LARiverFlows  
#RiverRestoration

### Bruce Orr **Use of LiDAR to Assess Riparian Vegetation Structure and Wildlife Habitat Suitability**

Technological advances in airborne laser mapping (also referred to as light detection and ranging or LiDAR) and other types of remote sensing are providing new and exciting tools for restoration planning, design, management, and monitoring. For example, LiDAR and other remote sensing tools can be used, in conjunction with focused field data collection, to conduct river floodplain and riparian assessments, develop restoration plans, and implement long-term monitoring at multiple scales (e.g., river corridor, reach, and site scales). Stillwater Sciences was contracted by Orange County Water District to conduct a Pilot Study to explore the use of LiDAR in assessing the structure and health of riparian vegetation and associated wildlife habitat in the Prado Basin on the Santa Ana River. Our talk will focus on the results of this pilot study that tested the use of LiDAR data collected by a commercial vendor (1) assessing the vertical structure of riparian vegetation, and (2) comparing it to field-based, labor-intensive methods currently used to link vertical vegetation structure with potential suitability as nesting habitat for the endangered least Bell's vireo (*Vireo bellii pusillus*) and other riparian-dependent wildlife species of interest. We will describe the results of the Prado Basin LiDAR Pilot Study and some findings from similar studies in other rivers, and then conclude with some recommendations regarding potential future use of LiDAR and geospatial cluster analysis for riparian vegetation and wildlife habitat assessment

and long-term monitoring along the Santa Ana River and other rivers in Southern California.

Bruce Orr [bruce@stillwatersci.com](mailto:bruce@stillwatersci.com)  
Ian Pryor and Peter Baker, Stillwater Sciences  
#remotesensing #lidar #riparianhabitat  
#riparianrestoration

### Lindsay Teunis **Reflections on why I feel lucky to have access to the California Rapid Assessment Method (CRAM)**

As my ecological career has evolved and taken me to other states (Texas, Utah, New Mexico, Colorado) I am continually reminded how lucky I am to work in the restoration space of California. In particular because of one tiny, yet powerful tool in the restoration toolbox. California is leaps and bounds ahead of any of the other western states because it has CRAM, a scientifically-based, standardized rapid assessment method for streams and wetlands. Although this might sound cheesy, I hope that you will come hear why our aquatic resources need all of us to understand how and why to use this tool in our restoration projects. 2024 will be the California Rapid Assessment Method's 20th year of assessing the condition of streams/wetlands across the state- a long time for any method to remain relevant. How has it stayed relevant, why is it an essential tool for California's aquatic resources, and why should we all feel lucky to have access to it? We will discuss how CRAM supports restoration through alternatives analysis, planning, monitoring, performance tracking, and even future condition estimation. We will illustrate how the training program, on-line EcoAtlas support tools, and long-term investment have increased its relevance. Most importantly, we will show how it can be used in all aspects of restoration, how not to use it, how to interpret the data, how to project post-restoration condition, how to incorporate CRAM into success standards, how to discuss data with resource agencies, how to use it for monitoring, and how to get

# Making it Work: The Whole Shebang May 9 @ Casa Loma

wetland condition \* adaptive management \* species recovery

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Lindsay Teunis 619.917.1872

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#monitoring #restorationsuccess

#wetlandcondition #restorationplanning

#watershedmonitoring

## Monitoring at All Stages —

01:45p–02:45p Session Moderator:

Clancy McConnell UC Davis

Logan Elms and Megan Wong **Seasonal Wetlands and Rare Plant Restoration as Mitigation for Riverside County Transportation Project, Riverside County, CA**

The implementation of the Mid County Parkway Project necessitates comprehensive mitigation measures overseen by the Riverside County Transportation Commission. Site consists of 44 acres of

former cropland acres, including created habitats totaling: 1.73 acres of wetland depressions, 2.2 acres of alkali playa, 27.50 acre of alkali grassland, and 10.30 acres of buffer alkali grassland. The restored habitat is characterized as a vernal pool ecosystem supporting a diverse array of rare plant species such as smooth tarplant (*Centromadia pungens* ssp. *laevis*), spreading navarretia (*Navarretia fossalis*), San Jacinto Valley crowscale (*Atriplex coronata* var. *notator*), and Coulter's goldfields (*Lasthenia glabrata* ssp. *coulteri*). LSA Associates formulated the restoration plan, meticulously outlined in the Habitat Mitigation and Monitoring Plan (HMMP). Stantec has been responsible for the plan's execution and monitoring for the past four years. The restoration strategy encompasses the creation of vernal pools, hydroseeding, weed abatement, and the systematic monitoring of hydrological data immediately post-rain events to quantify the duration of ponding. Native plant species

data collection involves the utilization of one-meter-square quadrats positioned at sampling points along transects across the site, as well as at reference sites. Estimations are made for the total number of rare plant species that attain maturity and produce seeds. Over the preceding four years, fourteen out of the fifteen outlined performance standards in the HMMP have been successfully achieved, encompassing criteria related to nonnative cover, ponding, rare plant succession, and native species richness. Significant challenges include non-native species, and timing/climactic variations associated with seasonal wetland ecosystems.

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#ecosystemrestoration #habitatrestoration #rareplants #vernalpools

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## Christian Braudrick and Wendy Katagi Upper Santa Ana River Watershed Comprehensive Adaptive Management and Monitoring (CAMMP)

We developed an adaptive monitoring and management framework for the Upper Santa Ana River Habitat Conservation Plan (HCP). This framework includes guidelines, and specific recommendations that will help the Upper Santa Ana River Sustainable Resources Alliance develop the Upper Santa Ana River HCP Comprehensive Adaptive Management and Monitoring Program (CAMMP). The purposes of this CAMMP framework—and one of the primary purposes of the CAMMP itself—are to ensure compliance with the HCP, to assess the status of Covered Species within the HCP Preserve System, and to evaluate the effects of management actions in the HCP conservation strategy that will be implemented to achieve the HCP's biological goals and objectives.

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#uppersarhcp #adaptivemanagement  
#monitoring #speciesrecovery #portal

## Tyler Hanson Case Study: Process-based Restoration Projects at the Petersen Ranch Mitigation Bank

Long-term success of fluvial restoration is rarely achieved through conventional, form-based restoration practices. Process-based restoration may be the key to the long-term rehabilitation of habitat functions of fluvial systems. The stochastic nature of fluvial processes presents unique challenges to restoration ecologists charged with designing restoration goals and associated success criteria. Conventional, static performance criteria may accurately measure the level of success for form-based restoration projects. However, process-based restoration projects ideally result in fluvial systems that oscillate between

different stream stages in response to natural variation of hydrological, physical, and biological processes, and conventional, static performance standards may not account for this dynamism. This case study examines two process-based, fluvial restoration projects at the Petersen Ranch Mitigation Bank. It will highlight successes of the process-based restoration, and it will examine the challenges caused by conventional success criteria.

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#Process-based #Restoration #stagezero  
#reestablishment

## Assessing the Situation — 03:00–04:00p Session Moderator: Clancy McConnell UC Davis

### Sarah Gaffney Assessing riparian restoration project performance: Multiple benefit perspectives

Within the floodways of the Central Valley, restoration projects have been designed and implemented to meet multiple benefits and outcomes. Returning to multi-aged sites years after completion is essential to evaluate these outcomes and look for ways to improve restoration and long-term maintenance decisions. We assessed 11 sites ranging in restoration age from 5 to 21 years, with designs including riparian, scrub and grassland vegetation communities. To evaluate the contributions of each restoration site to multiple outcomes, we compared the initial design and intention of the project to the current condition. We measured changes in diversity, cover, and structure of native and non-native vegetation; diversity and density of birds; consistency of designed vegetation communities and actual communities to interpret flood control; carbon sequestration; and ecological disturbances. Data-driven recommendations for long-term maintenance of restoration sites that support multiple outcomes vary in cost, intensity and frequency but can be applied

at site or landscape level. Data from this project will also inform the design of future monitoring projects.

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#riparian #multi-agesites  
#longtermmaintenance #multibenefit

## Clancy McConnell Finding the seeds that reforestation needs: A cone collection site selection protocol for ponderosa pine in California

Climate change and wildfire are increasing, stressing limited reforestation seed supplies. Conifer stands at low elevation with hot conditions are potentially both at the highest risk and contain the most climate-change-adapted seeds. We present a cone survey triage framework to guide cone scouting for *Pinus ponderosa* (Pipo). Its intended use is to identify areas at the highest risk of extirpation and with the least representation in CAL FIRE's current seedbank.

We created an up-to-date Pipo range map in California and intersected it with seed zones and elevation bands (SZEBs), used for cataloging the state's seed lots and directing reforestation efforts. Next, we integrated place-based climate change risk and potential wildfire intensity indices to rank-order risk each SZEB's *P. ponderosa* areas. We combined three measures of priority for CAL FIRE's nursery operations—current inventory, target seed supplies, and areas of high seed demand—as an operational priority ranking, and combined this metric with the SZEB risk metrics to identify overall scouting priority areas. We used summed road lengths in each SZEB as a measure of accessibility, but precise cone crop survey routes and annual assessments of cone crop condition could provide more comprehensive tracking over time. This framework is being adapted for other species (i.e., other conifers and oaks),

seed inventory \* adaptive management \* species recovery

and could be modified to evaluate other risk conditions or operational frameworks. It can be updated as seed inventory changes or with the inclusion of other seedbanks (e.g., the US Forest Service).

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#reforestation #climate change adaptation #seed selection #Sierra Nevada

## Haley Mirts **Informing restoration design: Applying Central Valley Joint Venture Population Objectives for Grassland and At-Risk Riparian Birds**

The Central Valley has been dramatically transformed over the last century by human activities, resulting in once abundant bird populations reduced to relatively small populations or locally extinct. In order to inform restoration design and support conservation of Central Valley grassland and riparian birds, we evaluated the success of restoration sites in meeting Central Valley Joint Venture objectives for species' breeding densities. We visited 11 restoration sites in the Sacramento Valley that had both riparian and grassland vegetation, ranging in ages from 5 to 21 years old. Point count surveys were conducted twice in May-June 2023 at 42 riparian and 38 grassland locations. To evaluate the current contribution of each restoration site to meeting CVJV objectives, for each site and habitat type, we compared

the mean density estimates  $\pm$  SE for each species against the short-term (10-year) objectives. We found considerable variation among species, sites, and habitat types in terms of meeting short-term density objectives for focal species. While these evaluations can effectively support bird conservation, improved recommendations for restoration design will arise through increased survey effort and additional survey methods, additional sites across successional stages, evaluation of habitat covariates, indicator scores for biodiversity and consideration of multiple benefits or outcomes simultaneously.

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#CentralValley #RestorationOutcomes #AvianConservation



uplands to wetlands \* writing to learn \* steelhead migration passage

## **A River Runs Through It —**

12:30–01:30p Session Moderator:  
**Brian Bartell** *PCI Ecological*

### **R.J. Van Sant Rindge Dam: Removing an obsolete dam to reconnect 15 miles of stream habitat**

Rindge Dam was constructed nearly 100 years ago within Malibu Creek, in what was then the privately owned, 17,000 acre Rancho Topanga Malibu Sequit. Since its construction it has filled up with sediment, rendering it obsolete, and blocked upstream habitat for countless aquatic and terrestrial species, including the highly endangered southern California steelhead (*Oncorhynchus mykiss*). It has also altered natural hydraulic and sediment transport processes, negatively impacting the overall creek ecology. Through funding from the state legislature, the project is moving closer towards dam removal and implementation of the overall Malibu Creek Ecosystem Restoration Project. The project involves not only the removal of Rindge Dam, but also eight upstream barriers within the watershed. Currently in the pre-construction, engineering, and design phase, California State Parks, along with several partners, is conducting updated H&H and sediment transport modeling, technical studies, and review of several dam and upstream barrier removal alternatives with an overall goal of dam deconstruction starting within the next 3-4 years.

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#steelhead, #ecologicalrestoration,  
#damremoval, #malibucreek

### **Lucila Barraza and Sam Ward The Development of the LA River Fish Passage Project: A design and Cutting the Green Tape SERP case study**

The LA River historically supported steelhead (*Oncorhynchus mykiss*). Steelhead are no longer present due to changes associated with urbanization of the LA River. Providing successful passage between the ocean and mountain spawning and rearing habitat is a significant challenge in reestablishment efforts. The reestablishment of steelhead and restoration of the LA River are an attainable goals consistent with the City of Los Angeles Mayor's Office biodiversity goals and NMFS recovery goals. These goals are also shared by other adopted restoration and biodiversity policies on a global and regional scale.

A detailed design was developed for a portion of the channelized LA River to provide steelhead migration passage and habitat features. The goal was to enhance fish passage and migration to upper tributaries and serve as a template for improving fish passage in urbanized watersheds and channelized streams. Significant stakeholder participation was conducted, which included agencies, non-profits, and community members. The Reach 8A Pilot Project alternative was selected as it significantly improves steelhead passage while minimizing construction disturbance and costs and integrates well with the LA River Ecosystem Restoration and Recreation Project. The 1/4-mile Project significantly improves the existing fish passage condition in the reach from virtually none to acceptable velocity and depth for most flows occurring annually.

Moving into implementation, coordination with CDFW was conducted throughout the design process to gauge the project's eligibility for CtGT SERP

exemption. Draft SERP exemption summaries were submitted to CDFW for their informal feedback, which accelerated review and CDFW's issuance of the SERP.

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#LARiverRestoration #LARiverBiodiversity

### **Yamina Pressler Applying Writing-to-learn to Ecological Restoration**

Ecological restoration requires thinking through complex problems that often require evaluating many potential solutions. Therefore, addressing restoration problems requires an understanding of our motivations, assumptions, and biases, but these ideas often remain implicit in our thinking. While writing is most often considered as a tool to communicate ideas to others, it is also a critical cognitive practice that helps us think, learn, and understand our ideas. Writing-to-learn is an approach that creates space for researchers, practitioners, and students to make their motivations explicit, clarify their assumptions, and reveal hidden biases. Here, I argue that writing-to-learn is a valuable approach to integrate into the process of ecological restoration. I explore the use of such low-stakes writing for teaching restoration ecology and applying adaptive management. This approach can be practiced by students, educators, and practitioners alike to clarify ideas and problem solve in the context of ecological restoration efforts. I will present examples of how students in an upper-division, project-based undergraduate course on ecological restoration apply the technique. I will also provide prompts and tools for applying writing-to-learn to your own restoration practice.

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#writing #learning #teaching

sea level rise \* spartina foliosa \* salt marsh habitat

## Coastal Resources —

01:45p–02:45p Session Moderator:  
**Brian Bartell** *PCI Ecological*

Scott Holbrook and James Jacksonn **Big Canyon Habitat Restoration & Water Quality Project: Invasives, Selenium and Sea Level Rise**

The Newport Bay Conservancy (NBC) in collaboration with the City of Newport Beach, and with Technical Advisory Committee (TAC) oversight, engaged a team led by Environmental Science Associates (ESA) to design and implement a multi-phased restoration program for Big Canyon Creek Nature Park. This project was primarily funded by grant awards to NBC, from California Department of Fish & Wildlife, the State Coastal Conservancy (SCC), the California Ocean Protection

Council (OPC) and the U.S. Fish and Wildlife Service (USFWS).

Phase 1 (2017) restored six acres of riparian habitat at the upstream end of Big Canyon Nature Park and included flood control measures and a dry-weather flow diversion to convey selenium-laden low flows to the local sewer system and reduce selenium input to the downstream habitat area. In collaboration with Burns and McDonnell, ESA developed the water quality and habitat restoration designs with input from City engineering. ESA prepared technical reports and CEQA documentation for this first phase and lead the regulatory permitting effort. ESA biologists also provided compliance monitoring during implementation which was performed under the supervision of the City's Public Works Department.

Phase 2 (2020) restored more than 11 acres of Big Canyon Creek in the middle of the site by first removing invasive Brazilian peppertrees and willows damaged by the destructive shot-hole borer beetle. Following clearing and grubbing, the creek was realigned to increase sinuosity and soil amendments were applied with four different plant palettes spanning from upland to wetland. ESA developed the design, technical reports and CEQA documentation. The project received two separate grants for the implementation which was completed in December of 2020. ESA prepared a Feasibility Study for Phase 3, covering the lower creek downstream to Upper Newport Bay. The study considered alternatives to achieve multiple objectives including the elimination of a large pond choked with cat-tails and reeds, improve

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public access connectivity \* open space restoration \* community engagement

public access while protecting wildlife habitat values, and establishing a resilient mosaic of native plant communities. ESA worked with NBC, the City, CDFW, and the project's TAC to develop the preferred restoration approach, which will cost-effectively achieve ecological, water quality, and public access benefits. This effort will restore a mosaic of valuable native coastal salt marsh, riparian, and upland habitats along a gently-sloping gradient. This approach reduces the accumulation of selenium and enhances the resiliency of Newport Bay to sea-level rise and climate change. The habitat gradient will allow salt marsh habitat to migrate up-slope into transitional riparian and upland habitat areas with future sea-level rise.

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invasives, exotics, riparian wetland, wetland restoration, water quality, sea level rise

## **Parker Richardson The effects of planting location and planting design on the survival and growth of transplanted California cordgrass (*Spartina foliosa*)**

Habitat restoration often involves the challenge of revegetating a site with unfavorable conditions for target plant species. For example, a restoration site may have poor soil conditions resulting from the site's history or site construction involving intensive earthwork. In these scenarios, restoration practitioners need planting strategies that can maximize plant survival and growth. Here we studied planting strategies to establish California cordgrass (*Spartina foliosa*; hereafter cordgrass) in a salt marsh restoration site in Seal Beach, CA. The restoration site received supplementary dredged sediment to build the marsh's elevation and increase sea level rise resilience, and subsequently experienced slow passive vegetation recovery due to the emergence of harsh soil conditions. Additionally, though the elevation of the site after sediment addition

was above the observed elevation range of cordgrass in this marsh, this species was targeted for planting because of its habitat value for the federally endangered light-footed Ridgeway's rail (*Rallus obsoletus levipes*). We analyzed the effects of several planting methods (plug spacing, proximity to ponds, and plug species composition) on the growth and survival of transplanted cordgrass, and the restoration trajectory of the site over one year. The survival and growth of transplanted cordgrass in the site was maximized by planting adjacent to ponds and in dense monoculture plantings. Planting mixed species assemblages led to increased rates of plug survival in the highest elevations of the site without out-competing cordgrass. These results highlight the importance of planting location and design for maximizing the success of active planting in unfavorable conditions.

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## **James Jackson Loma Alta Slough Wetlands Enhancement Project, Oceanside CA**

ESA is finalizing construction design documents for a coastal lagoon wetland habitat and public access project in the Loma Alta Slough, located in Oceanside CA. Funded by the State Coastal Conservancy, the City of Oceanside has hired ESA to provide planning, design, permitting, and environmental review for the restoration of wetland habitat in the Loma Alta Slough. ESA performed technical studies including hydrodynamics, biology, cultural resources, and sediment and water quality, and is preparing the restoration design for bidding in late 2024 and construction anticipated in Summer 2025. The project includes wetland establishment (creation) and enhancement at the 5.8-acre Loma Alta Slough and includes new public access trail and overlook. The presentation will provide an

overview of the project including existing conditions, summarize technical studies, and present final design elements and current status of the bidding and construction process.

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wetland restoration, lagoons, salt marsh, brackish marsh, public access

## **Public Access Connectivity — 03:00p–04:00p Session Moderator: Katy Chappaz Recon Environmental**

### **Lia Webb Trifecta: trails, restoration, & ecosystem services**

Recreational trails provide a human experience to recreate and connect with nature. Yet, we often do not account for the full ecosystem service or landscape level benefits of trails. Trails can serve as an opportunity for peoples to experience, learn from, and be part of the landscape. Trails serve as an avenue for ecosystem restoration, as well. There is a conduit for landscapes and the environment to welcome trails as part of an integrated approach. This presentation will showcase examples of trails integrated with the environment, where there is a living learning lab where people find a sense of place and learn valuable lessons about the ecosystems present. The value benefits both travelers and locals who seek a sense of place. We will share how trails can be a nexus for habitat restoration, and will include unique success stories in the coastal zone of CA including salt marsh habitats. This presentation will seek participant input and will include interactive discussion on what we can do for next steps to integrate education, restoration, and recreation, and highlighting ecosystem service and sense of place in our planning and funding efforts.

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#trails #ecosystemservices #community #education



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endangered plant species \* coastal restoration \* local genotypes

## Camille Pauley **From Marsh to Fields to Trails: Restoration and Public Access at Carr Lake**

The Carr Lake basin is a 480-acre historic lakebed in the center of Salinas, the largest city in Monterey County. Carr Lake, which previously was an extensive complex of wetlands and marshes, has been actively farmed since the “reclamation” process of the early 1900s. During this era, existing creeks were straightened and the lakebed drained to create prime arable land. In addition to its agricultural use, Carr Lake now provides significant flood storage capacity to surrounding urban areas and is a FEMA-designated regulatory floodway.

In 2017, Big Sur Land Trust (BSLT) purchased 73 acres within the Carr Lake basin to create a multi-benefit park and open-space restoration area in the heart of Salinas, where parks and access to nature are limited. The design of the restoration area, which was informed by a robust community engagement process, is intended to create wildlife habitat, improve water quality, and provide public trail access. The design development included 2D hydraulic modeling of the Carr Lake system to characterize flood behaviors and impacts.

Drawing on historical conditions, the design turns leveed ditches into dynamic, multi-thread channels with active floodplains. Other design elements include a freshwater marsh and seasonal wetland to provide habitat and hydroperiod diversity, and a treatment wetland to address water quality concerns for the urbanized upstream watershed.

Construction of the park will begin this year, with construction of the restoration area to follow in 2025.

Camille Pauley

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#Restoration #MontereyCounty #Trails

## Laura Moran and Lauren Huff **Purisima-to-the-Sea Trail Feasibility Study**

SWCA recently provided the Midpeninsula Regional Open Space District (Midpen) with professional site planning, technical analysis, and design services to complete a feasibility study for the Purisima-to-the-Sea Trail, parking area, connector trails, and pedestrian crossings in rural San Mateo County, south of the City of Half Moon Bay. The Purisima-to-the-Sea Trail will be an approximately 15-mile regional trail that will provide east–west connections from Midpen’s 5,038-acre Purisima Creek Redwoods Open Space Preserve to the San Mateo County coast, linking the Bay Area Ridge Trail along the Skyline corridor with the California Coastal Trail along the San Mateo Coast. SWCA’s comprehensive services for this important regional linkage project included biological and cultural resources assessments, field investigations and permitting, an opportunities and constraints analysis, conceptual design for the parking area and pedestrian crossings, and extensive multi-lingual public outreach to incorporate community feedback into the trail planning process. SWCA’s natural resources and restoration specialists have also assisted Midpen with the trail scouting process to select a preferred trail alignment that will avoid sensitive resources to the greatest extent possible and identify opportunities for on-site mitigation that will offset any unavoidable impacts that may be associated with implementation of the project.

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#access #connectivity #trails #openspace

## **Optimizing the Results —** 04:15p–05:15p Session Moderator: **Katy Chappaz** *Recon Environmental*

### Wayne Chapman **Maximizing Conservation: Getting the most out of restoration sites**

Conservation of rare biota is more important than ever, and identifying goals and targets beyond regulatory minimums, grass roots-level trends, and standard practices can make a world of difference to the rarest forms of life in any given region. Here we describe our opportunities and limitations along with successes and challenges on 300 acres of the UCSB campus and highlight conservation issues we have impacted both locally and regionally. With partnership, objective analysis, local knowledge and creativity, large gains in conservation are possible in small places. As practitioners, we remind ourselves that objectivity is not our default state and in doing so we make better advisors to the public in a world of increasing community involvement and make ourselves and colleagues better stewards. We describe our work with everything from rare local forms of plants to rare and critically endangered taxa and how we evaluate, prioritize, and implement conservation of the rarest members of our local and regional biological community for maximum benefit.

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Cheadle Center, UCSB

#endangered plants #local genotypes

#assisted migration #niches

### Nicholas Saglimbeni **Optimizing Restoration in Iceplant Dominated Landscapes of Coastal California**

Iceplant (*Carpobrotus edulis*) is a prolific invader along California’s coastline. In these sensitive ecosystems, iceplant can compete

invasive species management \* coastal restoration \* revegetation

with native plants, alter soil conditions, reduce habitat quality for local wildlife, and more. For these reasons, it is a commonly targeted species of restoration projects. Optimization of restoration techniques in iceplant dominated landscapes is being studied as part of a large-scale coastal restoration project at the Jack and Laura Dangermond Preserve in Santa Barbara County, CA. The 300+ acre iceplant-dominated restoration site encompasses a variety of native plant communities including wetland, grassland, sage scrub, and dune communities. A variety of restoration methods are being tested at all stages of the restoration process: 1) How should iceplant be killed and how should the dead iceplant material be dealt with? Some plots had the dead material left in place as a barrier to other weeds while some

had it stripped away to make room for native recruitment. 2) How should native vegetation be reintroduced after iceplant is managed? Broadcast seeding, outplanting, and natural recruitment (no action) are all being tested as means to increase native plant cover. 3) How should secondary invaders (weeds that may colonize after iceplant is removed) be controlled? Mechanical mowing, various herbicide agents, and different herbicide application frequencies are all being tested to control secondary invaders in the restoration plots. Trade-offs between effectiveness, scalability, and costs exist at each of these steps, especially when considering the diverse target plant communities. Success or effectiveness of the different restoration actions is being quantified by tracking plant species percent cover through time.

Preliminary observations suggest that ideal restoration strategies will be site specific. For example, in areas less prone to secondary invasions, low cost revegetation strategies such as broadcast seeding or natural recruitment of natives may be effective in producing high native plant cover. Alternatively, areas with higher potential for secondary invasion may require higher effort outplanting and weeding efforts to produce desired native cover after iceplant removal.

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#Iceplant #DangermondPreserve

#CoastalRestoration #Wetlands



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public access connectivity \* open space restoration \* community engagement

## More Than a Wetland —

12:30–01:30p Session Moderator:  
**David Shaw** *Balance Hydrologics*

### Julie Etra **Upper Truckee Marsh Restoration Project**

Construction of this multi-faceted restoration project in South Lake Tahoe, CA was completed in October 2022. Permitting and design occurred over a 10-year period, with three years of construction and one year of the two-year plant establishment / maintenance requirements completed in October 2023. Lead agencies include the California Department of General Services and the California Tahoe Conservancy. The design team includes Northwest Hydraulics, Western Botanical Services, Inc, and Balance Hydrologics. This \$8,576,000 project consists of the conversion of 12 acres of upland habitat to wetlands, the construction of pilot channels off the Upper Truckee River, the filling of the 'sailing lagoon' and a recreational trail. Similar to meadows and riparian systems throughout the Sierra Nevada, the sites had been disturbed, starting in the 1860s with the discovery of silver in Virginia City, Nevada. Much of the Lake Tahoe basin and surrounding Sierra were logged, while ranchers' impacts included manipulating and diverting water in the marsh to enhance cattle grazing. More recently, developers straightened the river to create real estate, and filled portions of the marsh with material excavated from the adjacent subdivision. Design emphasized balanced grading so that fill was neither exported nor imported, and reuse of on-site materials, including willows, pines, sod, organic matter, and topsoil. New pilot channels, draining to the marsh, followed existing willows to minimize disturbance and maximize erosion control. Other biotechnical methods included installation of willow fascines, poles, salvaged willows, propagated wetland plugs, berry-producing shrubs (to attract wildlife and enhance ecosystem diversity and structure), seeding, and mulching.

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#wetlandrestoration  
#biotechnicalengineering  
#wildlifehabitatrestoration

### David Shaw **More than a Wetland: Restoring the Landscape of Central Valley Riverine Wetlands, Seasonal Wetlands and Vernal Pools**

Balance Hydrologics was asked to assess the potential for restoration of 45 acres of seasonal wetland, vernal pool, and riverine habitat on agricultural land in Madera County, California. Initial feasibility investigations included historical ecology evaluations for site selection and targeted habitat types using topographic and aerial imagery analyses; field-based soils investigations and ground penetrating radar (GPR); and wetland hydrology monitoring and modeling using field methods and Balance's open-source Pond Inundation and Timing (POND-IT) water balance model. The evaluations led us to conclude that the landscape could support wetland restoration, since restrictive horizons in sub soils were still intact. Next, we developed restoration grading plans for landowner and agency review using historical aerial imagery, multispectral thermal imagery, and historical (2010) LiDAR data to approximate historical wetland morphology, soil signatures, and historical pool and swale locations, extents and depths. Once approved, the grading plan was converted to a digital surface that was used along with RTK GPS-mounted grading equipment to re-construct the approximated historical topography. Construction of 50 acres of wetland pools and swales and 125 acres of uplands started in December 2021 and was completed in June 2022 using a field-modification and adjustment approach. Adjustments were most often made when (a) indurated hardpan was encountered at unexpected shallow depths, or (b) restrictive or clayey soils were not encountered. Hydrologic monitoring at a local vernal pool reference

site and in a local creek started in WY2021 and serves as the basis for post-project monitoring, which also includes repeat aerial surveys during wetted conditions.

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#vernalpools #centralvalleywetlands  
#wetlandrestoration #UAV  
#landscaperestoration

### Clancy McConnell **Assessing reach-scale geomorphology using height above river zones to prioritize riparian restoration sites and inform restoration design on an incised and regulated California coast range river**

Predicting vegetation distribution using physical variables can be a useful tool in planning river restoration projects. One geomorphological metric, height above river (HAR), has been shown to be correlated to riparian vegetation distribution through several relationships, including depth to groundwater, discharge frequency, and soil moisture. While HAR has been used to identify areas suitable for riparian restoration according to inundation frequency, it has not been used in a predictive vegetation model to plan restoration.

In a study on Lower Putah Creek, California, we first establish that HAR is well-correlated to vegetation and discharge using 1-D inundation modeling and machine learning image classification. Riparian forest was found to dominate the lowest HAR zones. Next, we used HAR to predict land cover using a random forest classification, then created HAR zones relevant for restoration planning, and ranked each reach by the sum of two independent rankings: (1) the in-channel relative area of their combined core and

# Restoring Resiliency: Native Landscapes May 10 @ Valencia

restoring rare species \* best management practices \* from seeding to translocation

marginal riparian zones; and (2) the in-channel relative area of their combined aquatic and transition zones. The vast majority of Lower Putah Creek was found to be degraded. Finally, we used the relative area of aquatic and transition zones and the mean baseflow width of each reach to prescribe either baseflow narrowing or floodplain lowering (or both) as a site-scale restoration action. These methods can be used in other river systems to plan restoration, and the HAR zones created here can be directly incorporated into existing restoration design software for future projects on Lower Putah Creek.

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#riparian restoration #height above river  
#geographic information systems  
#machine learning

## Restoring Rare Plants —

01:45–02:45p Session Moderator:

**Luma Fowler** *Endemic Environmental*

Claire Wilhelm-Safian **A Partnership to Recover Nipomo Lupine: Recent Research and Discoveries**

Nipomo mesa lupine (*Lupinus nipomensis*), is a federally endangered annual plant endemic to the coastal dunes

of San Luis Obispo County. The loss of back dune habitat has restricted its range to just 2 mi<sup>2</sup> within the Guadalupe-Nipomo sand dune complex. A collaborative working group (California State Parks, the Land Conservancy of San Luis Obispo County, and UC Santa Barbara's Cheadle Center for Biodiversity and Ecological Restoration) has conducted research on the best practices for this critically endangered plant in partnership with CDFW and USFWS. This presentation synthesizes findings from nine years of studies and management, including yearly population monitoring; outplanting experiments examining the role of microhabitat, vegetation competition, seed scarification, herbivory, and fog condensation on germination and growth; an assessment of seed predation; and an



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topsoil removal \* prescribed fire \* native pollinators

impact assessment of grass-specific herbicide on lupine seed. Results indicate that *L. nipomensis* experiences stochastic population fluctuations from year to year, with wet, cool conditions contributing positively to germination and reproduction. It prefers swale habitat over steep slopes. Plots sown with artificially scarified seeds experienced higher germination than those sown with unscarified seeds. Herbivory and seed predation both had significant impacts on lupine survival and reproductive success. Veldt grass (*Ehrharta calycina*) cover was negatively correlated with fruiting success. The grass-specific herbicide, clethodim, was found to have zero effect on lupine seed production or viability, justifying its use in controlling veldt grass. Continued conservation efforts should take these results into account and work to increase the range and sustainability of Nipomo lupine populations.

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#endangeredspecies #nipomolupine  
#rareplants

**Christina Schaefer** **The soil is important: innovative translocation technique for the federally endangered San Diego ambrosia (*Ambrosia pubmila*)**

In 2020, we started planning the translocation of a large (over 25,000 stems) population of the federally endangered San Diego ambrosia (*Ambrosia pumila*). San Diego ambrosia is a clonal plant species that reproduces mainly vegetatively through rhizomes (or stolons) which remain vital in the soil. In addition to the established, but not always ideal, plot transplantation technique, we experimented with the salvage and excavation of the entire

population. We tested this method in the nursery first, and then translocated the population in February 2021. In addition to the soil salvage, we also used the plot transplantation method as a control. The translocation is in its second post-translocation year and thriving. In my presentation, I will detail the biological and mechanical requirements, techniques, and advantages of soil salvage versus plot transplantation for this clonal species and the post-translocation monitoring methods employed and success data collected (to date) to monitor success of this monoculture translocation project.

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Schaefer Ecological Solutions with acknowledgment to Helix Environmental for translocation installation.  
San Diego ambrosia  
clonal species  
population translocation  
translocation techniques

Luma Fowler and Barry Nerhus **Hand seeding or hydroseeding? Restoration techniques for Southern tarplant (*Centromadia parryi* ssp. *australis*) at Joint Forces Training Base, Los Alamitos Orange County, California** (Lightning Talk)

Southern tarplant (*Centromadia parryi* ssp. *australis*) is an annual herb native to Southern and Baja California and typically found in mesic grassland and wetland habitats (SDMMP). Due to human-related disturbance such as urbanization, habitat fragmentation, grazing, and non-native plant invasion, Southern tarplant is seriously endangered in California (rare plant rank 1B.1; CNPS). Habitat restoration efforts are needed to support and increase remaining populations of this rare and threatened species. Hydroseeding is a common method used to revegetate large areas by spraying a mixture of seed,

fertilizer, and mulch onto the soil surface. It is favored over hand-casting due to increased time efficiency and less labor and provides an added benefit of moisture to the seed bed (Gornish et al. 2017). Across all 10 sample plots, there was an average of 36 tarplant individuals per 4m<sup>2</sup> and 9 individuals per 1m<sup>2</sup>. These numbers were utilized to calculate an estimate of tarplant individuals for the Enhancement Site (1,889 m<sup>2</sup>) site. This data was collected from the first year of mitigation implementation at Joint Forces Training Base, Los Alamitos Orange County, California. The results showed that hydroseeding is a cheaper and more effective way to seed Southern tarplant compared to hand seeding due to increased germination rate and lower invasive plant competition.

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#restorationtechniques #social

Brett Bell **Loyal to the Soil: Lessons Learned from Revegetation of Maritime Chaparral After Topsoil Removal** (Lightning Talk)

Variability in native plant survivorship across restoration sites often corresponds with differences in pre-restoration site treatments. These treatments may include the extent of topsoil removal, soil compaction, and erosion control installation. We draw from over a decade of plant survivorship data on former Fort Ord lands in Monterey County to highlight challenges at sites with varying pre-restoration site conditions.

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#Maritimechaparral #Topsoilremoval  
#superfundsite #FortOrd

native seed partnerships \* testing land management strategies \* use of organic herbicides

## Invasive Species

**Management** —03:00–04:00p

Session Moderator: **Luma Fowler**

*Endemic Environmental*

### Christopher Berry **Integrating Prescribed Fire and Grass Specific Herbicides: A Strategy for Annual Wildflower Restoration**

The Cheadle Center for Biodiversity and Ecological Restoration has been using a combination of prescribed fire, grass-specific herbicide, hand-weeding and wildflower seeding to successfully restore portions of UC Santa Barbara from invaded, non-native grasslands, to native wildflower fields. Annual wildflowers are being lost due to competition from dense stands of non-native, annual grasses, and are rarely included in restoration targets. The Cheadle Center has been using prescribed fire to control *Bromus diandrus*, since 2008, with eight successful burns that have recovered 3.3 acres of native habitat. These burns utilize the addition of supplemental woody-fuel, to achieve high intensity fires that heat the topsoil to over 200 C, a level necessary to reduce the grass seedbank by nearly 99%. Initially, this method targeted recovering coastal sage scrub habitat and included hand-weeding and planting. The four most recent burns have focused, instead, on recovering native wildflowers through seeding. The three most recent burns have incorporated the grass-specific herbicide, Clethodim, to reduce disturbance of sensitive, germinating wildflowers and time spent hand-weeding. More than 20 species of annual wildflowers have become established in stands large enough, and flowering long enough (winter-summer), to successfully attract multiple species of native pollinators, including Crotch's bumble bee (*Bombus crotchii*). We know of no other similarly successful restoration strategies for recovering coastal wildflower fields in Southern California. This methodology

offers a chance to restore a significant habitat type that has been largely lost in coastal California due to development and invasion by non-native, annual grasses.

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Ecology, Evolution and Marine Biology, UC Santa Barbara

#PrescribedFire #Wildflowers #Restoration  
#Pollinators

### Eric Piehel and Alonso Gonzalez Cabello **Insights from the Laguna Mountains cheatgrass (*Bromus tectorum*) treatment pilot study, conducted as part of an Adaptive Weed Control Strategy with the United States Forest Service (USFS) and San Diego Gas & Electric (SDG&E)**

This presentation details the findings and outcomes of the Laguna Mountains *Bromus tectorum* and Fusilade® II Treatment Pilot Study, conducted as part of the Adaptive Weed Control Strategy Project with the United States Forest Service (USFS) and San Diego Gas & Electric (SDG&E). The study aimed to assess the efficacy of Fusilade® II treatments in controlling *Bromus tectorum* and facilitating the colonization of native species in treated areas. Key objectives included determining the duration of Fusilade® II treatment effectiveness, evaluating native vegetation response, and assessing potential inhibition of native bunch grass growth. The study encompassed a comprehensive experimental design with 160 0.25-acre plots, addressing treatment impact on *Bromus tectorum* and native vegetation. Results indicated a significant decrease in *Bromus tectorum* cover after Fusilade® II application, persisting over the study period. However, the anticipated increase in native vegetation cover and species diversity did not materialize, raising questions about the efficacy of Fusilade® II for broad-scale

native grassland restoration. The study also observed negative impacts on native bunch grasses, urging caution in the application of Fusilade® II in areas with valuable native grass species. Recommendations include refining application timing, exploring a hybrid approach with native seed application, and investigating long-term effects and recovery of native grasses post-treatment. The study concludes with insights into the limitations of the study and suggests avenues for future research.

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Alonso Gonzalez Cabello

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### Christopher McDonald and Carolyn Martus **Efficacy of Organic Herbicides for Restoration in Southern California**

As part of using integrated pest management (IPM), land managers need to use effective and cost-effective treatment methods to meet their restoration goals. Chemical methods have been an integral part of IPM when restoring habitat, especially when working at medium and large scales and working with difficult weeds. Chemical methods are often used in two critical phases of restoration, during site preparation and during site maintenance. Ineffective weed control can lead to restoration failures. Glyphosate, the active ingredient in many Roundup brand herbicides, has come under increasing scrutiny. In California some local jurisdictions have banned the use of glyphosate products or have mandated using it as a last resort, where managers need to first use organic herbicides, non-glyphosate herbicides, or non-chemical treatments. In addition, the public and some clients would prefer restoration practitioners to use organic herbicides. However, there are few studies looking at the efficacy of organic herbicides in controlling weeds in natural areas. In this research project, we compare the effectiveness and cost of using glyphosate, synthetic non-glyphosate herbicides

native seed amplification \* wildland seed collections \* burning-mowing-swathing trials

(aminopyralid and sulfometuron methyl, and glufosinate), and organic herbicides (caprylic and capric acids, and clove and cinnamon oils) at controlling weeds in San Diego County. We found that the organic herbicides were more expensive than both glyphosate and non-glyphosate synthetic herbicides. The organic herbicides were also less effective at reducing weed cover. We will also briefly review other studies that evaluated organic herbicides in non-agricultural areas.

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#organicherbicide #weedcontrol #non-glyphosateherbicides

## Amplifying Native Seeds —

04:15–05:15p Session Moderator:  
Eric Piehel *AECOM*

Eric Piehel, Rachel Chen Marc Doalson, and Rachel Ruston **Building a Native Seed Collection Program to Support a Complex, Long-Term Restoration Project in San Diego County**

This presentation discusses the development and implementation of a native seed collection program for a complex, long-term restoration project in San Diego County, California. In 2015, AECOM was contracted by a local utility company to assist with restoration of temporary impacts to over 55 acres of native habitat across 1,000+ restoration sites and 17 linear segments throughout San Diego County, primarily within the Cleveland National Forest. Per agency requirements, native seed for each project segment must be sourced from within a 10-mile radius and 500-foot (+/-) elevation band of each segment. AECOM and the utility collaborated to develop and implement a large-scale, long-term native seed collection program to support these stringent sourcing requirements for the 10+ year restoration

project. AECOM produced an innovative GIS modelling tool to identify properties that met the sourcing requirements, and the team leveraged relationships with public and non-profit land managers throughout San Diego County to obtain permission to collect seed. In partnership with the utility and a local non-profit, AECOM established a restoration facility in San Diego County where seed is dried, cleaned, stored, mixed, bagged, and bulked, using a custom-designed digital tracking system for real-time tracking of seed quantities throughout the process. To date, over 9,000 pounds of seed has been collected from over 300 native species, including special-status plants and host plants for a local endangered butterfly, for use in over 100 site-specific seed mixes. The program incorporates Traditional Cultural Knowledge for collection of culturally important species in collaboration with local tribes.

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## Julia Michaels **Native Seed Farms Can Help Inform Land Management Strategies**

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

In this talk, we describe several case studies of how native seed farming can inform land management. We focus on a recent trial in which we tested mowing, burning, and swathing on replicated production fields of Purple needlegrass (*Stipa pulchra*). The observed effects are

compared to 'old growth' control fields where the grasses were left untreated in the field through Fall dormancy.

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#nativeseed #regenerativefire #grasslands

## Pat Reynolds and Haleigh Holgate **Collecting and Amplifying Native Seed for CALTRANS' Willits Wetlands**

CALTRANS designed and constructed the Willits Bypass Project to alleviate congestion on Highway 101 in the town of Willits, California. The project impacted freshwater wetland habitat in the Little Lake Valley which required large-scale habitat restoration and conservation. At over 2,000 acres in size, the project is described by CALTRANS as the largest active public works wetlands mitigation project in the State of California. Heritage Growers ([www.heritagegrowers.com](http://www.heritagegrowers.com)), a non-profit venture of River Partners, was selected to provide native seed originating from the Little Lake Valley over a 5-year period to support the project's restoration efforts. Heritage Growers is using an innovative approach toward providing the seed required through a combination of wildland seed collection and wildland seed amplification to provide restoration appropriate native seed of known genetic origin. Heritage Grower's Wildland Seed Collection Manager Haleigh Holgate will describe the wildland seed collection process and Pat Reynolds, Heritage Grower's General Manager, will describe how a subset of the wildland seed collected is being amplified to help reach the project's native seed targets.

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Native Seed Amplification

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# Making it Work: Climate Resiliency May 10 @ Casa Loma

monarch waystations in traffic islands \*the importance of native assemblages \* aquatic invertebrates-

## Restoring Native Resilience —

12:30–01:30p Session Moderator:  
**Julia Michaels** *NativeSeed Group*

### Marcia Basalla **Traffic Island Conversion with California native plants**

Converting traffic medians to a thriving wildlife habitat. A description of a 14-year project resulting in a grassland/meadow, Monarch waystation and much more.

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#MonarchWaystation

#Californianativeplantsforpollinatorsandwildlife

#BiodiversityConnectivityCorridors

#buildinghabitatinanurbansetting

### Sean O'Brien **Invertebrate Community Composition Differs Between Restored and Natural Vernal Pools**

The loss of freshwater wetlands worldwide has underscored the importance of restoration to enhance biodiversity and functional objectives. While aquatic invertebrate communities within restored perennial freshwaters are well studied, few studies have occurred in the greatly reduced habitat of seasonal wetlands, such as vernal pools. California vernal pools have experienced high habitat loss and support many threatened or endangered invertebrate species. We compared 90 natural and 90 restored vernal pools of different ages across 10 sites throughout California and Southern Oregon using the Sars' Method. Large branchiopod abundance, total invertebrate abundance, class richness, and community composition were assessed between pool types (natural vs. restored) and along environmental gradients (e.g., site, pool depth, surface area, age since restoration). Large branchiopod and total invertebrate abundance were 215% and 274% higher in natural pools than restored pools, but class richness was not different. Community composition was

significantly different and driven by greater abundances of vernal pool fairy shrimp, San Diego fairy shrimp, Ostracoda, Cladocera, and Copepoda in natural pools. Few environmental or habitat variables explained patterns in richness or abundance. Our work demonstrates that restored pools, even those decades old, are different than natural pools. Future mitigation and monitoring guidelines for restored vernal pools should include quantitative evaluations for aquatic invertebrates. Restored pools are not adequate compensation for lost natural pools because they do not have the same ecological functions and values.

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#fairyshrimp, #branchiopoda, #vernalpool, #endangeredspecies

### Joanna Tang **Thatch removal as part of long-term, holistic stewardship in grassland vernal pools**

Invasive plant species are a widespread and persistent threat to native plants, including restored populations. Exotic annual grasses can invade ecosystems by producing a thick layer of thatch that initiates a positive feedback, promoting the regeneration of more exotic grasses and inhibiting the regeneration of native species. This invasion has resulted in the degradation of a vast majority of California's grasslands, including ones that have been restored in the past. In particular, restored vernal pool wetlands that are surrounded by an invaded grassland matrix are susceptible to exotic grasses encroaching into the edges of the pools. Our research investigates whether this invasion can be reversed by targeting the build-up of invasive thatch around the edges of the pools. We found that mechanical removal of thatch during the summer can successfully increase bare ground, providing open niches for regeneration of new populations. However, this open niche space was often recolonized by exotic grasses and forbs,

suggesting a lack of native seed bank. When thatch removal was coupled with the addition of native seed, native species richness did increase, but only after three years of annual seed addition. These results highlight the importance of long-term monitoring and management to ensure the restoration of native assemblages in the long-run. Restoring native habitat requires the restoration of the relationship between plants and people, and it's a long-term relationship! Are you ready to commit?

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Carla D'Antonio

#vernalpool #stewardship #grass #holistic

## Creative Funding Strategies

—01:45–02:45p Session Moderator:  
**Lindsay Teunis** *SWCA*

### AJ Ramon and Lauren Huff **Accessing Grant Funding: Proactive not Reactive**

Obtaining federal, state, and private grant funding is often a critical step towards successfully executing large-scale restoration and conservation projects. Early-stage identification of suitable funding mechanisms is crucial to project execution, as grant-funding can sometimes take over a year to become available to the grantee after applications have been submitted. If grant applications are not submitted at key milestones in the project development process, lengthy and unnecessary project delays can negatively impact project budgets and strain relationships with partner organizations. Despite the current abundance of federal, state, and private dollars for ecological restoration, competition for available funding is still aggressive. This atmosphere necessitates a proactive approach to the identification, application, and management of grant funding.

Lessons learned will be presented from three large-scale, grant-funded restoration

# Making it Work: Climate Resiliency May 10 @ Casa Loma

“cadillac-style” restoration \* leveraging environmental markets \* grant funding strategies-

and conservation projects, including: 1) The Rancho Canada Floodplain Restoration Project in Carmel-by-the-Sea; 2) The West Bay Sanitary District Living Shoreline Project in Menlo Park, and; 3) and the San Mateo Resource Conservation District Drought Resiliency and Water Conservation Program, in San Mateo County. These projects have seen a diverse investment from state and federal funding partners due to the creative and proactive approach to grant funding that the project team utilized. Each project presented its own unique set of challenges that addressed by thinking about funding before it became an immediate need.

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#Grants #Funding #RiverRestoration  
#LivingShorelines

## Darcy Hardwick **Banking on Nature: Funding Your Restoration Project Using Environmental Markets**

Restoration is a critical component of addressing global environmental challenges, but the financial barriers associated with large-scale projects can often impede progress. Today we will explore how restoration practitioners can leverage environmental markets to finance restoration and conservation initiatives. We will delve into two key strategies: mitigation and conservation banking, and corporate stewardship partnerships. We will provide a basic overview of each strategy, review the opportunities and constraints of each, and pose initial guiding questions practitioners can ask to determine if a given funding mechanism is the right path for them and their project site. We will also address the regulatory landscape, emphasizing the importance of compliance and stakeholder engagement in ensuring the success of ecosystem marketplace initiatives. The presentation will also showcase successful case studies, illustrating how project

proponents can use these frameworks to attract investment and achieve conservation goals. Attendees will leave better equipped to assess the suitability of each strategy for their projects and take initial steps toward implementation.

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#environmentalmarkets #mitigation  
#conservationfinance #ecosystemcredits  
#conservation #corporatestewardship  
#voluntarymarkets

## Kirsten Hodgson **Conservation Finance and the Forest Resilience Bond**

A key challenge of implementing landscape-scale restoration projects is obtaining adequate and consistent funding. Despite historic state and federal investments in ecosystem restoration, a gap persists between available and needed funding to achieve landscape-scale restoration. One solution to this challenge is conservation finance, a model which aims to address the restoration funding gap by leveraging additional, non-traditional resources to increase the pace and scale of restoration work. This presentation will introduce Blue Forest, a conservation finance non-profit and close partner of the USDA Forest Service, as well as our conservation finance tool—the Forest Resilience Bond (FRB). The FRB is an innovative public-private partnership that deploys private capital to ease cash flows and add new revenue streams to fund restoration work. Here we will address the structure and goals of the FRB, what kinds of partners Blue Forest engages with in these efforts, and characteristics of projects that are a strong fit for an FRB. We will also discuss Blue Forest’s ongoing FRB efforts across the western US, as well as the Yuba I FRB, Blue Forest’s pilot project in the Tahoe National Forest that was completed in 2024.

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Anna Yip. Presentation not affiliated with a publication or report.  
#conservationfinance #funding #casestudy

## Envisioning the Big Picture —

03:00–04:00p Session Moderator:  
**Ryan Lopez** *Natural Resources Group*

## Cris Sarabia **Multi-specie-Focused Accelerated Restoration: A race against time to save imperiled species**

The Palos Verdes Peninsula Land Conservancy’s (Conservancy) has been implementing restoration projects since its founding in 1988 in the sub-region of the Los Angeles metropolitan environment of the Palos Verdes Peninsula. Dotted with fragmented habitats, the Conservancy has worked diligently to acquire and restore those habitats to build a contiguous natural area along with various cities and diverse partners. Through successes and failures, the Conservancy has learned many lessons and is seeing the revival of many species of flora and fauna within the 1,700 acres of managed areas. This presentation will discuss the pros and cons of ‘cadillac style’ restoration, species recoveries that have resulted, and how restoration sites are meeting success criteria ahead of schedule. We will also share our hopeful vision for the future of the Peninsula, as the Conservancy prepares to restore a 166-acre wildlife corridor, creating new paths for wildlife to expand their territories. The session will inspire both new and experienced ecologists to think outside the box when facing large-scale restoration projects with unique local challenges.

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monitoring techniques in dynamic systems \*integrating restoration and infrastructure \*bioremediation

#wildlifecorridor #activerestoration  
#largescale #coastal

## Peter Tomsovic **Dynamics of Restoring Annual Dominated Communities**

The Riverpark Mitigation Bank (Bank) totals approximately 613 acres and includes restoration, rehabilitation, and preservation of a mosaic of regionally unique vegetation communities including alkali playa, alkali scrub, alkali grassland, vernal pool, and stream habitats. The Bank was constructed in 2020 by removing levees along 2.2 miles of the San Jacinto River, allowing seasonal flows to spread across the historic floodplain. The Bank has wetland and aquatic resources under the jurisdiction of USACE, CDFW, and RWQCB, Riparian / Riverine resources under the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP), and species listed under the federal and state Endangered Species Acts.

The vegetation types being managed are within the San Jacinto floodplain and are driven by unpredictable seasonal rainfall and annual species with overlapping growth and senescent cycles throughout the year. As a result, vegetation community structure and dominance are constantly evolving across each season and from one year to the next. The dynamic nature of these habitats presents challenges with traditional static and linear performance metrics. To capture changing conditions an array of monitoring techniques have been incorporated to support traditional restoration performance metrics.

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Mitigation Bank, Sensitive Species, Wetland,  
Western Riverside County MSHCP

## Will Benge and Peter Brastow **Restoration of Yerba Buena Island – Weaving Ecology with Place and Infrastructure**

Yerba Buena Island is the second largest natural island in San Francisco Bay. Together with the larger, man-made Treasure Island, its development and restoration is an on-going and multi-phase effort, preceded by years of planning. Historically used as a naval base and training center, much of Yerba Buena Island's native ecosystems have been replaced by ruderal landscapes and invasive species. However, significant and biodiverse natural areas remain. The ongoing redevelopment of the two islands has provided the opportunity to restore Yerba Buena Island's native ecology.

In addition to restoring Yerba Buena Island's remnant natural environment outside of the development footprint, the redevelopment area itself has provided the City and the developer numerous collaborative opportunities to restore the island's ecology. These infrastructure / restoration sites vary in their ecology and their intended use. Two stormwater gardens have been recently completed, which integrate ecological restoration with stormwater treatment infrastructure and park elements such as paths and seating areas. These sites are planted with over 50 species of native plants, many of which are native to the island. Nearly all of the plant material was grown by a local non-profit organization using seeds and cuttings collected from local island genetics. Various other sites have also recently been completed which include two parks and a potable water tank site.

The design and planning for these spaces involved a unique and collaborative effort between the developer, the City of San Francisco, ecologists, local nurseries and landscape architects. To carefully integrate the ecological restoration into parks, trails and infrastructure. This integrated approach provides for a multi-layered outcome, where

ecology, habitat, city infrastructure and public open space come together to create a rich and dynamic landscape.

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#YerbaBuenaIsland, #PublicOpenSpace,  
#SanFrancisco, #EcologicalInfrastructure

## **Reclaiming Functionality —** 04:15p–05:15p Session Moderator: **Ryan Lopez** *Natural Resources Group*

### Marty Melchoir and Jonathon Kusa **Breaking free: Lessons Learned From 20+ Years of Renaturalizing Concrete River Channels**

Throughout the early and mid-1900s, many urban streams were channelized, straightened, and lined with concrete in efforts to rapidly drain storm and floodwaters, to transfer water to more arid and populated landscapes, and increase lands for developable space. Today, most if not all of concrete infrastructure lining our waterways has reached or exceeded its lifespan and its ecological impacts have been realized. Early to recognize the mounting costs and impacts of aging concrete, in 1999 the Milwaukee Metropolitan Sewerage District (MMSD) began investing in the renaturalization of degraded concrete lined channels. This led to renaturalizing and expansion of river corridors to improve both flood resiliency and habitat availability. This presentation will review several projects completed by MMSD to achieve these goals and lessons learned in 20+ years of renaturalizing concrete rivers along the way. Projects reviewed will include The 1999 Lincoln Creek project that reclaimed approximately 6 miles of urban stream, 2) The 2018 Underwood Creek that reclaimed 8,000 feet of channel, and 3) The 5 Kinnickinnic River restoration projects. The presentation will include a review design strategies (including geomorphology,



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stormwater system retrofitting \*renaturalizing concrete rivers \*preventing seawater intrusion-

ecology, hydrology and hydraulic modeling analysis, and floodplain restoration), permitting, and implementation for concrete removal projects. Discussion topics will include how channel forming flows, sediment transport continuity, and inundation frequency-duration analysis were used as part of the design. The presentation will synthesize lessons learned in 20+ years of renaturalizing concrete-lined rivers as well as provide design strategies and directions for other concrete-removal projects.

Emily Alcott [ealcott@interfluve.com](mailto:ealcott@interfluve.com)  
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Marty Melchoir [mmelchoir@interfluve.com](mailto:mmelchoir@interfluve.com)  
#concreteremoval #resilientriverscapes #renaturalization

## Katrina VanDeusen **Phytoremediation for Innovative Stormwater Design**

Urban and sub-urban restoration for positive community response is possible when you use phytoremediation- a form of bioremediation. This innovative form of remediation uses plants to clean-up contaminants in soil and water. It is low cost compared to other remediation methodologies, runs on solar power, creates no effluent stream and requires no mechanical installations that need maintenance or repair. The best part is that all anyone sees is your landscape design. This form of remediation is approved by most states' environmental protection agencies, and EPA, for a large array of historic sites that may have been previously industrial or had a spill of hazardous contaminants. Runoff from these spill sites in urban and suburban settings makes its way into stormwater, contributing a large load of both inorganic and organic contaminants including forever chemicals that constantly cycle in aquatic resources and both biomagnify and bioaccumulate in the food chain. Combining bioretention designs that focus on retrofitting of existing stormwater systems' retention/detention

basins with phytoremediation enhanced pocket wetland restoration, is an Army Corp. of Engineers approved solution that prevents the cycling of these forever compounds. So how can you afford to miss this workshop on the USACE Best Management Practices for municipal stormwater improvements in the 21st century?

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#phytoremediation #bioremediation #stormwater #innovativerestoration

## Kristen Sissom **College Lake Project Addresses Critical Overdraft of Pajaro Valley Groundwater Basin**

The Pajaro Valley Groundwater Basin is a vital resource for sustaining an agriculture industry estimated to be worth nearly \$1 billion dollars. Long-term overdraft of the Basin has resulted in seawater intrusion that has elevated chloride concentrations up to three miles inland from the coast, in some areas making the groundwater unsuitable for irrigation and domestic uses without treatment. To prevent seawater intrusion and long-term groundwater overdraft, Pajaro Valley Water Management Agency is implementing the College Lake Integrated Resources Management Project. The Project will collect surface water and treat and deliver up to 3,000-acre-feet per year to

farmers in the region. Water produced by the Project will replace an equal amount of groundwater pumping, lessening overdraft and reducing seawater intrusion. The Project has been designed to adaptively manage habitat for a variety of sensitive biological resources. PV Water took a collaborative approach to developing the Project's Adaptive Management Plan (AMP) by creating an ad hoc committee consisting of resource agencies, technical experts, Native American tribes, non-profits, local landowners, and disadvantaged communities. SWCA Environmental Consultants is conducting ongoing surveys to monitor how project-related changes in vegetative cover and species composition affect wildlife habitat. Other local technical experts are collecting multi-year fish, wildlife, and hydrologic data to monitor how the Project will affect cyanobacteria blooms, steelhead populations, aquatic food web production, and invasive species populations. Implementation of the AMP will help PV Water protect environmental resources while providing a critical new source of water to help achieve sustainable groundwater.

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#CollegeLakeProject #Groundwater #SeaWaterIntrusion #AdaptiveManagement



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# Poster Session Beginning at 5:15p May 9 @ Orton

## Varren Anacleto **Revolutionizing Conservation: ecoSnap — Transforming Habitat Restoration along the Santa Ana River**

ecoSnap is a state-of-the-art mobile application designed for meticulous site monitoring. Rooted in the essence of tracking environmental and structural transformations, ecoSnap ensures continuity and consistency in photographic records over the years. Features include: Augmented Reality Mode: Enables users to return to their original photo stations, ensuring photos are taken from identical positions across different time frames. Assisted Photo Mode: Seamlessly guides users to capture images at all cardinal directions, aligning them perfectly with past snapshots. This ensures a precise year-by-year comparison. Interactive Gallery: Displays a curated collection of photos from various projects, offering a comparative view of changes throughout the years. Uploading Modes: Simplifies the process of adding photos to stations, whether in-field or remotely. Map Mode: A user-friendly interface pinning the precise location of photo stations across the project site, making navigation effortless. Export Mode: Allows users to preview and generate a comprehensive photo plate in a formatted PDF. EcoSnap is not just an app; it's a reliable companion for professionals who value precision and continuity in their monitoring projects. Emphasizing its efficacy, this poster showcases its value in a prolonged habitat restoration endeavor along the Santa Ana River in Riverside, CA for the Army Corps of Engineers.

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#ecoSnap #AugmentedRealityMode  
#photostations

## Diana Brand Ramirez and Jessie Vinje **Knowledge sharing for the present and future: Tailored Management, Seed Collection, Seed Bulking, and Seed Banking for Rare Plant Restoration**

The Framework Rare Plant Management Plan (FRPMP) logically and

comprehensively presents practical management strategies for the San Diego Management and Monitoring Program's (SDMMP) Management & Monitoring Strategic Plan (MSP) covered plants on conserved lands within western San Diego County. Developed as a "living document," the FRPMP was published in phases through a collaborative effort between SDMMP and other key stakeholders. The first phase launched in 2019, when SDMMP, AECOM, and Conservation Biology Institute (CBI) developed general framework sections, along with species chapters for four rare plant species. The second phase occurred in 2020, when three additional rare plant chapters were incorporated. To enhance readability and comprehension of the FRPMP, the team carefully coordinated the writing to seamlessly incorporate information from key stakeholders, including regulatory agencies, land managers, and species experts. The document underwent review by a cross-section of intended readers, including the public, regulatory personnel, and professional. Each chapter is focused on and addresses relevant information pertinent to management strategies and recommendations. Each species sub-chapter includes current and available historical data, tailored best management practices, a curated list of research needs based on gaps identified during researching, and other resource management topics. Additionally, a "companion plan" to the FRPMP was concurrently developed; the MSP Seed Collection, Banking, and Bulking Plan (SCBBP) provides species-specific strategies to managing seed resources for rare plants. The poster will focus on the species-specific research and stakeholder coordination involved in the development of the FRMP and SCBBP, including lessons learned, recommendations, and future chapter additions.

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## #RarePlants #SanDiego #SDMMP #SeedPlans Calen Campos **Assessing seed predation to inform conservation of endangered Nipomo Lupine**

Nipomo mesa lupine (*L. nipomensis*) and other dune stabilizing plant species have been impacted by the habitat-wide colonization by the invasive perennial veldt grass (*Ehrharta calycina*). Current veldt management practices prevent removal of the grass within a 15-foot buffer of extant lupine populations. Understanding the relationship between these dense stands of veldt grass and the potentially increased populations of *L. nipomensis* seed predators may further inform efforts to control veldt grass and aid in the recovery of the endangered lupine. This study assessed seed predation through low profile boxes baited with *L. nipomensis* seeds and camera traps capturing both video and still images to study relationships between the proximity of *L. nipomensis* to veldt grass monocultures and within open, native-dominated areas. Conservation implications were assessed by comparing areas 'caged' with a cloth wire fence and 'uncaged' areas to test for any significant reductions in seed predation and granivore activity. Overall, we found that uncaged bait stations lost the most seeds (0.4 seeds/day compared to 0.08 seeds/day in caged plots), and increased proximity to veldt grass modestly increased seed predation. The most common seed predators captured on camera were California kangaroo rats (found outside of cages and away from veldt grass), California deer mice (found outside of cages and adjacent to veldt grass), and California towhees (found within cages and away from veldt grass). Our results establish patterns of seed predation consistent with predicted results, emphasizing potential vulnerability to seed predation in areas near veldt or areas unprotected by caging.

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# Poster Session Beginning at 5:15p, May 9 @ Orton

#nipomolupine #seedpredation #rareplant  
#endangered

## Marco Castaneda Martinez **SEED LA: Los Angeles Regional Native Seed Network**

Seed LA is the collaborative effort of several environmental nonprofits based in Los Angeles. Seed LA is dedicated to bolstering the availability and use of regionally suitable and adaptive native seeds to conserve and enhance the ecological diversity of the greater Los Angeles area. Los Angeles County, with its large population and the second-largest metropolitan area in the United States, faces significant challenges due to urban expansion and habitat fragmentation. Urban greening projects are underway to preserve the region's threatened biodiversity, making the need for locally-sourced seeds urgent. By utilizing locally sourced seeds, restoration and greening projects can establish resilient plant populations that thrive in the local climate and soil conditions, providing numerous ecosystem services for people and wildlife. SeedLA identifies healthy populations within our region, collects seeds with permission, processes and stores those seeds, and makes them available for use in local restoration and urban greening projects. Through an ongoing partnership with the Nature Conservancy, SeedLA is currently engaged in the Bowtie Wetlands Demonstration Project. The Bowtie Parcel, an 18-acre brownfield site along the L.A. River, is closer to becoming a public green space. SeedLA will play a pivotal role in habitat enhancement with the provision of native plants, helping to improve water quality and supporting fauna. In this poster, SeedLA will share its history, challenges, accomplishments, and goals for the future, highlighting how strong collaborations between environmental organizations lead to more successful and impactful restoration projects.

Marco Castaneda [mmartinez@calbg.org](mailto:mmartinez@calbg.org), Cheryl Birker, Naomi Fraga, California Botanic Garden. Genevieve Arnold, Theodore Payne Foundation for Native Plants. Cris Sarabia,

Palos Verdes Peninsula Land Conservancy. Kat Superfisky, Grown in LA. Scott Cher, North East Trees. Jack Smith, TreePeople. Rachel O'Leary, City Plants. Amanda Bashir, Los Angeles Conservation Corps. Antonio Sanchez, Santa Monica Mountains Fund, an official NPS partner.

#lariver #seedLA #nativeseedbanking

## Saul Cervantes **Riparian Shade Model for Scott River**

A riparian shade model based on Heat Source, a stream temperature and hydrological model, was applied to monitoring stations along the Scott River. Shade is an essential variable in the health and temperature of ecosystems, and the shade model provides a creative solution to not being able to measure shade, or not having measured it in the past. This exploratory work serves as a proof of concept, in that we can use a shade model to compare the shade of an area at different periods. Digital area photographs, or rasters, that described the elevation, vegetation height, and canopy density were used to quantify and compare shade between the years 2010 and 2018. The outputs of the two years were analyzed to see if the comparisons align with our predictions on shade, given our knowledge of the monitoring points and the dates that the Light Detection and Ranging (Lidar), data was collected. With additional historical data about the weather along the Scott River, more Lidar data, and other creative ways of characterizing the vegetation and canopy density across the seasons of a year would make this model more accurate and could be a creative solution to characterizing shade and temperature for restoration science. The rasters were created from unclassified Lidar Point Cloud data in ArcGIS Pro with the assistance of applications like lastools and pdal. The model was written in Python, a middle-to-high-level programming language, by Lance Le to quantify shade in the Laguna de Santa Rosa watershed for the North Coast Regional Water Quality Control Board. Exploratory data analysis

was mainly done in R Studio, an integrated development environment for a high-level statistical programming language. The project was summarized in Overleaf, an online LaTeX editor.

Saul Cervantes

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#riparian #shade #model #scott

## Olivia Hockley-Rodes **Impact of Riparian Cover Loss on Stream Temperature in San Geronimo Creek (Marin Co., CA)**

The San Geronimo watershed is home to one of the southernmost independently viable populations of endangered coho salmon (*O. kisutch*) on the Pacific Coast, as well as threatened steelhead trout (*O. mykiss*). Over the past two decades, this system has been the focus of both local and state-sponsored restoration activities intended to remove fish passage barriers and increase habitat complexity. However, restoration activities have also had the unintentional effect of removing significant riparian shrub and canopy cover.

Using RStudio to analyze continuous temperature data from HOBO loggers deployed in San Geronimo Creek, we analyze how recent restoration projects have impacted seasonal in-stream temperature trends. Our findings indicate that sites most heavily impacted by riparian cover loss experienced higher temperatures and greater rates of salmonid lethality. However, the long-term benefits of these restoration efforts have provided significant boons to salmonid habitat viability and survival rates. The central question we pose is whether short-term threats (i.e. loss of riparian cover and rising in-stream temperatures) are worth long-term habitat enhancement gains.

Charlotte Diamant

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#watershed #salmonid #monitoring  
#climateresilience

Jacob Dioli and Ida Kaller-Vincent **Cactus**



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## Scrub Restoration for Coastal Cactus Wren (*Campylorhynchus brunneicapillus sandiegensis*)

The coastal cactus wren (*Campylorhynchus brunneicapillus sandiegensis*) is a California Department of Fish and Wildlife species of special concern and is considered a narrow endemic species covered by the County of San Diego Multiple Species Conservation Plan (MSCP). Consistent with the MSCP goal of allowing the coastal cactus wren to expand and persist, species-specific habitat restoration is being implemented at El Monte Ecological Preserve, Lakeside, California. The restoration site is 250 meters from the Lake Jennings genetic cluster of coastal cactus wren, which contains 25 pairs of coastal cactus wren. Successful restoration and habitat enhancement of 15 acres of maritime coastal sage scrub (cactus scrub) could support an additional seven pairs of coastal cactus wren. In 2021 Earth Discovery Institute partnered with Endangered Habitats Conservancy and RECON Environmental Inc. to implement cactus scrub restoration at El Monte Ecological Preserve. Objectives include creating 15 acres of live-in and stepping-stone cactus scrub habitat for coastal cactus wren, as well as creating suitable habitat for three additional MSCP-covered species: the federally threatened coastal California gnatcatcher (*Poliophtila californica californica*), San Diego horned lizard (*Phrynosoma coronatum blainvillii*), and orange-throated whiptail (*Cnemidophorus hyperythrus beldingi*). Preliminary findings from monitoring efforts indicate a significant shift in the landscape from invasive brachypodium grasses (*Brachypodium* spp.) to a predominance of native species. After two years of restoration, cacti are approaching the critical 4-foot height, crucial for potential coastal cactus wren colonization. Site observations have documented the presence of San Diego horned lizard, and coastal California gnatcatchers have been sighted nearby. Jacob Dioli- RECON Environmental Inc. [jdioli@reconenvironmental.com](mailto:jdioli@reconenvironmental.com)

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#cactuswren #elmonte #recon  
#earthdiscoveryinstitute

## Sarah Doyle and Noah Schott Restoring a California Central Coast Estuary for ESA-listed Salmonids

Coastal estuaries and wetlands are recognized as critical habitats for many plant and animal species. In California, nearly 90% of the state's historical estuaries have been lost due to human development and urbanization, and most remaining estuaries are severely altered and degraded. In an effort to improve conservation and recovery outcomes for at-risk native salmon populations, resource managers are increasingly focusing on restoration of coastal estuaries and lagoons and the key ecological functions they provide. In this poster, we summarize twenty years of fisheries research conducted in the Scott Creek estuary (Santa Cruz County) targeting two ESA-listed salmonids: Central California Coast (CCC) coho salmon (*Oncorhynchus kisutch*) and CCC steelhead trout (anadromous *O. mykiss*). Nearly a century ago, the Scott Creek estuary and lower river were altered and simplified to accommodate transportation along the central coast, with adverse consequences for local salmon populations. In its current state, the estuary is largely homogeneous rearing habitat that lacks complexity, cover and depth, and routinely experiences poor water quality conditions during the summer. Despite these challenges, the Scott Creek estuary is known to provide enhanced growth opportunities for juvenile salmon, and estuary rearing has been shown to improve subsequent marine survival and reproductive success. Consequently, the restoration of the Scott Creek estuary has been identified as a priority action item in salmonid recovery plans. The forthcoming Scott Creek Lagoon and Marsh Restoration Project aims to restore the Scott Creek estuary to its historic topology, allowing the floodplain to revive habitat complexity and heterogeneity.

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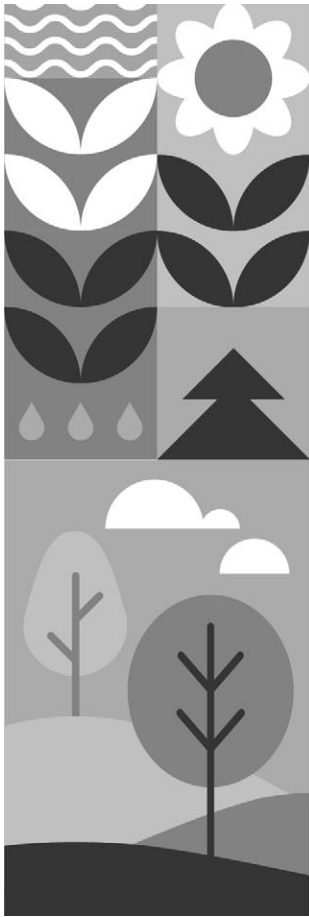
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#salmonid #estuary #habitatcomplexity

## Abby Dziegiel Wings Landing Tidal Habitat Restoration Project and Educational Kayak and Science Camp Program for underserved local middle school students

The 267-acre Wings Landing Tidal Habitat Restoration Project (Wings Landing), Located in the Suisun Marsh, Solano County, CA restored a private, managed marsh duck club into tidal habitat for fish species. A public access component of the project included an annual summer program that introduces local middle schoolers to the Suisun Marsh. The program includes a kayak tour of the Project Site, and fosters creativity and scientific exploration through hands-on activities.

Since 2021, Natural Resources Group Inc. and DWR have coordinated to provide this program to 6th-8th grade students from a Title 1 school in Suisun City, an underserved Bay-Delta community with limited access to the greater San Francisco Estuary. The students study local Suisun Marsh flora and fauna, and conduct experiments with equipment like trail cameras, zooplankton nets, and minnow traps. Students also paddle on kayaks to the Wings Landing restored marsh with a professional kayak nature guide.

Most local students have limited awareness of their neighboring ecosystem and have spent little to no time exploring it.



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During the program, students gain positive experiences in the marsh, and carry these memories into their future. Each year students discover a newfound appreciation for nature, and some are emboldened to lean into their interests in the natural sciences. As scientists, land managers, and stewards, we make a difference when we engage with our communities by reaching and supporting each new cohort of future scientists, advocates, and stewards. Funding for this program is secured through 2025, with plans to expand.

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#WingsLanding, #outreach, #kayak,

#SuisunMarsh

## Sophia Forstmann and Cody Cameron Evaluating impacts of management on carbon storage at Swanton Pacific Ranch

Grasslands, constituting a significant portion of the Earth's surface, hold considerable potential for mitigating climate change. They play a crucial role as a substantial carbon sink, with soil organic carbon (SOC) making up a notable percentage of the Earth's total. Under the threat of climate change, it is increasingly important to understand how carbon accumulates into soil for proper management and modeling. With this, grasslands have a significant potential to increase carbon storage through distributing large amounts of photosynthate into the soil. Additionally, increasing soil carbon storage in grasslands is recognized as an affordable mitigation pathway to offset greenhouse gas emissions, and contains potential benefits like increased soil water-holding capacity and reduced erosion. The two main components of SOC are mineral-associated organic matter (MAOM) and particulate organic matter (POM). MAOM are microscopic fragments of organic

material that have been chemically transformed by microbial activity and are attached to soil particles, making them resistant to decomposition. POM accounts for organic materials that are made of partially decomposed plant matter that have a short turnover rate making it the most vulnerable component of the SOC supply from the decomposition from microorganisms to agricultural practices like tillage. Unlike MAOM, POM has not yet been significantly chemically altered through microbial activity. These ecosystems act as a major carbon sink but have become altered through human interaction and climate change. We are conducting a study on how different management techniques influence plant cover, plant biomass, total plant carbon, MAOM, and POM distribution in coastal California rangelands. The study compared ecological responses of tilled versus passive restoration at Swanton Pacific Ranch in Davenport, California. We utilized a Randomized Complete Block Design where we identified three different sites each consisting of a tilled and old growth pasture. Within each pasture four samples were taken at a random location. We quantified the management influences on plant percent cover and percent coverage in relation to total plant and SOC. No significant difference was found between management practices in regards to plant percent cover and total plant carbon. However, based on our Analysis of Variance we found variations between site locations for each data type collected. We also will present the management impacts on soil carbon pool volumes.

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#carbonstorage #grasslandmanagement

#rangelands #climateresiliency

Alexandra Fowler **One size doesn't fit all:**

## Why site-specific success standards matter

Have you ever had a well-executed restoration project fail to meet its final success standards despite being nearly indistinguishable from the surrounding area, or inherited a restoration plan with unrealistic standards like native cover too high for the target habitat, or tree densities much higher than the site is capable of supporting?

If so, this poster is for you- it discusses different methods, such as use of baseline data, reference sites, and alternatives to cover such as plant densities, to identify what the attainable, realistic, and ecologically sound success criteria are for your project, how to decide which method to use, best practices for each method, and why incorporating these methods into restoration planning with result in achievable success standards and high-quality target habitat without compromising ecological function.

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#SuccessStandards #RestorationPlanning

#HMMP

## Ali Jahani Assessment of the impact of wood harvesting and livestock on forest degradation through the utilization of an optimized degradation model

Assessing the Impact of Wood Harvesting and Livestock on Kheyrud Forest Degradation: Utilizing an Enhanced Forest Degradation Model in Various Scenarios. This study aims to analyze the consequences of forestry practices, particularly wood exploitation and livestock grazing, on the degradation of Kheyrud Forest in Nowshahr city. The assessment employs an optimized forest degradation model in four scenarios: the current situation, without wood harvesting, without livestock, and without both wood harvesting and livestock. Homogeneous environmental units were established based on ecological resources, and human activities and their impacts were assessed



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# Poster Session Beginning at 5:15p, May 9 @ Orton

within these units. Predicted coefficients of the model in each scenario facilitated statistical comparisons of outputs and the assessment of significance in changes. Due to data abnormality, a Kruskal-Wallis test was conducted to statistically compare degradation coefficients in the four scenarios. The results reveal a significant difference in degradation coefficients among scenarios, with average values in the current situation, without wood harvesting, without livestock, and without both wood harvesting and livestock being 1.49, 0.72, 0.9, and 0.3, respectively. Livestock and wood exploitation emerge as the predominant factors influencing forest degradation. The utilized model demonstrates a robust capability in predicting and comparing scenarios, serving as a valuable decision support system for forest management. Its application allows for the evaluation of forest plan impacts both before and after project implementation.

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## Megan Kownurko **Relating Watershed Characteristics to Flow in the Navarro River Watershed**

Persistent streamflow is vital for salmonid populations in California, especially as climate change brings additional stressors from changing precipitation patterns and frequency of extreme air temperatures. When looking at streamflow, investigating its source is the prudent first step. Prior studies have identified the critical zone as a key contributor to streamflow; the critical zone extends from the surface vegetation canopy down to the base of weathered bedrock. Key critical zone elements that contribute to this water storage and flux include precipitation, land use, vegetation, lithology, soils, evapotranspiration, and other hydrologically relevant variables. This study investigates the relationship between critical zone elements to streamflow measured at long-term flow monitoring stations in catchments within the Navarro River watershed.

Megan Kownurko

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#Navarro #FlowMonitoring #StreamFlow

## Oscar Antonio La Madrid **Tackling Tamarisk**

*Tamarix ramosissima* and the control methods.

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#Tamarisk #SaltCedar #RiverValleyRestoration  
#TamariskRemoval

## Ryan Lopez **Riparian restoration, anthropogenic impact remediation, and the return of the Least Bells's vireo (*Vireo bellii pusillus*) at the Big Tujunga Conservation Bank, Los Angeles, CA.**

The Big Tujunga Conservation Bank (Big T) was established for the restoration and permanent protection of habitat for the federally threatened Santa Ana sucker (*Catostomus santaanae*) and California mountain lion (*Puma concolor*), within and adjacent to the Big Tujunga Creek, Los Angeles, CA. Prior to establishment, Big T was heavily impacted by daily and persistent trespass related impacts including dumping, human made rock dams, swimming, religious ceremonies, hunting, recreation, and other illegal activities. In 2022, Big T was fenced, no trespass signage was installed, approximately 600 feet of trail remediation occurred, and an excess of 40 cubic yards of trash and deleterious invasive plants such as Arundo (*Arundo donax*), Spanish broom (*Spartium junceum*), tree tobacco (*Nicotiana glauca*), and castor bean (*Ricinus communis*) were treated and removed. The first breeding season after restoration activities, the California and federally endangered Least Bell's vireo (*Vireo bellii pusillus*) was documented on site for the first time, despite multiple previous years of surveys without

detections.

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#restoration, #riparian, #endangeredspecies,  
#LosAngelesRiverWatershed

## Adam Maldonado and Aedan Lagillardaie **Otay River Restoration: The Mitigation of Invasive Species**

SWCA's environmental restoration team is implementing over 300 acre riparian restoration project to restore the Otay River, which feeds into the San Diego Bay. An important part of habitat restoration in this area is the removal of invasive plant and animal species. Both mechanical and manual removal measures have been used to control populations of American Bullfrogs (*Lithobates catesbeianus*), Tamarisk (*Tamarix ramosissima*), and Black Mustard (*Brassica Nigra*).

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#OtayRiver #TeamOtay #SWCA

## Virginia Matzek **Propagule pressure of invasive common reed (*Phragmites australis*) in Suisun Marsh: seedset, germination success, and seedling susceptibility to herbicide**

Problem Statement: Brackish wetland ecosystems around San Francisco Bay have been increasingly invaded by the species known as common reed or phragmites (*Phragmites australis*). In Suisun Marsh, long-term management has consisted of herbicide spraying, mowing, discing, and occasional burns, but treatments have been unsuccessful at halting the spread of phragmites.

Approach: We sought to determine if intensive management had diminished the propagule pressure of existing phragmites stands by decreasing seed number or seed viability, or, conversely, if the long history of



herbicide use had resulted in herbicide resistance in the invader. We collected inflorescences of phragmites from areas with a long history of intensive control (>10 years of spraying) and from sites where little or no spraying (0-3 years) had occurred. We stripped inflorescences of florets, measured seedset, and did germination trials to test seed viability. We also subjected seedlings to glyphosate as a test of acquired herbicide resistance.

**Results:** We found that inflorescences from the high-intensity treatment were less numerous and had fewer seeds on average than those from low-intensity sites, although high-intensity inflorescences tended to be larger and have heavier seeds. Coupled with decreased patch area and decreased inflorescence density of *P. australis* within patches in heavily treated areas, the propagule pressure of the invader

diminished by 73%, from 4486 seeds per m<sup>2</sup> of marsh to 1214 seeds per m<sup>2</sup> of marsh. We found no significant differences in germination rate between the low-intensity and high-intensity treatment areas. Results from the herbicide trials showed no difference in herbicide damage levels in long-sprayed populations, suggesting that herbicide resistance is unlikely to be a factor in the continued persistence of phragmites in Suisun Marsh.

**Conclusions:** We conclude that current control methods reduce the potential proliferation of new invasion fronts within Suisun Marsh, but are not applied sufficiently to halt marshwide spread.

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#phragmites #SuisunMarsh

#propagulepressure

## Peter Nguyen **Decoding Drought Adaptation: Reference Genome of the California Poppy, *Eschscholzia californica***

*Eschscholzia californica*, commonly known as the California poppy, exhibits significant adaptability to diverse climates, making it a compelling model for studying genomic responses to environmental stressors. As part of the California Conservation Genomics Project (CCGP), we present an improved chromosome-level genome assembly for *E. californica* to explore its genetic adaptability under increasing aridity due to climate change. This assembly spans 0.401 Gb, with a scaffold N50 of 66.4 Mb and a contig N50 of 11.8 Mb, markedly enhancing the genomic resolution compared to previous



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studies. Furthermore, seeds from *E. californica* were collected from 26 locations across eight Californian ecoregions and grown in a common garden at UC San Diego. After their growth, we successfully sequenced their genomes, providing a detailed genetic basis for our ongoing analysis of the genetic variations underpinning drought resilience and competitive advantage in invasive populations. Our ongoing research focuses on identifying gene variants indicative of natural selection in response to drought and increasing aridity, significant challenges posed by global climate change in California. Leveraging our improved genome, our efforts are directed toward understanding genes associated with drought tolerance. A key aspect of our work involves assessing areas within the species' range that exhibit high genetic diversity and effective population sizes, which will aid in predicting potential for climate change adaptation. Additionally, we utilize molecular genetic estimations of gene flow to refine species distribution models under future climate scenarios. This research offers insights into the adaptive mechanisms of *E. californica* in arid climates, contributing to conservation and restoration efforts under changing environmental conditions.

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#conservation #genomics #californiapoppy  
#restoration

### Kylee Nielsen and Anna Buecheler **Implications of Restoration-focused Grazing on Plant-Soil Linkages in California Coastal Rangelands**

California coastal grasslands are highly diverse and sensitive environments. Our study focuses on how grazing may aid in the restoration of annual grass invaded rangelands on the central coast. Soil and plant properties were compared across 3 ranches: a long-term continuous grazing

site, restoration-focused short-term rotational grazing, and a cessation of grazing. We will be focusing on soil health and its implications on restoration of rangelands. Data was collected in 1 by 1 m<sup>2</sup> quadrats within 3 randomly selected pastures at each site. We used a variety of field and laboratory techniques to analyze soil and plant physical, chemical, and biological properties including bulk density, total carbon and nitrogen, soil pH, soil mineralogy, organic matter fractions, plant cover, and nematode and arthropod abundance. This data was analyzed in R using univariate and multivariate approaches. Both grazed ranches were found to have significantly more annual grasses than the non-grazing site ( $p < 0.05$ ) while the two restored sites had significantly more perennial plant cover. In the soil, populations of bioindicator nematodes were significantly higher at the non-grazed site compared to the continuously grazed site ( $p < 0.05$ ). In the organic matter, the only differences found involved the fast-cycling pool (particulate organic matter) between the non-grazed and continuously grazed site ( $p < 0.05$ ). We will present these results alongside a multivariate analysis across sites. The results of this study will inform management of our coastal rangelands to protect soil health and biodiversity.

Anna Buecheler, Kylee Nielsen, Nora Bales,  
Stewart Wilson, Yamina Pressler  
#rangelands #centralcoast #studentled  
#grazing

### Raymond Nunez **Santa Ana River: Norco Bluffs Toe Protection and Alcoa Dike Mitigation Project**

To mitigate expected temporary and permanent effects resulting from the USACE SAR Mainstem Flood Control Project downstream of the Prado Dam along the SAR Mainstem, habitat restoration encompassing 205 acres of riparian and 13 acres of Coastal Sage Scrub (CSS) is underway. The project involves diverse activities such as vegetative sampling, avian surveys, protocol least Bell's

vireo assessment, southwestern willow flycatcher evaluation, CA gnatcatcher surveys, habitat restoration initiatives, public outreach endeavors, and the removal of non-native vegetation.

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#Santaaanarover #habitatrestoration  
#alcoadike

### Adeyinka Olusanya **Assessing ecosystems response to urban food- energy-water (FEW) dynamics**

The significance of sustainability in urban food, energy, and water (FEW) nexus is widely acknowledged, yet the understanding of the effects of this ever-changing nexus on ecosystems remains limited. Management efforts in the nexus focus solely on one component, typically the water system. This often creates spillover effects impacting other components and the ecosystems supporting FEW resources. The results of a preliminary study conducted on Trinity River Basin in Dallas showed how FEW nexus changes have resulted in ecosystems fragmentation over the years in the basin. Therefore, understanding the interactions within and outside this coupled human-nature system is crucial for developing integrated solutions that combine traditional methods with nature-based approaches. This proposed research will use the tele-coupling framework to model the interaction between FEW nexus and ecosystems. Also, it will use Indicators of Hydrological Alterations (IHA) to analyze how constant water management efforts causes problem transfer and how ecosystems respond to this scenario. The study aims to develop alternative management solutions that leverage nature-based approaches to create a balance between the components of the nexus, rather than only using water management efforts. The expected results will contribute to addressing the challenges of urban FEW resources use efficiency, ecosystem management, and enhance sustainability efforts.

Adeyinka Olusanya

# Poster Session Beginning at 5:15p, May 9 @ Orton

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#UrbanSustainability #FEWNexus  
#EcosystemManagement

## Dan Parker **Management of Mohave Tui Chub Habitat**

The Mohave tui chub (MTC) was federally listed as endangered in 1970 because only one known population existed near Baker, California. Transplants to several locations from this population were made in 1972 and today, a large population of Mohave tui chub exists in the Lark Seep System at Naval Air Weapons Station China Lake (NAWSCL). In the Lark Seep System, a series of man-made flood channels, created to drain water from buildings and roadways, due to low topography at NAWSCL, is now one of only five locations where the fish is found. With changing conditions, however, there was insufficient water in the canal to sustain the fish.

In support of Integrated Natural Resources Management Plan (INRMP) management objectives and the Endangered Species Act (ESA), IOEI was contracted to stabilize the interim on-base habitat of the Mohave tui chub. The objective was to provide an interim response to improve habitat to help sustain the Mohave tui chub pending identification of a long-term off-site solution.

To improve survival of the endangered species, IOEI completed removal of cattails and other invasive species from channels, excavation and recontouring of channel slopes, and construction of a flow-through catchment basin.

Prior to initiating construction activities, baseline data was collected. During construction a total of 68 MTC were translocated to suitable habitat. Once construction was complete additional data was collected and it was discovered that the restoration effort created aquatic habitat

and fresh aquatic vegetation growth. Waterfowl were observed to be numerous at each monthly visit.

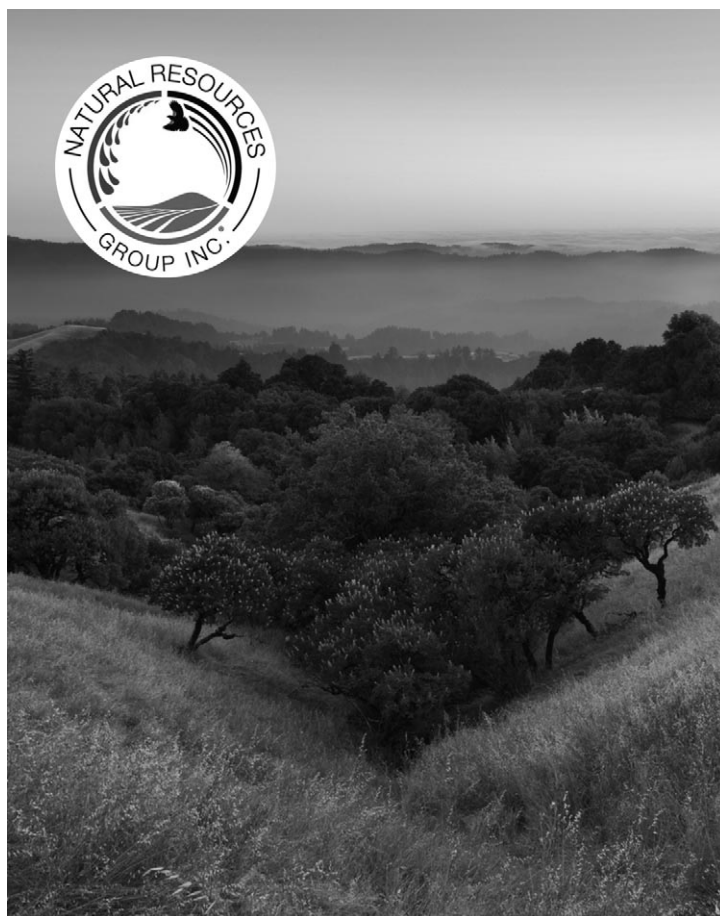
Lisa VanAmburg (NAVFAC SW)  
Dan Parker, Jeremy Thorn and Karen Collins (IO Environmental & Infrastructure)  
#endangeredspecies #restoration  
#aquatichabitat #sustainability

## Claire Pavelka **Stage Zero Restoration: Restoring Form and Function to a Degraded Alluvial Valley**

Recent study of stream channel evolution indicates that, for intermittent streams in low-gradient valleys of grasslands and emergent wetlands, the pre-disturbance (Stage Zero) condition is an anastomosing wetland channel complex rather than a single-thread channel. Findings from historical ecological analysis of the Petaluma River watershed are aligned with this model; many drainages currently leading directly to



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tidal zones previously dissipated into wetlands with shallow distributary channels. These pre-disturbance wetland complexes supported diverse plant and wildlife habitat. Historic land uses drained wetlands and connected them directly to larger channels, reducing habitat values. Lakeville Creek, on Sonoma Land Trust's Sears Point Ranch, adjacent to San Pablo Bay, reflects these changes; it was incised and increasingly disconnected from its valley floodplain wetlands due to historic land uses. SLT and PCI Ecological are working to restore the watercourse to a Stage Zero condition to provide improved hydrologic and biological functions. A mechanical whole valley reset approach was taken, with approximately 11,000 cubic yards of soil moved from the upper project reach, where graded soil was historically placed, to fill incised portions of the lower reach. Approximately 35,000 native wetland, wet meadow, and upland plants were installed to protect from erosion and increase habitat value for California red-legged frogs and other wildlife. Monitoring of groundwater, topography, wetland extent, and vegetation establishment will be used to gauge progress toward goals of reconnecting the channel to its floodplains, raising the seasonal water table to reestablish wetlands, and facilitating the development of ecologically complex, self-sustaining, resilient habitat.

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#StageZero #wetlands #restoration

## Candace Reynolds **Habitat Restoration at Hidden Valley Wildlife Area**

Riverside County Regional Park & Open-Space District (RivCo Parks) & HANA Resources (HANA) plan to restore & enhance native habitat in Hidden Valley Wildlife Area (HVWA) in Riverside, California. RivCo Parks obtained funding in

2020 from the California Wildlife Conservation Board (WCB) to develop a habitat restoration plan for 980.88 acres of native riparian and upland habitat restoration. The project will improve and increase breeding habitat for least Bell's vireo & habitat connectivity for native wildlife all while reducing the risk of fires. The goals of this planning project were to complete the necessary studies, designs, and environmental compliance for habitat restoration. The design will focus on restoring native plant structure, abundance, and species diversity; increasing the sites resistance to invasion by non-native plants; and increasing connectivity between and within habitat types and the surrounding open space.

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#HiddenValleyWildlifeArea #Santaaanriver

#habitatrestoration

## Maryam Saffariha and Ali Jahani **The development of an environmental decision support system for predicting the natural distribution of *Festuca ovina* in the restoration of degraded lands**

Human-induced activities, species invasions, and ecological variables are instigating rapid transformations within rangeland ecosystems. To ensure the abundance and sustainability of plant species habitats, there exists a critical need for a reliable predictive model capable of accurately forecasting and mapping species distribution across diverse ecological conditions. Our objective was to assess the efficacy of three commonly employed machine learning methods—Multilayer perceptron (MLP), radial basis function (RBF), and support vector machine (SVM)—in predicting the distribution of *Festuca ovina* in protected mountainous rangelands.

This investigation involved the analysis of *F. ovina* distribution in 305 randomly selected plant sample plots, each characterized by 10 ecological variables.

Three machine learning models were constructed to predict the likelihood of *F. ovina* distribution. Results indicated that the RBF model exhibited a higher number of misclassifications (11 samples) compared to the MLP and SVM models (10 samples), underscoring the greater accuracy of MLP and SVM models in distribution modeling. Furthermore, MLP demonstrated a higher R-squared value (0.87) compared to SVM (0.85), establishing MLP as the most precise model for land restoration efforts. Consequently, we developed the *Festuca ovina* Distribution Model (FODM) utilizing the MLP model.

Sensitivity analyses identified soil texture, soil depth, electrical conductivity (EC), pH, and vegetation density as significant influencers on *F. ovina* distribution, with respective sensitivity coefficients of 0.48, 0.47, 0.45, 0.41, and 0.41. Utilizing the finalized FODM, we designed an Environmental Decision Support System (EDSS) tool aimed at aiding rangeland managers in mapping *F. ovina* distribution. Application of the EDSS tool demonstrated its practical utility in leveraging the FODM for informed decision-making and land management. The EDSS tool emerges as a valuable asset for rangeland managers, providing them with the means to make informed decisions regarding *F. ovina* restoration and effectively deploying the predictive capabilities of the FODM in practical scenarios.

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## Sloane Sanchez **Invasive Plant Management in Los Padres National Forest**

HANA Resources Inc. (HANA) and U.S. Forest Service Los Padres National Forest (USFS-LPNF), along with project partners Cachuma Resource Conservation District (CRCD), Natures Image (NI), and Santa Barbara Botanic Gardens (SBBG) acquired funding from the National Fish and Wildlife Foundation (NFWF) Southern California

Forests and Watershed grant program to implement a three-year invasive plant removal project in the Santa Barbara District of Los Padres National Forest (LPNF), Santa Barbara County, California. Fire suppression activities during the Zaca (2007) and Jesusita (2009) fire boundaries promoted the establishment of small and isolated populations of invasive plants along fuel breaks and roadsides. These invasive plant occurrences are spreading from fuel breaks and roadsides into pristine native chaparral where they increase fuel loads, disrupt natural ecosystem dynamics and cause a loss of native species diversity and composition. The main objective of this project was to control these isolated invasive plant occurrences and prevent their spread into the surrounding native ecosystems, thus increasing wildfire resiliency and supporting biodiversity and ecosystem function. The project targeted the removal of seven invasive plant species prioritized by the USFS on a total of 508.13 acres.

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Jose Olvera, Lauren Hill  
#lpnf #habitatrestoration

## Damini Sindhar **Pollinator and Avifaunal Diversity Effects of Riparian and Coastal Scrub Establishment after of Drainage Improvements**

Wildlife and habitats are inextricably linked. Restoration with a diverse plant palette creates habitat conditions that attract more and more organisms over time, increasing biodiversity. The Ventura County Public Works Agency-Watershed Protection's Santa Rosa Road No. 2 Debris Basin Decommissioning Project (SRRBD) presents a case study of increasing avifaunal nesting and pollinator diversity that positively correlates to increased plant species diversity.

The SRRDB purpose was to decommission a debris basin providing minimal flood protection. Subsequent re-vegetation with a diverse plant palette created a high-quality habitat of sandbar

willow thickets surrounded by a diverse mix of California Coastal Sage Scrub Species, including black sage, purple sage, California buckwheat, California sagebrush, lemonade berry, and sticky monkeyflower, among others, with a complex native herbaceous understory.

After a few grow-kill weeding cycles, irrigation installation, hydroseeding, and container planting in 2021, 1.05 acres of native riparian willow and coastal scrub habitat was established over a previously bare debris basin. With periodic weed abatement, irrigation, and replanting of non-survivors, the site met the Year 5 (2025) success criteria at the end of Year 2 (2022).

The habitat patch invited nesting pairs of adult yellow breasted chat (CDFW species of special concern), wrentit, cliff swallow, song sparrow, mourning dove, lesser goldfinch, common yellow throat, and California quail in 2023. On May 9, 2023, a male least Bell's vireo (USFWS and CDFW Endangered) was photographed there.

Many insect pollinators were observed in 2023 and 2024, including three species of bumble bees (*Bombus melanopygus*, *B. californicus*, and *B. vosnesenskii*), Southern California carpenter bee (*Xylocopa californica* ssp. *diamesa*), syrphid flies (*Copestylum violaceuma*, *C. marginatum*), cactus chimney bee (*Diadasia australis*), striped sweat bees (*Agapostemon* spp.), gray buckeye (*Junonia grisea*), fatal metalmark (*Calephelis nemesis*), sara orangetip (*Anthocharis sara*), white-lined Sphinx moth (*Sphinx Hyles lineata*), western tiger swallowtail (*Papilio rutulus*), and others.

Management Implications: Restoration success is generally measured by growth and cover of plant species. The establishment of complex fauna and species richness further illustrates the ecosystem benefits of restoration success and can be used as a secondary indicator to track successful restoration.

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pollinator diversity, wildlife biodiversity, measurement of Restoration success

## Joanna Tang **California Rapid Assessment Method: Using vernal pool CRAM to evaluate past restoration success & prioritize future restoration goals**

The California Rapid Assessment Method (CRAM) is a level 2 landscape quality surveying method. Wetlands are rated on their buffer/landscape context, hydrology, physical structure, and biotic structure. Certified practitioners are trained and calibrated such that CRAM scores are standardized throughout the state. This allows for state-wide comparisons and analysis of wetlands across sites, projects, and managers. Here, we present comparisons of CRAM scores for natural and restored vernal pool wetlands across the state. This allows us to assess how restoration projects compare to natural ecosystems, and also allows us to target specific regions or landscape metrics for future restoration.

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#cram #monitoring #vernalpools

## Joanna Tang **Long-term monitoring detects reinvasion in restored vernal pools**

Invasive species control is often limited in time and scope by funds and other resources. Does short-term management alone allow for self-sustaining native communities to persist, or do ecosystems become re-invaded after management ceases? We used a long-term monitoring dataset from a set of restored vernal pool wetlands in Santa Barbara to investigate the plant species abundance and diversity at varying times after intense weeding had ceased. The center of pools, where inundation duration is the longest, showed stable or even increasing native cover and no trends in exotic abundance over time. However, exotic cover and richness increased in the upland edges of the pools

over time, likely due to the encroachment of exotic grasses from the surrounding unrestored grassland. We also found that increasing exotic cover correlated with other abiotic conditions, like pool shape and location, that can potentially be manipulated in restoration planning to minimize invasion susceptibility. Our findings reveal the importance of ongoing monitoring and adaptive management to detect and prevent reinvasion. This suggests the need for long-term stewardship, i.e., reintroducing the indigenous world view of maintaining a longstanding relationship between humans and the land.

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Lisa Stratton [lisastratton@ucsb.edu](mailto:lisastratton@ucsb.edu)  
#monitoring #stewardship #vernalpools  
#survey123

### Sally Trnka **San Diego Ambrosia Translocation: A Three-Level Approach**

Translocation of a large population of San Diego ambrosia (*Ambrosia pumila*) located in Temecula was undertaken in December 2023/January 2024. Two salvage methods and three translocation methods were implemented as part of the translocation effort - collecting 1-gallon potted transplants to grow out at a nursery site as a contingency population for later out-planting; collecting 1-gallon transplants to immediately install into plots prepared at several receptor sites; and collecting soil mixed with ambrosia rhizomes and installing it at a prepared 0.5-acre receptor site. In order to maximize genetic diversity, all collections were spread out over the entirety of the donor population. This translocation effort will be maintained and monitored for 5 years.

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#SanDiegoAmbrosia #Translocation  
#SDAmbrosiaTranslocation  
#SensitiveSpeciesTranslocationMethods

### Alice Voulfson **Refining habitat**

### restoration guidance for Western Snowy Plover (*Charadrius nivosus nivosus*) nesting areas using multiple measures through time

The Pacific coast population of the Western Snowy Plover (*Charadrius nivosus nivosus*) is a threatened shorebird likely vulnerable to “coastal squeeze” from rising sea levels and, in many areas, impeded inland migration of their dune and sandy beach habitat. Current guidance for plovers related to vegetation and dune topography is being developed from fine scale vegetation species and debris composition as well as viewshed characteristics collected at plover nest sites at Vandenberg Space Force Base in southern California. Although it is the most extensive dataset available, there is a temporal mismatch between the nesting date and the date at which habitat characteristics are measured; nesting peaks in May—June and habitat data are typically collected in the Fall of the nesting year. We plan to collect the same habitat information in Monterey Bay but at standardized time intervals (i.e., during egg-laying, the day after hatch, and two or more months after hatch) to determine 1) to what degree measurements taken two or more months post-nesting are representative of nest site habitat collected when the nest was active and 2) to refine guidance for restoration practitioners on collecting and assessing habitat data.

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### Mike Walsh **Life in the Drawdown Zone: An Examination of Avian Nesting Ecology in a Southern California Reservoir**

In the context of the Los Angeles River watershed, flood control reservoirs function as an important novel habitat for riparian birds which have otherwise been displaced due to channelization and habitat

destruction. Although the nesting ecology of many Southern California birds are well understood in typical habitats, information on nesting birds within the drawdown zones of flood control reservoirs is lacking. Between 2019 and 2023, Biological Monitors working on the Devil's Gate Reservoir Restoration Project on the Arroyo Seco in Pasadena's Hahamongna Watershed Park performed daily nesting bird surveys. These surveys have yielded over 500 nests inside and adjacent to the project's 80-acre footprint. The Project Area straddles a reservoir drawdown zone and includes adjacent upland areas; this broad elevational gradient provides considerable variation in habitat. By comparing the nest elevation to reservoir water surface elevations each year, we examined patterns of nest establishment across the local suite of bird species in response to flood inundation. With a better understanding of how these habitats work for nesting birds, management decisions on restoration design and water level can begin to better reflect the ecological needs of nesting birds on the Arroyo Seco and across Southern California.

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#Arroyoseco #Losangelesriver  
#Leastbellsvireo #Birds

### Jade Woll **UC San Diego Ecological Reserve- Open Space Management in an Urban Setting**

UC San Diego's Ecological Reserve is preserved open space that contains the campus's most high-quality native habitats. Other open space preserves on campus consist of restoration lands, historic groves, and urban forest. The ecological preserve is offered the highest level of preservation on campus and serves as an important resource for teaching and research when appropriate. It is protected from development and maintained to support continued ecological function. These lands are located in four distinct parts of the campus: Scripps Institution of Oceanography, West Campus, East Campus, and University House/Beach

## Poster Session Beginning at 5:15p, May 9 @ Orton

Properties. The Ecological Reserve consists of habitat types, ranging from Diegan Coastal Sage Scrub to dense chaparral, grasslands, and wetlands. These habitats, unique to southern California, support many sensitive plants and animals. The health and integrity of these habitats are critical to ensure the survival of threatened and endangered species, some of which are present in our Ecological Reserve (e.g., coastal California gnatcatcher). The Ecological Reserve, like any natural area surrounded by urban development, faces many threats. Ongoing efforts by UC San Diego to actively restore disturbed areas include non-native species removals, unauthorized trail closures, native species plantings, erosion control, and litter removal. Additionally, restoration projects are implemented on an as-needed basis based on coordination and communication with the maintenance and monitoring contractor for the Ecological Reserve. Restoration projects range from native plant installation within areas dominated by non-native species to erosion control along severely scoured trails. These ongoing

maintenance and restoration efforts ensure that the health and longevity of these open space areas are preserved and maintained in perpetuity.

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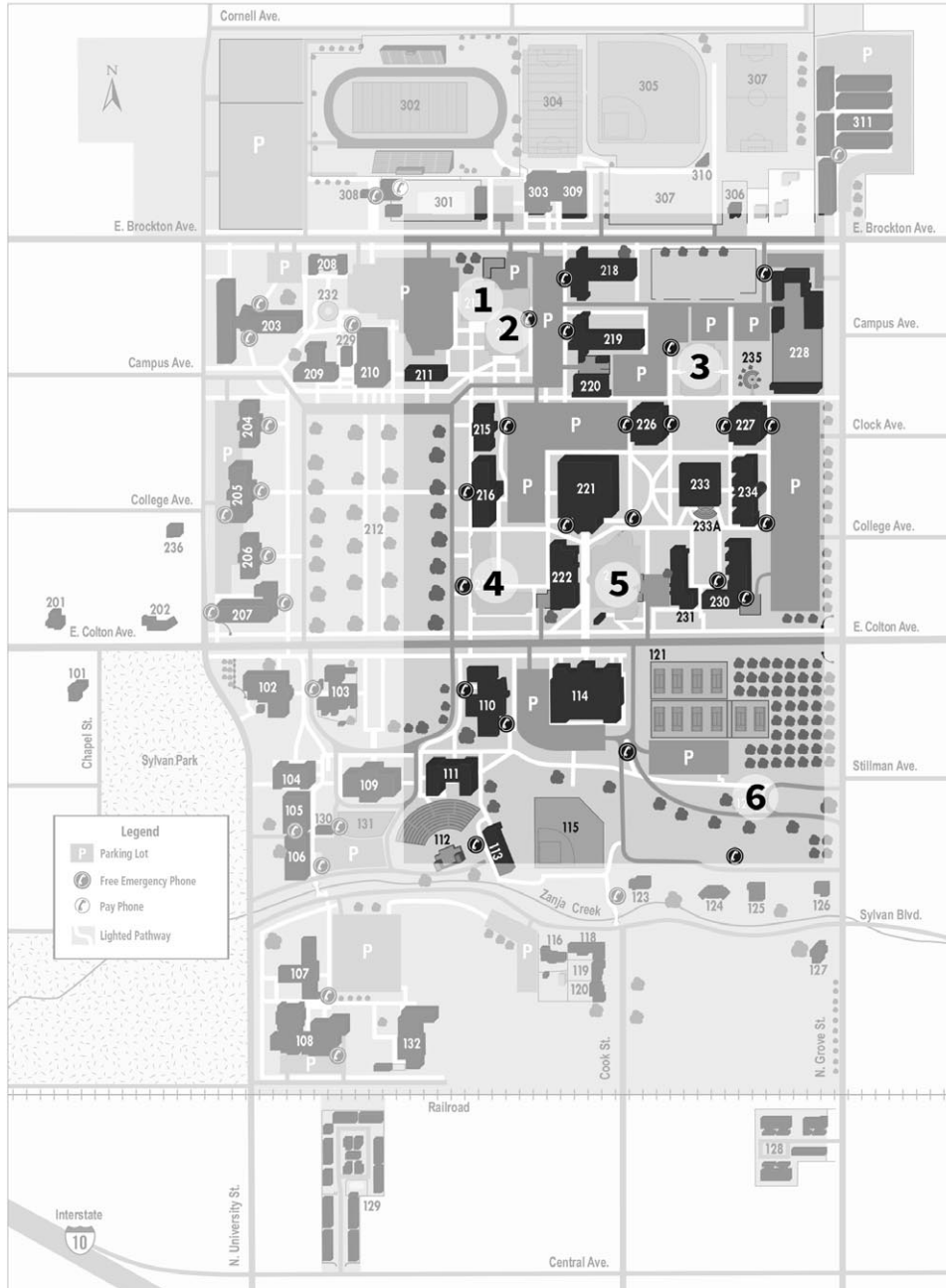
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# Welcome!

## We're Glad... ***YOU ARE HERE!***



### SERCAL 2024 at University of Redlands

- 1** Casa Loma Hall
- 2** Valencia Hall
- 3** Orton Center
- 4** Dorms
- 5** The Table
- 6** Alumni Center