Flowing

Growing

Knowing

Posters: Flowing, Growing, & Knowing

Photo by Monte Kawahara, BLM

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Our Dedicated Conference Team

Conference Chairs

Isaiah Thalmayer *Point Blue Conservation Science*
Ashley Zavagno *WRA, Inc.*

Diversity Chair: **Nina Omomo** *Literacy for Environmental Justice*

Session Leads: **Michelle Orr** *ESA* | **Stephanie Freed** *Ecosystem Investment Partners* | **Lindsay Teunis** *SWCA* | **Cara Clark** *Watsonville Wetlands Watch* | **Sierra Phillips** *UC Davis* | **Julia Michaels** *Hedgerow Farms* | **Taylor Akers** *CSU Sacramento* | **Jake Marcon** *Dudek* | **Mary Paul** *Elkhorn Slough* | **Nina Omomo** *Literacy for Environmental Justice* | **Barry Nerhus** *Endemic Environmental* | **Gregor-Fausto Siegmund** *Center for Adaptable Western Landscapes, Northern Arizona University; Southwest Biological Science Center, U.S. Geological Survey* | **Brad Hoge** *Nueva School* | **Jamie Kneitel** *CSU Sacramento* | **Michelle Stevens** *CSU Sacramento* | **Allegra Bukojemsky** *Westervelt* | **Rachel Davis** *UC Davis* | **Madeline Sides** *Carnegie Mellon* | **Joanna Tang** *UC Santa Barbara* | **Stephanie Ma Lucero** *UC Santa Barbara* | **Cassie Pinnell** *Vollmar Natural Lands Consulting* | **Rachel White** *Vollmar Natural Lands Consulting*

Room Chairs: **Ashley Zavagno** *WRA, Inc.* | **Brian Bartell** *Prunuske Chatham, Inc.* | **Kari Dupler** *RestorCap* | **JP Marie** *UC Davis* | **Rob Hobbs** *RECON Environmental*

Fieldtrip Leaders: **Stephanie Freed** *Ecosystem Partners* | **Julia Michaels** *Hedgerow Farms* | **Pat Reynolds** *Heritage Growers* | **JP Marie** *UC Davis* | **Mark Young** *Westervelt* | **Chad Aakre** *Westervelt*

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.

SERCAL 2023 Schedule at a Glance

Cultivating Connections

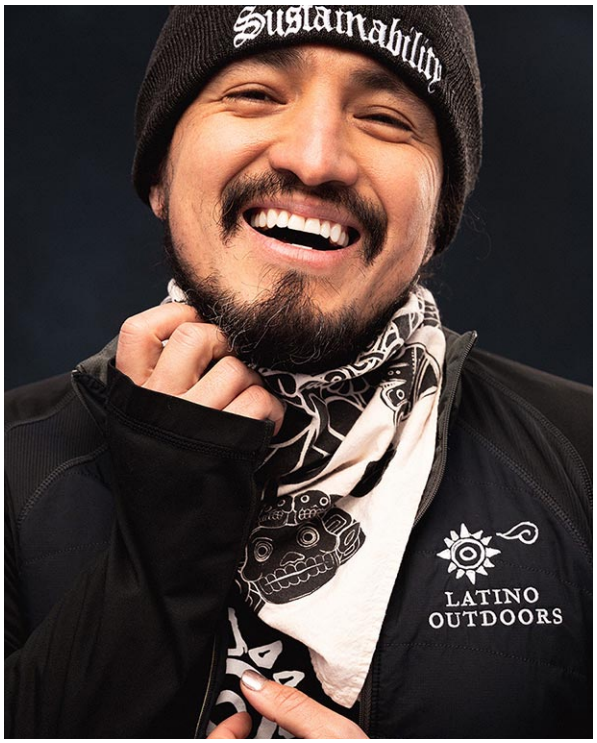
Please note: We will do our best to stick to the schedule or at least let you know if plans change.

	Flowing *Recorded / Livestream*	Growing *Recorded / Livestream*	Knowing *Recorded / Livestream*
THURSDAY 13 April: Day 1	*Daytime Fieldtrips (times TBA) followed by Nightime Celebrations!*		
5:00 – 8:30pm	**Opening Hosted Reception, Awards Presentations, and Keynotes**		
FRIDAY 14 April: Day 2	*Check–in and Hosted Breakfast beginning at 7:30a*		
8:30 – 10:00am	**Welcome, Announcements, and Keynotes**		
10:00 – 10:30am	Hosted Coffee Break		
10:30 – 12:15pm	**Living Shorelines**	**Securing Native Seed**	**Fostering Learning and Connection in Natural Spaces**
12:15 – 1:30pm	**Hosted Lunch and Career Panel**		
1:30 – 2:45pm	**Restoring Floodplains: Lookout Slough**	**What Lies Beneath: Connecting Above and Below Ground Communities**	**Dismantling Barriers**
2:45 – 3:10pm	Hosted Coffee Break		
3:10 – 4:45pm	**Restoring Floodplains: Let it Flow**	**Bridging Intentions and Outcomes in Species Restoration & Management**	**Listening to Traditional Ecological Knowledge**
4:45 – 6:30pm	**Poster Session & Hosted Reception**		
6:30 – 8:30pm	**Friday Night Film: Spotlight on Diversity**		
SATURDAY 15 April: Day 3	*Hosted Breakfast beginning at 7:30am*		
8:30 – 9:00am	**Plenary Presentation: Cutting the Green Tape**		
9:00 – 9.45am	**Open Mic**		
9:45 – 10:15am	Hosted Coffee Break		
10:15 – 12:00pm	**Restoring Floodplains: Thinking Outside the Channel**	**Managing Invasives: Tools in the Toolbox**	**Uplifting Urban Ecosystems**
12:00 – 1:30pm	**Hosted Lunch and Raffle Drawing**		
1:30 – 3:00pm	**Restoring Floodplains: Riparian Revegetation**	**Managing Invasives: Supporting Species Recovery**	**Thinking Outside the Box: New Approaches to to Current Challenges**
3:00 – 3:30pm	Hosted Coffee Break		
3:30 – 5:05pm	**Thinking Outside the Box: Stream Restoration**	**Growing Strong: Recovery, Diversity, and Resiliency in Vegetative Communities**	**Thinking Outside the Box: New Approaches to to Current Challenges**

Keynote Speakers: Thursday Evening

Dr. Earyn McGee

Dr. Earyn McGee received her BS in Biology from Howard University and a MS and PhD in Natural Resources from the University of Arizona. Dr. McGee is passionate about field research, herpetology, and social justice. This is reflected in her research which focuses on how drought affects lizards in arid environments and also how to increase the representation of African American women in natural resources careers. She is a NSF Bridge to Doctorate Fellow and a NSF GRFP Fellow. She has served her community as a Doris Duke Conservation Scholars graduate mentor, the Co-chair of her department's Inclusive Excellence committee, and as a science communicator. You can find her on Twitter and Instagram at **@Afro_Herper** where she runs a popular social media game called **#FindThatLizard**. Every week she sends out a photo of a lizard camouflaged in its natural environment to her 47k+ followers on Twitter and almost 20k followers on Instagram. Players then have four hours to **#FindThatLizard** before the location is revealed. Earyn uses this game as an opportunity to teach people about lizards and help them build a greater appreciation for these cool animals. Dr. McGee was also one of the co-organizers for the 2020 social media phenomena **#BlackBirdersWeek**. She has been recognized for her efforts as a Forbes 30 under 30 lister in 2020. In the fall of 2019 Dr. McGee was named an AAAS IF/THEN STEM Ambassador. As a part of this program, she has been able to share her work with a national audience. Including inside *Marie Claire* magazine, on Goldieblox's *Fast Forward Girl*s, and soon an episode on CBS's *Mission Unstoppable.* Dr. McGee and the other 124 Ambassadors have been honored with life sized statues as part of the **#IfThenSheCan** — The Exhibit program. She spent the summer of 2020 working for the *Las Vegas Review Journal* as an AAAS Mass Media Fellow. Her greatest accomplishment in this program was having her work was featured on the front page of the newspaper. One day Dr. McGee hopes to host a natural history TV show to teach people about animals and showcase Black, Indigenous, and other People of Color doing important conservation work.



José G. González

José G. González is the Founder of Latino Outdoors and Co-Founder of the Outdoorist Oath. He is a professional educator with training in the fields of education and conservation while engaging in different artistic endeavors with art and messaging—often exploring the intersection of the environment and culture. As a Partner in the Avarna Group and through his own consulting, his work focuses on Equity & Inclusion frameworks and practices in the environmental, outdoor, and conservation fields. He is also an illustrator and science communicator.

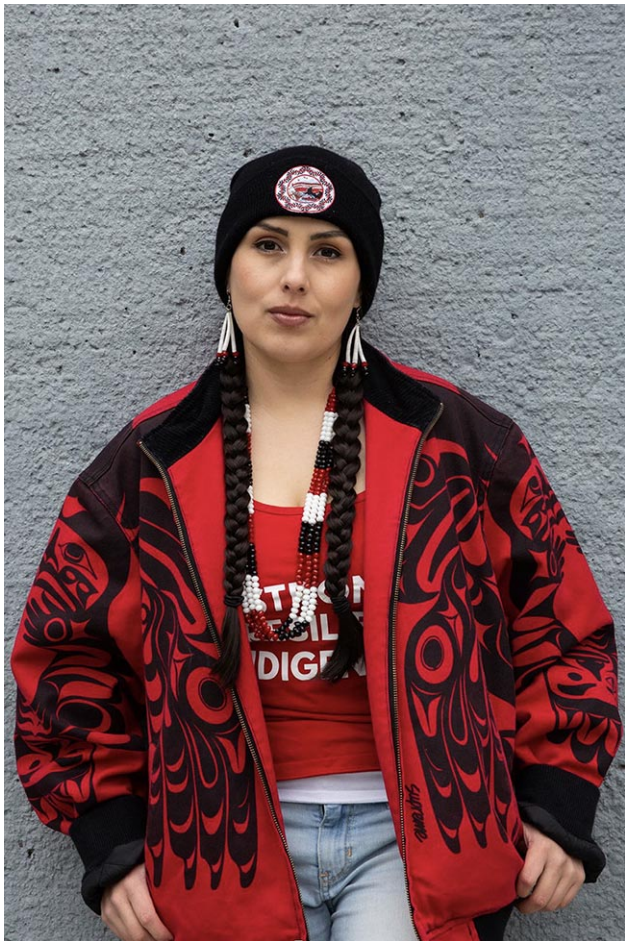
He received his B.A at the University of California, Davis, and his M.S at the University of Michigan School of Natural Resources & Environment. His teaching coursework was at the Bilingual, Multicultural, Education Department at Sacramento State.

He serves as a Trustee for the National Outdoor Leadership School, a Trustee for the National Recreation Foundation, and Outdoor Industry Association Board Director, among other such leadership volunteer roles.

You can connect with him on social media **@JoseBilingue**. Puns welcomed.

Keynote Speakers: Friday Morning

Brook M Thompson



Brook Thompson (She/Her/They) is a Yurok and Karuk Native from Northern California. Growing up she lived and fished on the same land that her ancestors have been on since time immemorial. Brook fights for water and Native American rights through public speaking, academic research, and frontline activism. She has been an intern for the City of Portland's Bureau of Environmental Services, the Senate Committee on Indian Affairs in D.C., the California State Water Resource Control Board Office of Information Management, Save California Salmon, and currently works as a Restoration Engineer for the Yurok Tribe's fisheries Design and Construction Program. In 2017 Brook was awarded the American Indian Graduate Center's Undergraduate student of the year and in 2020 she won Unity's 25 Under 25 award, and in 2022 was accepted into the Water Solution Network. Brook is a graduate of Portland State University with a Bachelor of Science in civil engineering with a minor in political science and a master's in environmental engineering at Stanford University and is now attending UC Santa Cruz for a Ph.D. in environmental studies where she studies how Indigenous Knowledge can be better implemented to into California water policy. Thompson's goal is to bring together water rights and Native American knowledge through engineering, public policy, and social action.

You can find her at **BrookMThompson.com** or on Instagram at **brook_m_thompson**.

Nailah Pope-Harden

Nailah (nah-EE-lah) is the Executive Director of ClimatePlan. In her role at ClimatePlan, she is responsible for expanding the network presence, cultivating new members, and ensuring the mission and vision of the organization are being carried out. She comes to this position with years of community organizing and coalitions building experience that spans neighborhood, regional, state, and national social justice campaigns. The through-line in Nailah's personal and professional life is always ensuring her son has a healthy, safe, loving environment and future. She does this by building community everywhere she goes, learning from those around her, and being open to (transformative) change. Nailah is located in Sacramento. **nailah@climateplanca.org**.

Nailah first came into SERCAL's radar when we heard about the Morrison Creek Revitalization Project and watched her presentation, *Equity is Not Salt; We Need to Add Spice.* From there, we hired her to conduct a series of DEI workshops for the Board of Directors, and she presented during our SERCAL 2021 session on Diversity, Equity, and Inclusion. Needless to say, we are huge fans of Nailah!

Keynote Speakers: Saturday Morning

Brad Henderson is CDFW's Cutting the Green Tape statewide Program Manager. Brad has spent his career as a restoration planner, practitioner, permitter, and partner, including restoring pinyon pine and Joshua tree woodlands, riparian and wetland habitats, and restoration planning for the Klamath Dams removal project. In 2004, Brad's backyard habitat restoration project was featured on the PBS television show, *California's Green*. Through CDFW's Cutting the Green Tape Program, Brad is advancing restoration projects throughout the state to make restoration a new way of life in California.

Jen Olson is the Statewide Restoration Permitting Coordinator for CDFW's Cutting the Green Tape Initiative. She started her career as a field ornithologist working on songbird research projects across the western U.S. and abroad. Since moving to California in 2012, she has served in a variety of environmental review and permitting roles at CDFW. She is grateful to be able to use her regulatory knowledge to increase the pace and scale of restoration in her adopted home state. In her free time, Jen enjoys birding, running, and backpacking with her standard poodle, Dipper.

Cutting the Green Tape at CDFW

Brad Henderson and Jen Olson

The California Department of Fish and Wildlife (CDFW) is implementing a new statewide Cutting the Green Tape (CGT) program focusing on developing procedures and tools designed to improve its restoration granting and permitting activities. The State of California has identified Cutting Green Tape as a priority initiative to increase the pace and scale of ecological restoration, conservation, climate adaptation, and stewardship. Within the California Natural Resources Agency (CNRA), the Cutting Green Tape Initiative is focused on improving regulatory processes and policies so that ecological restoration and stewardship can occur more quickly, simply, and cost-effectively. CDFW's CGT program also supports and complements CNRA's "30 x 30" initiative, a commitment to conserve 30 percent of California's lands and coastal waters by 2030.

Throughout its first full year, the CGT program developed and employed new restoration tools and efficiencies across the state. The CGT restoration permitting strike team (CGT Strike Team) is hard at work, matching restoration projects with the most efficient permitting tools. CDFW has funded, permitted, or assisted with CEQA exemptions for over 146 projects leading to approximately 134,515 acres and 103 stream miles of restoration, saving an estimated $1,552,600 dollars. CDFW will provide an overview of the CGT program's organization and structure followed by a review of its new restoration permitting tools, the new CEQA statutory exemption, and how the CGT Strike Team is engaging in the restoration granting process. We will share case studies for a selection of the diverse restoration projects that we have assisted. Restoration practitioners will learn who we are, what we do, and how to connect with us.

Thank you for being a part of this WATERSHED event and we hope to see you next year… in Riverside!

SERCAL 2023 Leadership Team

Cassie Pinnell, President
Geoff Smick, Treasurer
Will Spangler, Secretary
Allegra Bukojemsky
Ashley Zavagno
Brian Bartell
Chelsea Palisoc
Cindy Thompson
Isaiah Thalmayer
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James Mizoguchi
Jeannine Ross
Kari Dupler
Lindsay Teunis
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!

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.

Friday 14 April Sessions

FLOWING

Living Shorelines

Innovating Living Shorelines: Employing Green and Gray Strategies in Design for Resilience Shorelines Sarah Moos Thompson

Invitation to the Shoreline: Ecological Restoration and Public Access Ingrid Morken and Russell Prange

Tiscornia Marsh: Nature-based Sea Level Rise Adaptation in the Canal Community Ann Borgonovo

Heron's Head Park Shoreline: Demonstrating a Nature-based Approach to Protect Eroding Coastal Habitats Eddie Divita

Living Shorelines: an engineer's perspective on green strategies for resilient shorelines Michelle Orr

Regionally Advancing Living Shorelines in San Francisco Bay: AKA We're Stronger Together Marilyn Latta

Lunch

Restoring Floodplains: Lookout Slough

Overview of a multi-benefit tidal habitat restoration and flood improvement project in the Delta Stephanie Freed

Numerical Modeling to Support Multiple Benefits — Lookout Slough Tidal Habitat Restoration and Flood Improvement Project John Pritchard

Giant gartersnake historical habitat design and conservation measures at Lookout Slough, a multi-benefit restoration project Patricia Valcarcel

Contractor Engagement — Alternative Contract Delivery Methods for Habitat Restoration Projects Peter Smith

Mid-Afternoon Break

GROWING

Securing Native Seed

Regretably, this session was not recorded because of the chaos with zoom

Production of Source Identified Native Seed for Habitat Restoration at Heritage Growers — A Restoration Seed and Nursery Supplier Program of River Partners Pat Reynolds

Partnering to Ensure Native Seed Quality for Restoration Julia Michaels, Ph.D., and Alexander B. Mkandawire, Ph.D

Building the supply of native plant materials to support restoration and landscape change in the era of SGMA Doug Iten

Growing together: How the Orange County Native Seed Partnership is working to improve access to native plant materials in Southern California Matt Major

Increasing Commercial Availability of Early Emerging Species for Monarch Butterflies Michele Ranieri

Lunch

What Lies Beneath: Connecting Above and Below Ground Communities

Soil fungi respond to prescribed fire and mechanical thinning Taylor Akers

Fire and Fire Surrogate Effect on Soil Exoenzymes of Western Sierra Mixed Coniferous Forest Kalen Edwards

Effect of Nitrogen Availability on Early Development in a Native and Invasive Forb Timothy Chen

Effects of herbicide treatment on European beachgrass decomposition Savannah Fuqua

What does it mean to be a 'host plant'? Wolfgang Schweigkofler

Mid-Afternoon Break

KNOWING

Fostering Learning and Connection in Natural Spaces

The Inspirational Power of Ecological Art to Foster a Sense of Home Kelsi Anderson

The Native "Landscape": Creating native gardens that are connected, beautiful and, most importantly, alive! Patrick Montgomery

Regenerating a degraded park connects a community to Southern California's native biodiversity Jennifer Zell

Studying ecological responses to conservation grazing using a student-centered teaching & research approach Yamina Pressler

Prairie Restoration on School Campuses Brad Hoge

Revitalizing Communities by Restoring Ecosystems: STRAW (Students and Teachers Restoring a Watershed) 30 Years of Learning and Growth Alison Pollack *(regrettably, the recording of this presentation was lost)*

Climate Change and California Youth: Partnerships of the Next Generation Allie Dumas and Nyah Sadler

Lunch

Dismantling Barriers

Dismantling Barriers: Pathways to Entry in the Field of Natural Resource Conservation Christopher Gardner and Jennifer Neale

Applying a Racial Equity Lens to Trout Stocking Richard Muñoz and Haya Johnson

Fulbright Scholar Program: What you need to know! Jamie Kneitel

Serve or Partner with the California Conservation Corps Watershed Stewards Program in partnership with AmeriCorps Jody Weseman and Jason Lopiccolo

Mid-Afternoon Break

Friday 14 April Sessions

FLOWING

Restoring Floodplains: Let it Flow

Environmental Flows for All Rivers in California Samuel Sandoval Solis

Long-term Flow Regulation in a Semi-arid River Results in Landscape-scale Biophysical Changes Clancy McConnell

Damn that Dam: Restoring the Lower Otay River Floodplain while Considering Onsite Constraints and a (Mostly) No-Release Dam Lindsay Teunis and Alice McKee

Floodplain restoration incorporating a novel water control structure Mike Davis

GROWING

Bridging Intentions

Multi-Scale Endangered Plant Introduction Planning: Using Habitat Characterization and Species Distribution Modeling for Endangered Plant Introduction Jake Marcon

A collaborative approach to develop restoration guidelines for the salt marsh harvest mouse Katie Smith

Assessment of Native Turtle Habitat Use After Tidal Restoration Melissa Riley

Tecopa Hot Springs Wetland Restoration Project Mark Brandi, Charlotte Soergel, and Erich Schickenberg

Long-term Vegetation Changes following Wet Meadow Restoration Kristen M. Kaczynski

KNOWING

Listening to Traditional Ecological Knowledge

Eco-Cultural Restoration: Traditional Ecological Knowledge and Western Ecological Knowledge in a Novel and Highly Disturbed Urban Corridor Michelle Stevens

Acorn is Medicine, Restoring Reciprocal Relationships with Black Oaks and People Irene Vasquez

Oak and Elderberry Agroforestry Project at the American River Ranch Charles McClain

Career Panel

How to Successfully Work with Local Tribes on Restoration Projects

New SERCAL Webinar coming later this Spring (date TBA):

Prioritizing culvert replacement for fish passage and wildlife connectivity

Over the past decades scientists and policymakers have recognized the importance of removing or replacing culverts and other infrastructure that restrict passage of salmon and other native fish into high quality spawning and rearing habitat present in upstream reaches and tributaries. Scientists have also recognized the importance of roads and highways as barriers to wildlife movement and the contribution of transportation infrastructure to habitat fragmentation. Habitat fragmentation decreases access to key resources, leads to genetic isolation, and reduces the ability of species to adapt to changing conditions and climate change. Additionally, wildlife-vehicle collisions cause direct injury and mortality to both wildlife and humans constituting an important conservation and public safety issue. However, the challenges and potential solutions surrounding human infrastructure and aquatic and terrestrial connectivity have rarely been combined.

This webinar will provide an overview of these issues and will demonstrate approaches for multi-factor prioritization of fish barrier removal for improving access for salmon, increasing wildlife connectivity and decreasing wildlife and human injury and mortality, and providing integrated cost-effective improvements for transportation infrastructure.

Instructors: Laura McMullen, Shannon Crossen, Kevin MacKay

Saturday 15 April Sessions

FLOWING

Restoring Floodplains: Thinking Outside the Channel

Floodplains Reimagined: Landscape-scale Ecological Floodplain Enhancement Jenna Duffin

Restoring Seasonally Inundated Floodplains: Design, Implementation and Monitoring of the Lower American River Salmonid Habitat Enhancement Improvement Program Evan Pesut

Sugar Pine Floodplain: Restoring the Floodplain to Save a Historic Bridge Erin Dickman

Ecological restoration of a natural floodplain along Watsonville Slough Cara Clark

Stage Zero Restoration Design in the Petaluma River Watershed Joan Schwan and Carrie Lukacic

Van Norden Meadow: Restoring climate resilient headwater habitat in the Sierra Nevada Alecia Weisman

Lunch

Restoring Floodplains: Riparian Revegetation

Riparian Planting and Natural Recruitment: Understanding the Connections Danielle Conway and Bobbie Flores

Cottonwood Seedling Recruitment: Development and Application of a Mechanistic Model Sierra Phillips

Can cottonwood establishment locations on a dynamic, regulated river be accurately predicted? Rachel Wright

Panorama Vista Preserve, Kern River: 14 years of habitat restoration Anna Talken

Adaptive management of riparian restoration at Dos Rios Ranch Preserve Sarah Gaffney

Mid-Afternoon Break

GROWING

Managing Invasives: Tools in the Toolbox

Integrated Pest Management (IPM) to control invasive plants in a vernal pool-grassland complex Jasmine Rios

Vegetation Management Dawn Cunningham

Lingering legacy effects of invasion and restoration complicate coastal dune ecosystem restoration Lorraine S. Parsons

Prescribed fire for Medusa Head (Elymus caput-medusae) control and impacts to species composition in an invaded CA Grassland Jason M. Mills

Restoration strategies following eucalyptus removal Mary Paul and Andrea Woolfolk

Building a Living Shoreline in San Francisco's Heron's Head Park Nina Omomo, Eliz Ismailoglu, and Alijah Mestayerorallo

Lunch

Managing Invasives: Supporting Species Recovery

***Arundo* may be silent killer of pond turtle populations** Barry Nerhus

Thatch Management Using Mowing and Grazing to Benefit the Behren's Endangered Butterfly (*Speyeria zerene behrensii*), Manchester, California, USA Terra Fuller

Worth the Fight: Urban Preserve Management Angie Harbin

Progress in tidal marsh restoration by The San Francisco Estuary Invasive Spartina Project (ISP) Tobias Rohmer and Jeanne Hammond

Mid-Afternoon Break

KNOWING

Uplifting Urban Ecosystems

Ecology for Health: Linking biodiversity actions to human health in cities Bronwen Stanford and Jenny Symonds

Redefining Restoration Realms: Can urban gardens function as ecological restoration sites? Lara Hsia and Rachel Davis

Experimental Investigation of the Social and Ecological Effects of a Green Roof Environment on California Grassland Plants Summer Santich and Natan Euol

Grants for Restoring Urban Streams Esther Tracy

Opportunities in Ecologic Restoration — Helping Humans and the Ecosystem Andrew Smith

Berkshire Creek Rehabilitation Project Brent P. Maue, PE, and Marc T. Blain

Lunch

Thinking Outside the Box: New Approaches to Current Challenges, Part 1

Transition Design: Design thinking for Ecological Restoration Madeline Sides

A Multi-Faceted Approach to Reducing Catastrophic Wildfire in California Angela Chongpinitchai

Cutting the Green Tape: Benefits and Outcomes of the Restoration Management Permit Program – A Case Study from Malakoff Diggins State Park Geoff Smick and Leigh Patterson

Developing a Comprehensive Cross Border Resource Conservation and Management Program on the San Diego/Tijuana International Border Christina Schaefer,Clayton Tschudy, and Teddy Cruz

Mid-Afternoon Break

Saturday 15 April Sessions

FLOWING

Thinking Outside the Channel: Stream Restoration

Filling Conservation Gaps: Stream Restoration as Infrastructure on Private Lands Jonathan Snapp-Cook

River Architect software to help assess and design river and floodplain restoration Gregory B. Pasternack

Predation reduction as a potential juvenile salmonid habitat restoration strategy in Central Valley rivers Avery Scherer and Rocko Brown

Using Horsepower to Remove Debris and Invasive Vegetation, Steelhead Creek, City of Sacramento, California Roland H. Brady, III and Crystal Tobias

GROWING

Growing Strong: Recovery, Diversity and Resiliency in Vegetative Communities

Environmental controls on plant regeneration in drylands: a systematic review protocol Gregor-Fausto Siegmund *(regrettably, the recording of this presentation is not available)*

Drill-seeding for large-seeded species Alex Palmerlee

Utilizing Native Seed to "Fill the Gaps" in Ecological Restoration Cameron Yackly

Daylighting Streams: Restoring stream channels by removing legacy logging roads in Redwood National Park Elijah Severson

Boost Biodiversity with Traditional Methods: Restoration Insights from the Kumeyaay People of San Diego Katy Chappaz

Long-term Vegetation Changes following Wet Meadow Restoration Kristen M. Kaczynski

KNOWING

Thinking Outside the Box: New Approaches to Current Challenges, Part 2

Calculating Least Bell's vireo credits for the Otay River Mitigation Bank Project Courtney Casey

New Statewide Tools to Accelerate Aquatic Habitat Restoration Permitting Stephanie Falzone

Determining Revegetation Success — Comparing Multispectral UAV Analysis to Traditional Field Transect Data Collection Sundaran Gillespie

Digitizing the Workflow: Why I NEVER print datasheets Robert Fitch

What's the easiest way to take data? Survey123! Joanna Tang and Stephanie Ma Lucero


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Living Shorelines

Session Lead: Michelle Orr, ESA *Listed in order of presentation*

Friday 10:30a – 12:15p with 15 minutes Q&A of for all presenters at the end

10:30 **Innovating Living Shorelines: Employing Green and Gray Strategies in Design for Resilience Shorelines** Sarah Moos Thompson

Living shorelines present a unique opportunity to address aspects of sea level rise, flooding, and widespread habitat loss, but they need to be tested and used more broadly to advance the science and potential that they offer. Landscape architecture is at the nexus of ecology and design, and the discipline offers a unique opportunity for cross-disciplinary collaboration to advance living shoreline experimentation and implementation. Presented from a landscape architect's perspective, this talk will describe the unique ways landscape architects are planning and designing for living shorelines as key components of urban waterfront projects. It will draw from San Francisco Bay Area projects to highlight opportunities to collaborate across disciplines, methods to integrate living shorelines early-on in the planning and design process, and strategies to leverage resourcing from development projects for living shoreline design and implementation. And it will inform about new, innovative models for a resilient natural systems approach using gray and green coastlines that promote shoreline protection and biodiversity preservation in the face of changing climate conditions.

Sarah Moos Thompson,
smoos@bioniclandscape.com

#livingshorelines, #landscapearchitecture, #sanfranciscobayarea

10:40 **Invitation to the Shoreline: Ecological Restoration and Public Access** Ingrid Morken and Russell Prange

The planning and design of shoreline and tidal marsh restoration projects in urban environments must take into consideration several complex factors, including dynamic natural processes, protection of endangered species and sensitive wetland communities, climate adaptation strategies, and equitable public access. In this presentation, we will cover some of the challenges and rewards of shoreline restoration and public access improvement projects in the San Francisco Bay Area, including those which affect historically underserved communities. Our case studies demonstrate how shoreline restoration projects can provide new opportunities for communities to experience and learn about ecosystems such as tidal marshes and dunes, plan for tidal marsh migration and protection of trails and facilities under sea level rise, define a sense of place connected to the natural environment, and foster the next generation of outdoor enthusiasts who will steward these ecological havens in years to come.

Ingrid Morken[1] and Russell Prange[2], WRA, Inc. [1]Sr. Landscape Architect, morken@wra-ca.com [2]Sr. Landscape Architect, prange@wra-ca.com

#tidal marsh restoration, #public access, #sea level rise adaption

10:50 **Tiscornia Marsh: Nature-based Sea Level Rise Adaptation in the Canal Community** Ann Borgonovo

Marin Audubon Society and the City of San Rafael are undertaking the Tiscornia Marsh Habitat Restoration and Sea Level Rise Adaptation Project, with support from Multicultural Center of Marin and Environmental Science Associates. This project is designing innovative, nature-based defenses against sea level rise, to help protect San Rafael's Canal community, one of Marin County's most underserved and vulnerable regions.

The Project site, which includes Pickleweed Park, the Albert J. Boro Community Center, and the adjacent Tiscornia Marsh, is located at the confluence of San Rafael Creek and San Rafael Bay. This Project seeks to address two main site conditions that are expected to worsen in the coming decades as sea level rises.

First, the low-lying Canal neighborhood adjacent to Project Site is currently at risk of coastal flooding, as it occupies what was once tidal marshlands and open bay. The area is currently in the 100-year floodplain and will be increasingly susceptible to flood hazards as sea level rises. The neighborhood is partially protected from coastal flooding by the unaccredited shoreline levee; some of the lowest portions of which are located within the Project site.

In addition, the 8-acre Tiscornia Marsh has experienced considerable erosion over the past 30 years, retreating as much as 200 feet, with approximately three acres lost. This erosion has resulted in a significant loss of habitat for the endangered Ridgway's rail and salt marsh harvest mouse, migratory shorebirds, and other important marsh wildlife. The habitat impacts of the marsh loss are exacerbated by the current lack of a functional wetland-upland transition along the marsh's landward boundary.

The goals of the Proposed Project are to enhance the ecological function of the Tiscornia Marsh property, increase flood protection for the Canal neighborhood, and to enhance community involvement and learning. The Project is being designed as a Demonstration Project which will showcase four nature-based sea level rise adaptation strategies being promoted in San Francisco Bay. (1) The Project will restore Tiscornia Marsh to its 1950s-era extent by beneficially reusing dredged material from local sources. (2) A gravel beach will be constructed along the bayside edge of the restored marsh to resist future erosion. (3) Tidal action would also be restored to the City-owned diked marsh at the north end of Pickleweed Park. (4) The Project will also raise 1,700 feet of existing shoreline levee to improve flood protection and public access, incorporating

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a gently-sloped ecotone to enhance the adjacent marsh habitat.

Community engagement and participation have been integral to the Project since its inception. The Project includes opportunities for youth to explore sea level rise, learn about the potential impacts on their communities, and promote youth participation by documenting changes in the current living shorelines. Under the leadership of Multicultural Center of Marin, the Project team has conducted public outreach to educate the adjacent communities about sea level rise and the use of nature-based adaptation solutions. The new Resilience Team consists of Canal community members who are being trained to expand and amplify public education services. The Project team has encouraged public participation and input throughout the planning, CEQA documentation and design phases through public meetings, field trips and radio programs. Additional community participation will be encouraged during implementation through volunteer planting events.

Ann Borgonovo[1] and Stephanie Bishop[2], ESA. [1]ABorgonovo@esassoc.com [2]SBishop@esassoc.com

11:10 **Heron's Head Park Shoreline: Demonstrating a Nature-based Approach to Protect Eroding Coastal Habitats** Eddie Divita

Heron's Head Park is a 21-acre peninsula in San Francisco, California, featuring seven acres of tidal marsh and ponds, and 14 acres of public open space. The Park's construction in the late 1990s transformed a blighted legacy fill area in the Bay into a valuable natural and community resource. Owned and managed by the Port of San Francisco, the park is a highly valued resource for both wildlife and people: it is home to or visited by over 100 species of migratory and resident birds, two endangered species, and enjoyed by thousands of San Francisco Bay Area residents annually. However, since construction of the park, the shoreline at Heron's Head Park has experienced subsidence, erosion from wind-waves and boat wakes, and in the most impacted area, erosion had caused the shoreline to retreat by up to 50 feet since 1999 (~2.5ft/year), threatening valuable tidal marsh and tidal pond habitats.

The Heron's Head Park Shoreline Resilience Project began in 2017 to study nature-based approaches to protect and enhance the shoreline habitats. Environmental Science Associates (ESA) developed a project design based around the creation of a 1,600-foot long coarse gravel beach, and also including nearshore oyster reefs, rocky headlands, wood habitat structures, and native planting. The project planning, design and construction was supported by a broad team of technical experts, community organizations, and public agencies.

The project offers a case study highlighting the challenges and opportunities for applying nature-based shoreline protection and habitat enhancement. ESA's design engineers and biologists will present an overview of the process to take the project from concept through construction, highlighting the importance of a collaborative multi-disciplinary team supported by engaged project partners to create a successful project. The presentation will also include lessons learned during construction and initial observations from Year 0 and Year 1 post-construction monitoring.

Eddie Divita[1] and Leonard Liu[2], ESA. [1]edivita@esassoc.com [2]lliu@esassoc.com

#NatureBasedSolutions, #HeronsHeadPark, @ESAssoc, @SFPort

11:30 **Living Shorelines: an engineer's perspective on green strategies for resilient shorelines** Michelle Orr

With a changing climate and widespread habitat loss there's a lot of interest in implementing living shorelines such as marshes, beaches, and sand dunes. Recently, there's been great progress in communicating the benefits of living shorelines, and building public support. Yet obstacles remain related to a lack of understanding of where living shorelines are appropriate and what types of flood reduction and erosion benefits are provided. This talk will describe ways that living shorelines provide natural-infrastructure benefits so they can be proposed in the right places for the right reasons. I'll also discuss the importance of physical and biological processes in living shoreline design, drawing on examples from projects that have been implemented or planned in the San Francisco Bay area.

Michelle Orr, ESA. morr@esassoc.com

#livingshorelines, #naturalinfrastructure, #engineeringwithnature

11:40 **Regionally Advancing Living Shorelines in San Francisco Bay: AKA We're Stronger Together** Marilyn Latta

Living Shoreline Projects have increased substantially in the last decade in California, a region which is still in a capacity-building stage with designing approaches that are effective with Pacific coast habitats, wave conditions, tidal exchange, and regulatory requirements. The CA State Coastal Conservancy, San Francisco Estuary Institute, Smithsonian, San Francisco State University, and many other community, academic and resource agency partners are engaged in several demonstration projects that are generating innovative data on these nature-based shoreline restoration approaches in SF Bay and CA. Project designs link sound science into regional management actions, include testing and monitoring experimental methods in the bay, and provide a model for others to get involved. Project manager Marilyn Latta will briefly share key results from demonstration projects 2012-2022 and describe robust monitoring that led to identifying best

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practices and lessons learned that have been integrated into ongoing projects and new projects. With accelerating sea level rise and other climate changes, we see an urgent need to provide a catalyst for others to take on similar demonstration projects and to grow the expertise and capabilities of partners at all phases. This rapid capacity-building will require forming diverse collaborative partnerships and will be critical to scaling up living shoreline projects that can effectively contribute to regional climate adaptation. The team of practitioners working together are now planning to build on the last decade of work and work with ten landowning partners in the Central SF Bay, to draft new Regional Design and Constructability Guidance, develop a programmatic permitting approach, and coordinate on design planning for 10 sites as a suite of projects to regionally advance high-quality living shorelines. This approach to scale up and transfer design and construction knowledge thoughtfully into a linked set of permitted projects, versus designing and constructing each one separately project site by project site, will reduce years of effort and better match the urgency of climate change impacts.

Marilyn Latta[1] and Jeremy Lowe[2]. [1]CA State Coastal Conservancy, marilyn.latta@scc.ca.gov [2]San Francisco Estuary Institute

#living shorelines, #subtidal restoration, #programmatic permitting, #regional collaborative planning

Restoring Floodplains: Lookout Slough

Session Lead: Stephanie Freed, Ecosystem Investment Partners *Listed in order of presentation*

Friday 1:30p – 2:45p with 25 minutes Q&A of for all presenters at the end

1:30 **Overview of a multi-benefit tidal habitat restoration and flood improvement project in the Delta** Stephanie Freed

The multi-benefit Lookout Slough Tidal Habitat Restoration and Flood Improvement Project will restore over 3,100 acres of freshwater tidal wetland habitat for the California Department of Water Resources within the Cache Slough Complex and increase the flood conveyance capacity of the lower Yolo Bypass. The project provides design elements for multiple species not limited to Delta smelt, longfin smelt, steelhead, salmon, sturgeon, and giant garter snake. Habitat design was a collaboration between species experts, agency personnel, the project design team, and a restoration general contractor, to incorporate both aquatic and terrestrial habitat elements for species needs while meeting project goals for habitat mitigation crediting and flood risk reduction and planning for constructability efficiencies of this large-scale restoration project. The presentation will cover an overview of the project goals, major design elements, considerations in balancing trade-offs between multiple objectives, and managing for design uncertainties. The project is currently in its second year of construction and is anticipated to be completed in fall of 2024.

Stephanie Freed, stephanie@ecosystempartners.com

#floodplain restoration, #multi-benefit project

1:40 **Numerical Modeling to Support Multiple Benefits — Lookout Slough Tidal Habitat Restoration and Flood Improvement Project** John Pritchard

3,100 acres of natural freshwater tidal marsh in the Cache Slough Complex in the northern Sacramento-San Joaquin Delta and increase the regional flood conveyance capacity of the Yolo Bypass by constructing three miles of new setback levee. Currently under construction, the Project is being funded by DWR to mitigate impacts to Delta Smelt and other aquatic species resulting from operation of the Central Valley Project and State Water Project, while also increasing the flood conveyance capacity of the Yolo Bypass in a manner that is consistent with the Central Valley Flood Protection Plan and DWR's 2017 Sacramento Basin-Wide Feasibility Study. In addition to lowering flood stages in the Yolo Bypass, the Project will create creditable acres for Delta Smelt that will satisfy DWR's obligations under the USFWS Delta Smelt Biological Opinion (BiOp) and salmonids under the Salmonid BiOp.

This presentation will briefly summarize some of the numerical and geospatial modeling tools developed by EIP's Project Delivery Team to assess fundamental high- and low-flow dynamics within the vicinity of the site, and methods used to characterize uncertainty and risk associated with the alternation of the State-Federal Project. The talk will include a brief discussion of the types of design trade-offs that are sometimes required to align multiple objectives to develop a preferred project design.

John Pritchard, jpritchard@esassoc.com

#floodplain restoration, #multi-benefit project

continued

Restoring Floodplains: Lookout Slough *Friday 1:30p – 2:45p*

FLOWING

2:00 **Giant gartersnake historical habitat design and conservation measures at Lookout Slough, a multi-benefit restoration project** Patricia Valcarcel

Many endangered species live in extremely altered habitat and historical habitat may only be known through written descriptions of landscapes prior to alteration. Restoring habitat for species in these situations can be difficult when there are unknowns and consensus on design is needed to ensure habitat elements for listed species. California's Central Valley is reflective of this situation where the vast expanse of wetlands has been levied and converted to agriculture and development. Lookout Slough, a large-scale multi-benefit restoration project for fish habitat and flood protection would create tidal wetland habitat reflective of historical conditions. The project provides a great opportunity to include design elements for the semi-aquatic giant gartersnake (*Thamnophis gigas*), a threatened species endemic to the Central Valley. Habitat design was a collaboration between species experts, agency personnel, and the project design team to incorporate both aquatic and terrestrial habitat elements for the snake while still meeting project goals for fish restoration credits. Habitat design was adjusted to reduce snake winter refugia flood risk. An overview of the project and processes to address design uncertainty for snake habitat and the value of working with the Contractor in the permitting phase to ensure avoidance and minimization measures are feasible is provided.

Patricia Valcarcel, valcarcel@wra-ca.com

#floodplain restoration, #multi-benefit project

2:20 **Contractor Engagement — Alternative Contract Delivery Methods for Habitat Restoration Projects** Peter Smith

Alternative project delivery methods that allow Contractor engagement early in the project development process, such as Construction Manager General Contractor (CMGC), can often facilitate a more flexible and efficient approach to project delivery. The CMGC method is characterized by the close collaboration between the construction manager (CM) and the general contractor (GC) throughout the project lifecycle and is particularly well-suited for habitat restoration projects due to the complex nature of the work and the need for specialized expertise. Application of this project delivery method for the Lookout Slough Tidal Habitat Restoration and Flood Improvement Project will be covered.

The CM and GC work together to identify and mitigate potential issues early on in the project, the CM is able to provide valuable input on the design and construction of the project, and it allows for a more collaborative approach to project delivery which can lead to cost savings and improved project outcomes.

Overall, the CM and GC collaboratively work together while considering the needs of all stakeholders in order which leads to a more successful project, with greater community buy-in and support.

Peter Smith, p.smith@hanfordarc.com

#floodplain restoration, #multi-benefit project, #construction

Restoring Floodplains — Let it Flow

Session Lead: Lindsay Teunis, SWCA *Listed in order of presentation*

Friday 3:10p – 4:45p with 15 minutes Q&A of for all presenters at the end

3:10 **Environmental Flows for All Rivers in California** Samuel Sandoval Solis

This conversation discuss how rivers in California naturally used to flow (natural streamflow classes). Then, a statewide survey was performed to estimate the different channel types in California. Finally, how this information was used to generate environmental flow recommendations for every river in California. It will also be discussed how river are currently altered and what can we do to restore them.

Samuel Sandoval Solis, samsandoval@ucdavis.edu

#Environmental flows, #water for the environment, #freshwater ecosystems

3:30 **Long-term Flow Regulation in a Semi-arid River Results in Landscape-scale Biophysical Changes** Clancy McConnell

Putah Creek is a regulated, semi-arid river in California's Sacramento Valley, one that experienced dramatic and permanent biophysical changes after the construction of Monticello Dam. Its story is a common one in the Mediterranean state; there are well over 1,000 dams in California, and the bulk of dammed water is located in the Sacramento Valley. This study's geographic analyses show Putah Creek went from an ephemeral flash-and-scour system, with a mostly barren channel and oak woodland-covered natural levees, to a perennial system, with dense riparian forest in the channel and on the banks. Regulation after the construction of Monticello Dam in 1957 resulted in much reduced peak streamflows and elimination of over-bank floodplains but maintenance of a small year-round baseflow. Additionally, dredging eliminated in-channel floodplains and slowed flow, leading to dramatic ecological changes on the reach scale.

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Myriad GIS workflows were synthesized in a variety of software, including HEC-ras, Pix 4D, ENVI, ArcGIS Pro, and ArcMap, in order to compare historic hydrology-vegetation dynamics to modern dynamics. Primary datasets included historic topographic quadrangles, historic aerial photos, modern satellite imagery, LiDAR-collected topography, and peak streamflow records. Methods and results from this study will form the foundation of future novel succession models for small, regulated, semi-arid river systems, especially for similar systems in the Sacramento Valley, to analyze past restoration effects and predict future reach-scale restoration outcomes.

Clancy McConnell, cmcconnell@ucdavis.edu

#historical ecology, #environmental history, #riparian succession, #GIS

3:50 **Damn that Dam: Restoring the Lower Otay River Floodplain while Considering Onsite Constraints and a (Mostly) No-Release Dam** Lindsay Teunis and Alice McKee

We live during a time when restoring processes to create self-sustaining ecologically intact systems must contend with competing anthropogenic needs ranging from water supply, housing, energy creation/delivery, food production, and recreation. Rather than running away from these complex interactions, successful restoration project design and implementation must face them head on and generate shared goals and compromise. The Otay River Restoration Program team has spent the last eight years determining how to restore a functioning river, its floodplain, transitional uplands, and tributaries in a watershed with extensive anthropogenic constraints. The site's watershed and predicted hydrology are complicated by its location in arid southern California which is experiencing extended periods of drought as well as unpredictable weather patterns associated with progressing climate changes. The project design is further complicated by its location one mile downstream of Savage Dam and Otay Lakes, a no-release water reservoir that holds back 60% of the Otay Watershed. The truncation of the project's historical watershed means that annual hydrology is severely reduced, and the project must be designed to function accordingly. However, every 7–10 years, when Otay Lakes reaches storage capacity, water will be released from Savage Dam for days or longer resulting in heavy to extreme flows, which the site needs to accommodate. So how do we design for the two extremes? How do we model existing and post-restoration conditions; how is groundwater considered; can we predict post-restoration waters and wetlands; what is our revegetation approach; how do we incorporate miles of stable trails; and how do we monitor and create meaningful success standards? The first step is developing a project team with diverse skill sets and experience while also creating an environment where tough conversations occur, and creative solutions emerge. Second, we layer information on top of data on top of knowledge and sprinkle in some informed assumptions. Third, you generate predicted outcomes (i.e. project commitments) with conservative yet confident brackets, always in the favor of the resources and reduced project risk. Fourth, you implement, monitor, then adapt, and share your project's successes and hurdles with your work community so we all can keep learning and doing better. In this presentation we will illustrate this philosophical approach to complex restoration design through the lens of hydrology and hydraulics with a nod to all the other good stuff.

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#restoration+compromise, #informed decision-making, #creative solutions, #holistic river restoration

4:10 **Floodplain restoration incorporating a novel water control structure** Mike Davis

The Willow Bend Preserve is located on the eastern bank of the Sacramento at river mile 159 near the city of Colusa, CA. Fields previously utilized for row crops were known to inundate regularly and create fish stranding hazard. In 2022, this 175-acre floodplain was restored with native vegetation and graded to enhance a natural swale to direct receding flood waters towards a notch in the berm separating the floodplain from the river. In this notch, a novel fish passage and water control structure was installed. This structure's design facilitates floodplain connection to the river reducing stranding hazard while controlling outflow to improve the site's capacity as refuge and food source for fish. During and following flood events resulting from successive atmospheric rivers in January 2023, members of River Partners and UC Davis Center for Watershed Sciences monitored the site's vegetation, usage by wildlife, and function of the water control structure. Year one monitoring outcomes include 8 species of native fish observed on the site, including juvenile Chinook Salmon (*Oncorhynchus tshawytscha*) of fall-run, late-fall-run, and spring-run size classes. 9,574 native plants of 24 species were established on site and persisted through flood events. Continued monitoring will assess vegetation establishment and water characteristics, as well as fish, wildlife and pollinator use of the site and reference sites to incorporate lessons learned into improving area restoration planning and management.

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#floodplain restoration; #Sacramento River

Floodplains: Thinking Outside the Channel

Session Lead: Cara Clark, Watsonville Wetlands Watch *Listed in order of presentation*

Saturday 10:15a – 12:00p with 15 minutes Q&A of for all presenters at the end

10:15 **Floodplains Reimagined: Landscape-scale Ecological Floodplain Enhancement** Jenna Duffin

The Sacramento Valley is heavily managed and supports a diverse agricultural industry (much of it in rice) interspersed with private, State, and Federal wetlands whilst providing flood protection to said lands and urbanized areas. Historically this area supported large numbers of waterfowl, migratory birds, and salmon, but habitat is now limited from historical river channelization and leveeing and land reclamation. This area has huge potential to voluntarily increase the frequency and duration of shallow inundation in the winter months through increased connectivity with the Sacramento and Feather Rivers to: (1) improve juvenile salmon migration and access to productive rearing habitat, (2) reduce adult fish passage impediments, (3) Improve Pacific Flyway bird populations, (4) improve groundwater recharge, (5) respect flood management functions, and (6) protect existing property and water rights. The focus of this project is on evaluating the feasibility and ecological benefits of low flow floodplain reactivation in the flood system footprint of the Butte Basin, Colusa Basin, and Sutter Bypass. Using multiple basin scale hydrodynamic models, we will be evaluating the performance of a suite of voluntary actions to provide ecological benefits to juvenile rearing salmon, waterfowl, and shorebirds, while not negatively impacting flood performance, existing land uses, and water rights.

Chris Campbell[1] and Jenna Duffin[2]
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#Floodplain enhancement, #hydrodynamic modeling, #ecological benefits

10:35 **Restoring Seasonally Inundated Floodplains: Design, Implementation and Monitoring of the Lower American River Salmonid Habitat Enhancement Improvement Program** Evan Pesut

In the last 15 years, concerted efforts led by local, state and federal agencies have resulted in 12 aquatic habitat enhancement projects in the lower American River, which runs through the greater metropolitan area of Sacramento, California. These projects have focused on the creation and enhancement of spawning and juvenile rearing habitats for Central Valley steelhead and Fall-run Chinook salmon as mitigation for habitat loss due to the construction of Folsom and Nimbus Dams, components of the Central Valley Project. Project features include the enhancement and/or creation of spawning riffles, side channels, seasonally inundated floodplain benches, planting of riparian vegetation, and the placement of large woody material. The ecohydraulic design process used includes comprehensive bathymetric and topographic surveys, terrain surface development, hydraulic surveys/measurements, and development of two-dimensional hydraulic and habitat suitability models. Outputs from the models are used to estimate salmonid spawning and rearing habitat suitability for proposed design configurations, as well as to assess the potential mobility of the placed sediment.

Extensive post-project physical and biological monitoring has occurred at these sites, which has documented the utilization of the sites by salmonids at various life stages in a variety of hydrologic conditions (i.e., critically dry through wet years), as well as the rate of degradation or evolution. These post-project monitoring data have been used to enhance the design process and project complexity in subsequent projects. Enhancements to the design process resulting from the post-project monitoring include refinement of habitat suitability curves, inclusion of increasing amounts of large wood, addition of side channels and seasonally inundated floodplains, and refinement of and experimentation with the size of the sediment placed in spawning areas. The projects have substantially contributed to the limited amount of habitat used by anadromous salmonids during multiple freshwater life stages in the lower American River.

Evan Pesut, EIT[1], Chris Hammersmark, Ph.D., P.E., Ben Taber, B.E., John Hannon, and Erica Bishop. [1]e.pesut@cbecoeng.com

#Floodplain Reconnection, #Side Channel Creation, #Juvenile Chinook Salmon Rearing Habitat, #Large Wood Habitat Structure Design

10:45 **Sugar Pine Floodplain: Restoring the Floodplain to Save a Historic Bridge** Erin Dickman

The Merced River flows through the iconic Yosemite Valley in Yosemite National Park. Although it is designated as Wild and Scenic, it has been impacted by past management practices. The Merced Wild and Scenic River Management Plan (2014) called for additional study to consider removing the historic Sugar Pine Bridge because it is undersized and misaligned with the river, causing negative effects to the river's natural processes and habitat qualities. The study concluded that rather than remove the bridge, the park could undertake a series of restoration actions as mitigations for leaving the bridge intact. The largest restoration action was restoring the Sugar Pine Floodplain, a 17-acre area immediately upstream of Sugar Pine Bridge. This floodplain had been filled to create a campground that was subsequently destroyed by the 1997 flood, a 100-year event. We have completed the first year in the restoration of this floodplain and will share initial results along with upcoming plans to complete this project.

continued

Erin Dickman[1] and Anna Puchkoff.
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#floodplain, #restoration, #historic bridge

10:55 **Ecological restoration of a natural floodplain along Watsonville Slough** Cara Clark

The Watsonville Sloughs in the Pajaro Valley are some of the largest freshwater wetlands in coastal California. Nestled amongst extremely productive farmland, the ecological function and health of these wetlands has been impacted by channelization, habitat loss, and nutrient and sediment run-off. The Bryant-Habert Ecological Restoration Project is a multi-phased project that began in 2016 with the goals of improving water quality, providing flood capacity, and restoring aquatic, wetland, and wet meadow habitat in the historic floodplain of Watsonville Slough. The project entailed retiring 25 acres of marginal farmland, reintroducing topography into the leveled fields and revegetating with native plants.

The first two phases created four simply shaped oval ponds and a complex wetland depression with multiple arms and a sinuous shoreline. The depressions were designed to hold water into August to support California red-legged frog breeding, but dry down most years to control invasive fish and bullfrogs. Red-legged frog egg masses were first observed in the ponds in 2020. Phase 3 is focused on shallower scrapes to create seasonal wetlands and enhance wet meadow habitat. All graded areas were revegetated with native plants using hydroseeding, broadcast seeding, drill seeding, and container planting. Weed management is addressed with a diverse suite of methods including mowing, weed whacking, flame weeding, and removal with hand tools. Wildlife has become abundant, particularly raptors, songbirds, shorebirds, reptiles, and amphibians. The project is a partnership between the Land Trust of Santa Cruz County, Watsonville Wetlands Watch, and the Resource Conservation District of Santa Cruz County.

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#farmtofloodplain, #redleggedfrog, #drillseeding, #wildlife

11:15 **Stage Zero Restoration Design in the Petaluma River Watershed** Joan Schwan and Carrie Lukacic

Lakeville Creek flows into the Petaluma River near the edge of San Pablo Bay. Its lower reach, on Sonoma Land Trust property, is rapidly eroding and deeply incised. Based on PCI's site analysis and Technical Working Group input, a "Stage Zero" (Cluer and Thorne 2013) condition was identified as the restoration goal. Stage Zero refers to dynamic, multi-threaded wetland channel forms that were once widely distributed in many landscapes, providing high habitat and ecosystem values. Historical ecological analysis of the Petaluma River watershed indicates that such settings were once common in the project region (SFEI 2018). On the site and elsewhere in the watershed, past land uses including intensive livestock grazing and channel realignment contributed to loss of wetland function and extent. PCI's restoration design eliminates the single-thread channel, returning it to its original grade, and providing conditions for natural establishment of a mosaic of channels, wetlands and uplands. Restoration is expected to improve habitat diversity, water infiltration, and long-term wetland persistence. While Stage Zero restoration projects have been successfully completed elsewhere, this approach is new to the project region. Tailoring the design to the site's grassland setting, addressing site considerations including an adjacent roadway and special-status species habitat, and planning for climate variability were important to design development. Technical experts and regulatory agency representatives played a key role in project planning. The project received approval to use the new CEQA Statutory Exemption for Restoration Projects. Work to date has been funded by CDFW Rivers and Streams Restoration Grant Program.

Joan Schwan[1], Mike Jensen[1], Lauren Hammack[1], Lucas Walton[1], Carrie Lukacic[1], Claire Pavelka[1], and Julian Meisler[2].
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#Stage Zero, #restoration design

11:35 **Van Norden Meadow: Restoring climate resilient headwater habitat in the Sierra Nevada** Alecia Weisman

Van Norden Meadow, known as Yayalu Itdeh in Washoe, has been impacted for centuries by human activities such as logging, grazing, water storage, infrastructure development, and recreation. The Van Norden Meadow Restoration Project is restoring 485 acres—of which, 335 acres are open meadow habitat, and 150 acres are encroached by conifers. The project will restore high functioning headwater wetland habitat and improve hydrologic function which will allow this high elevation meadow to support a diverse community of plant and wildlife species later into the year. Restoration actions focus on restoring hydrologic and ecological function within the meadow by spreading surface flows from incised channels across the meadow, to slow them down, reconnect them with the floodplain, and increase groundwater infiltration. These actions will increase the resiliency of the ecosystem against future climate impacts and the threat of further degradation. The combination of full channel fill approach on the South Yuba channel and beaver dam analogs in the lower reaches of Castle Creek and in large swales throughout the meadow will protect the stream channels from the erosive power that is experienced during

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peak snowmelt and rain on snow events, which are expected to increase as a result of climate change. This approach will also support wildlife adaptation in a changing climate, specifically during predicted increased periods of drought, providing wet habitat for high elevation aquatic species and migratory birds, along with high quality forage for terrestrial wildlife and pollinators.

Alecia Weisman[1] and Summer Driscoll[2].
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Restoring Floodplains: Riparian Revegetation

Session Lead: Sierra Phillips, UC Davis Dept. of Land, Air, and Water *Listed in order of presentation*

Saturday 1:30p – 3:00p with 15 minutes Q&A of for all presenters at the end

1:30 **Riparian Planting and Natural Recruitment: Understanding the Connections** Danielle Conway and Bobbie Flores

Riparian revegetation is a common practice for river restoration projects and is generally a mitigation requirement when existing trees must be removed as part of the restoration action. Although short-term survival documentation is generally a permitting requirement, multi-year monitoring of tree establishment is generally not conducted, and natural recruitment and establishment following riparian restoration is even less studied. The Yuba Hallwood Side Channel and Floodplain Restoration Project (Project) is a large-scale restoration project connecting off-channel and floodplain habitats to provide rearing habitat for juvenile salmonids. A key aspect of this Project is a long-term riparian tree recruitment and planting survival study to address the following questions: (1) Is natural riparian tree recruitment (native vs non-native) influenced by habitat feature? (2) Is long-term riparian tree survival influenced by habitat feature? (3) Do recruitment and survival differ by species? (4) Is long-term survival of natural recruits higher than that of planted trees? After one year, we have found that the presence of plantings within certain habitat features may contribute to higher natural recruitment of native plants, particularly willows and Cottonwoods.

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#riparian, #vegetation, #willows, #restoration, #yuba, #hallwood

1:50 **Cottonwood Seedling Recruitment: Development and Application of a Mechanistic Model** Sierra Phillips

Decline of riparian forests have been observed throughout the Central Valley due to the alteration of landscapes, flow regimes, and natural physical processes. Over the past 30 years, conceptual models have been used to develop stage-relationship models and GIS-based approaches to assess cottonwood seedling recruitment in rivers across North America. The goal of this research was to develop an open-source tool with a spatially explicit, mechanistic approach using novel algorithms to represent previously conceptualized hydrophysical processes that are crucial for predicting the potential for seedling recruitment, both for real and design scenarios. The seedling recruitment model is coded in Python-3 and fully integrated into the River Architect software as a new Ecohydraulics module named the Riparian Seedling Recruitment module. The model requires two-dimensional (2D) hydrodynamic numerical model results and a daily flow record to assess the recruitment potential for a given topography and substrate. The lower Yuba River (LYR) in northern California was selected as the pilot site given the availability of a high-resolution topographic data, substate and vegetation mapping, and hydrodynamic numerical model outputs. Using the mean daily flow record from a hydrologic model output under current operational constraints on the LYR and the 2017 DEM, 93 years of *Populus fremontii* (Fremont cottonwood) seedling recruitment potential was analyzed over ~34 km of the river. For the set of parameters selected for this initial analysis, the relationships between the hydrophysical processes and the overall recruitment potential indicates that bed preparation is limiting potential seedling recruitment sites across the LYR as well as within each distinct geomorphic reach over the 95-year period spanning 1921 to 2016. Given that the model has multiple parameters with complex interactions, sensitivity and uncertainty analyses will be used to quantify the uncertainty and identify the relative importance of each individual input parameter and combination of interacting parameters. The results of these analyses will then be used to tune the model for application on the LYR and validated with observation data to evaluate the model accuracy.

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continued

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#seedling recruitment model; #cottonwood; #ecohydraulics

2:10 **Can cottonwood establishment locations on a dynamic, regulated river be accurately predicted?** Rachel Wright

Riparian vegetation management is a vital component to river restoration projects, stressing the need to better identify where vegetation is most likely to establish in dynamic river settings. Determination of the most limiting factors influencing vegetation recruitment remains a barrier to river restoration success. This study mapped the spatial pattern of young cottonwoods along the lower Yuba River (LYR) in Northern California and investigated the principal topographic and hydro-physical variables driving young cottonwood presence and absence. The Riparian Seedling Recruitment module, within an open-source software called River Architect, was used to predict theoretically suitable areas of Populus fremontii (*Fremont cottonwood*) seedling establishment along 34 km of the LYR for the years 2017 to 2021 considering 6 levels of suitability. Predictions were compared against 2,957 Fremont cottonwood field observations collected by using an equal effort sampling of randomly selected sites that had been stratified by five geomorphic reaches of the LYR and model results. The four hydro-physical outputs of the Riparian Seedling Recruitment module (scour, inundation, recession rate, and bed preparation) and 16 topographic variable rasters (such as channel proximity or bed slope) were then used as predictors in a Random Forest machine learning model to identify the main drivers of young cottonwood presence. The results of the machine learning model indicated that topographic variables were the main drivers in cottonwood presence, while the hydro-physical variables were not as significant. This information can be used to advise suitable locations or topographic characteristics needed for riparian vegetation restoration efforts along the LYR, while the methods could be applied to other rivers given the availability of suitable data inputs.

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*machine learning, *cottonwood, *riparian vegetation, *topography

2:20 **Panorama Vista Preserve, Kern River: 14 years of habitat restoration** Anna Talken

Since 2009, the Panorama Vista Preserve (Preserve) Restoration Project has restored over 200 acres of floodplain and upland habitat along 2.75 miles of the Kern River north of Bakersfield, CA, for the benefit of wildlife, plants, and people. Water diversions and land clearing for oil extraction and agricultural uses had converted the Preserve from riparian forest and scrub, elderberry savannah, and saltbush scrub to non-native grasslands dominated by weeds. The altered hydrology of the Kern River limits natural regeneration of riparian forest to support area species on the Preserve, and active, large scale restoration approaches are needed to re-establish diverse riparian vegetation and high-quality wildlife habitat. Restoration strategies at the Preserve have included selecting target vegetation based on current physical and biological site conditions, rather than a historical condition or endpoint; targeting multiple management objectives to include recreational and outdoor education opportunities for the local community; and planting both long- and short-term successional endpoints. Soils at the Preserve are dominated by sandy loams and silt loams which were formed by repeated cycles of scour and sediment deposition caused by historic (pre-dam) flooding. Because these soil types drain quickly, are underlain with sand and gravel, and have a relatively deep groundwater table, frequent irrigation was employed for plant establishment. Field managers used a combination of evapotranspiration estimates and plant water stress observations to assess water availability and alter the irrigation regime as necessary. Additionally, we planted of aggressive, native understory species such as creeping wildrye (*Elymus triticoide*s), gumplant (*Grindelia camporum*), and mugwort (*Artemisia douglasiana*) to thwart the establishment of non-native species by growing in dense stands.

Anna Talken[1], Emma Havstad, Erin Hagen, and Julie Rentner. [1]atalken@riverpartners

2:40 **Adaptive management of riparian restoration at Dos Rios Ranch Preserve** Sarah Gaffney

Located at the confluence of the Tuolumne and San Joaquin rivers in the San Joaquin Valley, Dos Rios Ranch Preserve is a 1,600-acre floodplain restoration project. Habitat restoration began in 2013 in a phased approach with an adaptive management design to facilitate incorporation of lessons learned into subsequent restoration activities. Fields previously utilized for row crops were actively restored over three years, including field preparation, installation of native plants and maintenance. Monitoring throughout all phases included measures of vegetation diversity and structure, avian point counts, and anecdotal wildlife observations, as well as tracking of resources utilized in restoration activities. The fourth and final phase of native plant installation at the preserve initiated in 2020 with an approach to understory planting different from previous phases: understory seeding took place within the same season as the container planting as opposed to delayed seeding. Comparisons between phase 4 and earlier phases of restoration show no difference in vegetation after two years; however, Phase 4 required fewer labor hours and less herbicide to establish vegetation.

continued

Restoring Floodplains: Riparian Revegetation *Saturday 1:30p – 3:00p*

Lessons learned from restoration at Dos Rios Ranch Preserve underscore the importance of consistent monitoring of implementation effectiveness and restoration outcomes to drive adaptive management and improvements in restoration practice. Summary of techniques and comparisons that may be applicable to other restoration projects and considered in planning and management will be shared.

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#monitoring; #restoration; #invasive plant management; #san joaquin

Thinking Outside the Box: Stream Restoration

Session Lead: Lindsay Teunis, SWCA *Listed in order of presentation*

Saturday 3:30p – 5:05p with 15 minutes Q&A of for all presenters at the end

3:30 **Filling Conservation Gaps: Stream Restoration as Infrastructure on Private Lands** Jonathan Snapp-Cook

The Natural Resources Conservation Service (NRCS) and the U.S. Fish & Wildlife Service (USFWS) Partners for Fish and Wildlife Program are federal agencies which work with private landowners to address resource concerns by assisting with technical and financial assistance. Private lands have historically been overlooked for their potential contribution to landscape level conservation. However, approximately 60% of the land in the United States is considered private land (non-state, non-federal), therefore, conservation on private lands can be very important to overall environmental conservation. In Temecula, California, these two agencies worked with a private homeowners' association (HOA) with an ephemeral stream running through 400 acres of open space. The stream has incised 10- to 12-foot banks into the floodplain, which is adjacent to a public trail. Both agencies provided technical and financial assistance to design and implement a restoration project on 1200 linear feet of stream that met HOA goals. Additionally, the project's complex bioengineering design and permitting required that NRCS, USFWS, and the HOA build partnerships between several regulatory agencies. These partnerships brought in diverse partners to help address issues of public safety, water quality, flood control, watershed protection, and wildlife conservation. At project implementation, the HOA had community backing, 14 federal, state, and local partners, and 5 required permits. These partnerships were imperative to the project's success. This collaboration between public agencies and the private landowner addressed the HOA's concerns and goals and shows that voluntary conservation on private lands is a viable approach to the conservation of natural resources. This project provides a model with regional and state-wide implications for implementing nature-based conservation projects in a voluntary context. This talk will provide details of the partnership dynamics, the restoration methods, and show the results of 4 years of photo monitoring data.

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#stream restoration, #southern california, #private lands, #voluntary conservation, #bioengineering, #partnerships

3:50 **River Architect software to help assess and design river and floodplain restoration** Gregory B. Pasternack

Many procedures exist to assess historical and current intertwined ecological and physical conditions in rivers. Understanding the past provides general insights into potential future vulnerabilities. However, management and rehabilitation of rivers based on generalities has resulted in many failed projects and poor long-term outcomes for both ecological and physical metrics. It is imperative to develop a new generation of systematized methods that yield spatially explicit, high-resolution analyses of past, current and future conditions with equal attention. Given the natural complexity of rivers, this can only be achieved with deterministic and holistic modeling. To solve the holistic modeling challenge, we have developed River Architect (https://riverarchitect.github.io) — a free, peer-reviewed, open source Python-based toolkit with a graphical user interface that has a growing number of modules to aid assessment of both real and alternative design conditions, considering environmental flow regimes, flood resilience, and engineered biophysical rehabilitation. River Architect receives input from any two-dimensional hydrodynamic model, a variety of geospatial data files, user-adjustable spreadsheet templates with ecological and geomorphic data, and

continued

hydrological time series. It standardizes procedures for data preparation, management, and pre-processing so that all modules can function in a unified framework. The current suite of modules include (1) geomorphic lifespan/sustainability assessment for many eco-physical features (e.g., young and established vegetation, landforms, large wood, and boulders), (2) traditional 2D physical habitat suitability assessment/mapping, including provision of abundance statistics and time series analysis, (3) fish stranding risk assessment during flow recession, (4) cottonwood riparian recruitment potential assessment, (5) river design terraforming tools, and (6) project planning tools to scope out financial cost and produce preliminary construction plans. Most importantly, River Architect's modular framework readily facilitates additional development from everyone. Contributors can focus on their new features without having to code their own back-end framework.

Dr. Gregory B. Pasternack[1], Dr. Sebastian Schwindt[2], Kenny Larrieu[3], Sierra Phillips[4], and Sunny Bommasani[5].
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#river restoration, #aquatic habitat assessment, #cottonwood recruitment, #river design

4:10 **Predation reduction as a potential juvenile salmonid habitat restoration strategy in Central Valley rivers** Avery Scherer and Rocko Brown

Predation is a contributing factor in the decline of many Pacific salmon species and predation by nonnative piscivores is believed to be a major component of mortality for rearing and emigrating juvenile salmon in the California Central Valley. Predation by nonnative fish species can be exacerbated when anthropogenic alterations enhance predator habitat suitability and increase juvenile salmon vulnerability. For example, during critically dry years water temperatures can exceed suitable limits for salmonids; chronic disturbance such as dam, levee, and floodplain development can simplify channel morphology; and widespread channel incision and anthropogenic structures can increase occurrence of deep-water features used by large-bodied piscivores such as nonnative black bass (*Micropterus* spp). Additionally, the need to balance salmon restoration efforts with human water use has increased the value of predation control as a non-flow-based conservation tool. Potential techniques for reducing predation include eliminating predator hot spots, timing habitat activation to disrupt predator life cycles, restoring natural stream morphology, and constructing off channel habitat refugia. Such reductions in predator habitat suitability (deep, slow, warm water) often simultaneously improve habitat suitability for salmonids (shallow, fast, cool water). This talk will explore targeting predation reduction as a juvenile salmonid habitat restoration strategy, including controls on salmonid predators, anthropogenic alterations to predator/prey interactions, potential approaches, and preliminary examples.

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#salmon, #habitat restoration, #predation

4:30 **Using Horsepower to Remove Debris and Invasive Vegetation, Steelhead Creek, City of Sacramento, California** Roland H. Brady, III and Crystal Tobias

Steelhead Creek is a wadable, perennial, urban stream that flows through the American River Parkway and empties into the Sacramento River at Sacramento. The stream supports small but important runs of steelhead and Chinook salmon and a vibrant ecological corridor. However, significant debris from dumping and homeless camping threaten the stream's ability to sustain its aquatic life. Mattresses, sleeping bags, tarps, and tents armor the channel bottom, impeding burrowing organisms and creating an anoxic "dead zone" beneath. Shopping carts accrete floating debris, obstructing fish passage and reducing water conveyance leading to bank erosion. Non-native scarlet wisteria lines the banks, trapping debris and displacing native vegetation. Mats of aquatic primrose block the channel, impeding fish migration, trapping debris, and preventing light from penetrating the water. This Project (funded by Sacramento Regional Sanitation in partnership with Save the American River Association) tested whether draft horses could be used to remove debris and plants where machinery or hand work alone could not. In 13 days, we successfully removed over 43,000 lbs of solid waste, which we inventoried and weighed, 11,750 lbs primrose, and 349 wisteria plants from 0.7 miles of channel. The horses readily pulled loads of debris over 1,000 lbs — much heavier and faster than can be done manually. The horses extracted primrose 500 lbs at a time, and pulled out mature wisteria up to 4.5 in. in diameter. This summer, we intend to re-visit the site, surveying any new vegetation and inventorying any new debris to determine the rate of influx.

Roland H. Brady, III, PhD, PG[1] and Crystal Tobias[2]. [1]Emeritus Professor of Geology, Brady_Geology@msn.com
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#Cleaning stream channel–Unconventional methods, #Removing invasive non-native vegetation, #Effects of uncontrolled homeless camping in the urban riparian corridor

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Securing Native Seed

Session Lead: Julia Michaels, Hedgerow Farms *Listed in order of presentation*

Friday 10:30a – 12:15p with 15 minutes Q&A of for all presenters at the end

10:30 **Production of Source Identified Native Seed for Habitat Restoration at Heritage Growers — A Restoration Seed and Nursery Supplier Program of River Partners** Pat Reynolds

The need to increase the supply of source identified native seed is a significant limiting factor in habitat restoration and has garnered increasing attention particularly with the release of the National Academies of Science, Engineering and Medicine's 2023 report on the Assessment of Native Seed Needs and the Capacity for their Supply. This report describes the considerable urgency for increasing the supply of restoration appropriate native seed to meet the challenges of climate change, habitat loss and invasive species spread as well as the many barriers that exist to expanding the supply of this essential commodity. Heritage Growers (www.heritagegrowers.com), a non-profit supplier of source identified native seed and plants for habitat restoration is working toward increasing the supply of restoration appropriate native seed and improving habitat restoration outcomes by producing new species, new ecotypes and refreshing the genetics of existing commercially available ecotypes to create more resilient and biologically diverse restoration projects. The production of source identified native seed is a complex, multi-step process that involves considerable resources, technical expertise and substantial trial and error. This presentation will describe the process of producing restoration appropriate source identified native seed from wildland collection through planting, field maintenance, harvest, cleaning, drying and storage. It will include a discussion of some of the lessons learned with starting a new native seed venture from the ground up with recommendation for restoration professionals to help increase the supply of restoration appropriate native seed.

Pat Reynolds, 916.769.7076, preynolds@heritagegrowers.com,

#Native Seed, #Seed Amplification, #Seed Supply, #Source Identified

10:50 **Partnering to Ensure Native Seed Quality for Restoration** Julia Michaels, Ph.D., and Alexander B. Mkandawire, Ph.D

Many restoration projects require the addition of native seed— and we all know that the quality of the seed we put into our projects matters. As the demand for native seed increases across the state, producers must work to establish quality standards, particularly for wildland-collected local ecotypes. The California Crop Improvement Association (CCIA), based in Davis, has established standards for over 100 native plant species to help preserve their essential genetic identity and consistency. In this presentation, Hedgerow Farms and the CCIA demonstrate how producers can team up with the CCIA to certify their native seed. This certification process includes pre-collection wildland site visits, field inspections, and standards for cleaning and handling. At Hedgerow, taking these steps has allowed us to carefully scale up production, while ensuring that restoration practitioners are receiving the best possible native seed for their projects.

Julia Michaels, Ph.D.[1], and Alexander B. Mkandawire, Ph.D.
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#Native seed, #Plant ecology, #Best Practices, #Partnerships

11:10 **Building the supply of native plant materials to support restoration and landscape change in the era of SGMA** Doug Iten

Regionally adapted native plant species are a critical component of successful restoration work. However, limited availability of appropriate native seeds and plants has hindered the progress of conservation and restoration action throughout the state. Great Valley Seed (GVS) is working to scale up the production of native plant materials specific to the San Joaquin Valley, where SGMA is driving significant landscape changes. More broadly, GVS is collaborating with other growers, State agencies, and NGOs, to increase the commercial availability and stabilize pricing of high-ecological value native plant materials for restoration practitioners, land managers, landscape architects, and engineering firms. In this presentation, GVS General Manager Doug Iten will talk about GVS's work and highlight some of the most effective ways seed producers and seed buyers can collaborate to help prevent a supply bottleneck of native seeds and plants.

Doug Iten and Emma Debasitis, Great Valley Seed. doug@greatvalleyseed.com, emma@greatvalleyseed.com

#Native seed, #Restoration, #Project planning, #Partnerships

11:30 **Growing together: How the Orange County Native Seed Partnership is working to improve access to native plant materials in Southern California** Matt Major

Efforts to restore California ecosystems depend on access to provenance specific native seed. These plant materials are often difficult for individual organizations and agencies to acquire in sufficient quantities, due to the advance planning and resources required. Regional seed partnerships can help overcome some of these common challenges and create economies of scale around seed collection and production that can benefit all participants. In Southern California, the Orange County Native Seed Partnership (OCNSP) is a coalition of local landowners, managers, restoration practitioners, seed collectors, and growers working to create a consistent and

continued

Securing Native Seed *Friday 10:30a – 12:15p*

dependable supply of high quality and affordable native plant material that can support habitat restoration and enhancement at a scope and scale sufficient to increase the resilience, diversity, and functionality of natural areas in the region. They have been working since early 2021 to establish a partnership structure and develop a strategic plan that defines how seed will be collected, produced, and distributed. This presentation will provide an overview on the collaborative planning process, with a special focus on challenges that came up along the way, lessons learned, and key takeaways that will hopefully be valuable to those interested in developing seed partnerships in their own regions.

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#plant materials, #native seed partnership, #ecotypes

11:50 **Increasing Commercial Availability of Early Emerging Species for Monarch Butterflies** Michele Ranieri

Heritage Growers, a new native seed and plant business, is working to increase the commercial availability of key plant materials for pollinator species.

Michele Ranieri, mranieri@riverpartners.org

#Monarch butterflies, #habitat, #pollinators, #seed supply, #nursery supply

GROWING

What Lies Beneath: Connecting Above and Below Ground Communities

Session Lead: Taylor Akers, CSU Sacramento *Listed in order of presentation*

Friday 1:30p – 2:45p with 15 minutes Q&A of for all presenters at the end

1:30 **Soil fungi respond to prescribed fire and mechanical thinning** Taylor Akers

Fire is an ecological process, a force that alters the physical structure and function of ecosystems. Fire of low to moderate intensity is understood to promote ecological diversity, when applied to the landscape with a frequency that is suited to the evolutionary history of a particular region.

In the past two centuries of Euro-American colonization, indigenous burning practices have been severely repressed and land managers have actively suppressed fire. This altered fire regime has resulted in plant communities that are less diverse, less resilient to climate change and are subject to high intensity wildfires. In companionship with plants, communities of soil fungi are also impacted by changes of fire regime. Soil fungi, including several functional groups, contribute to fundamental biological processes such as nutrient cycling, soil formation, water retention, and plant growth.

The objective of my study is to understand how intentional and low to moderately intense fire influences the structure and function of fungal communities in the soil of a mixed coniferous forest. I collected 144 soil samples from 12 stands within the Blodgett experimental forest. In 2002, each stand was randomly assigned to one of four treatments: fire only, mechanical thinning only, thinning followed by fire, and unmanaged control. I hypothesize that soil fungal diversity and community composition will differ between the management practices and certain functional groups of fungi will dominate within each treatment. I anticipate that my findings will help guide management decisions to increase the diversity and functional capacity of our plant and fungal communities.

Taylor Akers, 916.595.2721, taylorfayakers@csus.edu

#GoodFire, #Fungi, #SoilMicrobes, #LandManagement

1:50 **Fire and Fire Surrogate Effect on Soil Exoenzymes of Western Sierra Mixed Coniferous Forest** Kalen Edwards

Prescribed fire and mechanical fire surrogate strategies are used by forestry to control understory growth, promote timber productivity, and mitigate the risk of severe wildfires. These practices have varying effects on forest structure, soil community, and nutrient characteristics. A major function of the soil microbial community is metabolization of organic materials through exoenzymes, providing resources to the soil microbe and plant community. What enzymes are produced is affected by the soil nutrient profile and needs of the community. When biologically available nitrogen and carbon are abundant, glycoside hydrolases involved in decomposition of complex polysaccharides are suppressed. Soil chemistry also impacts enzyme activity, primarily soil pH; most glycoside hydrolases optimal pH is ~5 while polyphenol oxidase's is ~8. The alkalizing effects of fire on soil chemistry are well-documented, however the effects of fire on soil exoenzyme activity have yet to be

continued

explored in mixed coniferous forest of the western Sierra. My project will be using Blodgett Forest Research Station (BFRS) in Quintette California, primarily mixed conifer with small portion of black oak forest. Since 1998, BFRS has been participating in the national Fire and Fire Surrogate (FFS) project, a standardized regime of prescribed fire and mechanical treatments. 12 compartments within BFRS are designated FFS and have received a total of 3 rounds of treatment over 25 years. I hypothesize that plots that have experienced low severity fire will have lower glycoside hydrolase and higher polyphenol oxidase activity than unburned plots, reflecting shifts in nutrient availability and fire induced pH changes.

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#Prescribed Fire, #Soil Exoenzymes, #Forestry Management, #Sierra Nevada

2:00 **Effect of Nitrogen Availability on Early Development in a Native and Invasive Forb** Timothy Chen

Nitrogen, an essential plant nutrient, is important in grassland competition dynamics. Nitrogen-based fertilizers are commonly applied, yet nitrogen deficiency is also thought of as a limiting factor during competition. Most of the current literature on grassland species focuses on community effects of nitrogen, while the detailed morphological effects of both nitrogen addition and removal, especially in stages of early growth, remain unclear.

I compared the effect of nitrogen addition on the above and below ground traits of California native, *Hemizonia congesta* (hayfield tarweed), and its non-native counterpart, *Centaurea solstitialis* (yellow starthistle) at different stages of early growth. The experiment will involve a germination experiment followed by a 10-week greenhouse experiment, observing trait differences under a high nitrogen treatment and a low nitrogen treatment. Various traits will act as independent proxies for productivity, and resource acquisition, and resilience against low nitrogen availability. I predict *C. solstitialis* will have greater above ground biomass, height, and leaf area than *H. congesta* in the high nitrogen treatment, but that *H. congesta* will exhibit faster and more expansive root growth in the low nitrogen treatment than *C. solstitialis.*

This study will shed light on how native and invasive species respond to varying nitrogen availability, informing nitrogen's role in early plant establishment in California grassland. For grassland managers and restoration practitioners, the response of native and invasive species to different nitrogen availability could inform timing decisions of when to apply or immobilize nitrogen, utilizing it as a tool to limit the spread of *C. solstitialis* or promote the growth of natives such as *H. congesta.*

Timothy Chen, tmzchen@ucdavis.edu

#Grassland management, #invasive management, #nitrogen availability, #Hemizonia congesta, #Centaurea solstitialis"

2:10 **Effects of herbicide treatment on European beachgrass decomposition** Savannah Fuqua

European beachgrass (*Ammophila arenaria*) is one of the most problematic invaders of coastal dune ecosystems, often forming dense, monotypic stands that suppress growth of native species. At Point Reyes National Seashore (PRNS), many efforts have been made to control *Ammophila*, including herbicide treatment. However, the invader continues impeding restoration of native dune communities after treatment, as dead beachgrass persists on the landscape for years. Previous studies showed that soil microbial communities at PRNS differ between invaded, native, and herbicide treated habitats. We hypothesized that these changes in soil microbe communities contribute to the delay in decomposition of *Ammophila.* To test this hypothesis, we conducted a litterbag experiment in the dunes of PRNS. We filled Nylon mesh bags with either naturally senesced *Ammophila* or *Ammophila* that had been treated with 1.5% imazapyr, 2% glyphosate, a modified vegetable oil surfactant, and blue dye. These bags were placed in three habitat types: native Dune Scrub habitat, highly invaded habitat, and sites where *Ammophila* had been chemically treated. We measured change in biomass over 13 months. We found that *Ammophila* invasion significantly increased rates of decomposition compared to uninvaded habitats, and decomposition rates in restored sites returned to pre-invasion levels. We then used Structural Equation Models and data on plant communities, soil microbial communities, and soil chemistry from the same sites to determine the causal factors underlying changes in decomposition. We found that the shift in composition of plant litter following beachgrass invasion resulted in changes in the microbial community. This shift in the microbial community indirectly resulted in increased enzyme activities via changes in soil chemistry. Our results provide insight into an important side effect of *Ammophila* invasion and highlight the importance of understanding belowground communities and processes when restoring coastal dune ecosystems.

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#Invasion, #Herbicide, #Coastal Dunes, #Decomposition

2:20 **What does it mean to be a 'host plant'?** Wolfgang Schweigkofler

Plants used in restoration projects can be infected by native and invasive pathogens, and therefore pose the risk of introducing

continued

harmful plant diseases into a new environment and create significant ecological damage. Some plant pathogens are very host specific and only grow on one or a few closely related species, whereas other pathogens may infect hundreds of very different plant species. It is crucial to know the host range of dangerous plant pathogens, especially for those that are regulated by state or federal laws. In order to verify if a pathogen causes a disease on a plant, a number of parameters, called Koch's postulates, have to be fulfilled. However, being a 'host plant' can have very different consequences for both the plant itself as well as the environment. E.g. both the Chinese and Japanese chestnuts as well as the American chestnut are host plants for the fungus *Cryphonectria parasitica*, but while symptoms caused on Chinese and Japanese chestnuts are minimal, the pathogen cause widespread death of the American chestnut. In the case of *Phytophthora ramorum*, the causal agent of Sudden Oak Death, the pathogen kills oaks and tanoaks but only causes minor foliar symptoms on California bay laurel (*Umbellularia californica*). However, inoculum produced on Bay laurels plays a major role for the spread of the disease in Coastal California. We will present our research projects on host plant-pathogen interactions and discuss their relevance for ecological disturbances and restoration efforts.

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#plant disease, #Phytophthora ramorum, #ecology

Bridging intentions and Outcomes in Species Restoration & Management

GROWING

Session Lead: Jake Marcon, Dudek *Listed in order of presentation*

Friday 3:10p – 4:45p with 15 minutes Q&A of for all presenters at the end

3:10 **Multi-Scale Endangered Plant Introduction Planning: Using Habitat Characterization and Species Distribution Modeling for Endangered Plant Introduction** Jake Marcon

Endangered plant species with a restricted range provide limited information to those who work to restore and expand species populations. Traditionally, restoration practitioners use apparently suitable habitat proximate to occupied habitat as a best guess for suitable introduction areas. However, it is often unknown whether isolated patches of occupied habitat provide complete information about the full range of potentially suitable habitats. Our observations of the endangered Gaviota tarplant (*Deinandra increscens* ssp. *villosa*) indicated that the existing habitat description for the taxon may be limited by incomplete observational data. Therefore, we used a paired modeling and field assessment approach to better understand and predict habitat suitability and to serve as a foundation for reintroduction efforts. We used MaxEnt, a species distribution model, to identify suitable habitat throughout the taxon's range, which is roughly coastal Santa Barbara County. We then designed and implemented a habitat characterization study within occupied habitat, as available, throughout Gaviota tarplant's range. We also evaluated unoccupied but modeled suitable habitat locations for their potential value in introduction efforts. Our efforts led to the first quantitative description of habitat conditions within occupied Gaviota tarplant habitat, which allowed for creation of management targets in occupied habitat; produced range-wide mapping of modeled suitable habitat for the taxon; and identified several high-quality locations for introduction both nearby and farther afield from currently occupied locations.

Jake Marcon[1] and Ariel Levi Simons Ph.D. [1]jmarcon@dudek.com

#Rare Plants, #Restoration, #Reintroduction/introduction, #Endangered Species

3:30 **A collaborative approach to develop restoration guidelines for the salt marsh harvest mouse** Katie Smith

For decades restoration guidance in the San Francisco Estuary was largely limited to one document that did not directly address the needs of wildlife. The differing, sometimes conflicting needs of endangered wildlife in the Estuary further complicate the situation. When planning tidal enhancement and restorations designers must make trade-offs with every available acre; shallow bay cannot also be high marsh. This means that in most cases, fish habitat cannot be habitat for terrestrial wildlife like the endangered salt marsh harvest mouse (SMHM). Being unable to disperse between marshes and vulnerable to competition and predation in upland habitats the SMHM is especially vulnerable to inappropriate habitat design as even temporary loss of habitat function (e.g., extreme flooding) can wipe out local populations. In the past prescriptive guidance regarding design of specific habitat features to benefit SMHM was impossible due to a lack of comprehensive occupancy and density data. To address this deficiency we created the first database of all available SMHM survey data and performed spatial analyses to correlate habitat characteristics with SMHM densities. Using these results and expert consultation we determined that patch size, connectivity, elevation, and tidal action have

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the greatest impact on SMHM. We also developed recommended design targets and ranges (300+ acre area, 20+ m depth, 6.5+ ft elevation, etc.). Although designers must consider myriad goals when designing wetland habitat in the Estuary, it is our hope that this guidance will result in the creation of better habitat for SMHM in the future.

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#salt marsh harvest mouse, #endangered wildlife, #tidal restoration, #spatial analysis

3:50 **Assessment of Native Turtle Habitat Use After Tidal Restoration** Melissa Riley

If you build it, will they leave? Suisun Marsh is the largest contiguous brackish water marsh in western North America, consisting of a mosaic of managed and tidal wetlands primarily managed for waterfowl. However, its location between the San Francisco Bay and Delta makes it home to many important fish and wildlife species including the Western Pond Turtle (*Actinemys marmorata*, WPT), one of California's only remaining native freshwater turtles. WPT are abundant in Suisun Marsh, but little is know about their habitat requirements. It is also unknown how they will react to planned restoration project implementation. The Suisun Marsh Plan (SMP) calls for 5,000-7,000 acres of tidal restoration by 2043. While the SMP realized the need to move away from focal species approaches into restoration projects that have multi species benefits, this can still be challenging depending on the specific restoration priorities of project proponents and funding sources that push for an emphasis on specific suites of species like fish. Studying WPT can help support goals of providing multi-species benefits since they rely on both aquatic and terrestrial habitats. Turtles were tracked before and after a restoration project at the Hill Slough Wildlife Area within Suisun Marsh. On average home ranges increased after restoration and WPT shifted habitat use by up to 1,500 meters away from the immediate area of impact. Lessons learned from this study can help inform adaptive management and provide guidelines for future restoration, improving multi-species management.

Melissa Riley[1] and Brian Todd[2]. [1]melriley@ucdavis.edu [2]btodd@ucdavis.edu

#tidal restoration, #native species, #western pond turtle, #home range and habitat use

4:10 **Tecopa Hot Springs Wetland Restoration Project** Mark Brandi, Charlotte Soergel, and Erich Schickenberg

The University of California, Davis (UC Davis) and the Bureau of Land Management are currently working to restore wetland and marsh habitat for the Tecopa Hot Springs Wetland Restoration Project in Inyo County, California. UC Davis has conducted extensive surveys and analyses to track the status of the federally endangered Amargosa vole (*Microtus californicus scirpensis*) across its range in the Amargosa River Valley in an effort to address the species recovery goals and prevent the species extinction. This species has experienced habitat loss due to encroaching development, water diversion, groundwater mining, and other associated changes to the hydrology of the river basin. To address habitat loss, UC Davis plans to enhance and restore common Olney's three-square bulrush habitat (*Schoenoplectus americanus*, Herbaceous Alliance) within the designated critical habitat of Tecopa Hot Springs Marsh, located approximately two miles north of the town of Tecopa. This marsh habitat currently provides the sole food source for the Amargosa vole, which also provides thatch and canopy for protection from predators such as raptors.

The project would ultimately expand and enhance the amount of wetland habitat available to the Amargosa vole within the Tecopa Hot Springs Marsh by connecting currently fragmented areas. The project involves technical experts from UC Davis, state and federal agencies, and SWCA, all collaborating on the concepts, objectives, and design of the project. There are also numerous stakeholders with interest in the project including, but not limited to, adjacent property owners, local community members, and recreational users. The project is part of a regional effort to restore wetland habitat and connect essential marsh complexes to support the endemic Amargosa vole.

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Managing Invasives: Tools in the Toolbox *Listed in order of presentation*

Session Leads: Mary Paul, Elkhorn Slough, and Nina Omomo, Literacy for Environmental Justice

Saturday 10:15a – 12:00p with 15 minutes Q&A of for all presenters at the end

10:15 **Integrated Pest Management (IPM) to control invasive plants in a vernal pool-grassland complex** Jasmine Rios

Integrated pest management (IPM) focuses on sustainable land management practices to control and prevent invasive species. Invasive plant species are pests because they cause substantial environmental and economic impacts that threaten natural habitats by reducing native plant diversity and landscape heterogeneity. Using a combination of IPM approaches can target invasive plants at different phenological growth stages, while preventing resistance or tolerance of any single approach. Grazing, herbicide, and mowing are common approaches, each of which have their own caveats when used alone. These management approaches alone cannot effectively control invasive plants, or sustain native plant communities. At present, grazing is the only weed management tool being used in the grassland-vernal pool complex at the Yolo Bypass Wildlife Area. I will examine the efficacy of combining three IPM approaches to manage invasive plants at this site. I hypothesize that using a combination of IPM approaches like grazing, herbicide, and mowing, to target weeds at different phenological stages will significantly reduce invasive plant cover and increase native cover, compared to grazing alone. Ten treatment blocks are randomly distributed within 1-ha of the grassland matrix and consist of 5 treatment plots, totaling 50 experimental plots. Plots are randomly assigned and will consist of the control, grazing, grazing + herbicide, grazing + mowing, and grazing + herbicide + mowing. The success of combining IPM approaches can be used to develop land management plans and provide solutions for environmental and economic impacts caused by invasive plant species in all landscapes.

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#invasive species management, #managing grassland ecosystems, #integrated pest management, #IPM, #sustainable land management

10:25 **Vegetation Management** Dawn Cunningham

RES ecologists encounter several challenges managing vegetation on multiple properties throughout the West Coast from Washington, Oregon, and California! In this presentation, we take a closer look at the encounters of vegetation management at three mitigation/conservation banks: Nookachamps Wetland Mitigation Bank, Elsie Gridley Mitigation Bank, and Buena Creek Conservation Bank. RES employs multiple methods of treatments to sustain native vegetation relatively free from introduced aggressive plants, restore habitat functionality, enhance biotic diversity of plant and animal species, and develop vegetation management practices to aid in future restoration efforts.

Dawn Cunningham, 2125 19th Street, Suite 200, Sacramento, CA. 916.465.1372 dcunningham@res.us

10:35 **Lingering legacy effects of invasion and restoration complicate coastal dune ecosystem restoration** Lorraine S. Parsons

Coastal dune restoration often focuses on weed removal to reestablish native vegetation communities. Point Reyes National Seashore (PRNS) initiated large-scale dune restoration after becoming aware of the loss of dune and rare species habitat from spread of non-native European beachgrass (*Ammophila arenaria*) and iceplant (*Carpobrotus edulis*). Two projects removed beachgrass from 146 hectares of heavily invaded dunes using either mechanical removal or herbicide treatment. PRNS conducted pre- and post-restoration vegetation monitoring for up to 10 years post-implementation, evaluating success in (1) eradicating beachgrass, and (2) reestablishing vegetation communities similar to native dunes in cover, diversity, and species composition. Both methods eradicated beachgrass with annual retreatment. However, they were less successful in rebuilding native communities with comparable native species cover and/or richness. Mechanical removal areas remained largely barren expanses of sand that struggled to support native plants. Conversely, herbicide-treatment areas were dominated by standing dead beachgrass that resisted decomposition even after 5–7 years. The only exception occurred in foredunes where sand overwash from beaches buried beachgrass necromass. By 2021, only older herbicide-treated backdunes, and to a lesser extent, mechanical backdunes, showed signs of convergence with native dunes. Evolution of restored dunes may be hindered by legacy effects of beachgrass invasion and restoration treatment effects on soil microbia and chemistry. While mechanical removal would seemingly have less potential for lingering legacy effects, this approach also altered soil chemistry and microbia. Adaptive restoration measures may be needed to counter these effects and improve project success.

Lorraine S. Parsons[1], Savannah R. Fuqua[2], Michael K. Spaeth[3], Benjamin H. Becker[4].
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#European beachgrass, #coastal dunes, #legacy effects

10:55 **Prescribed fire for Medusa Head (Elymus caput-medusae) control and impacts to species composition in an invaded CA Grassland** Jason M. Mills

Invasive Medusa Head (*Elymus caput-medusae*) was introduced and rapidly spread over the grasslands of an 160-acre wildflower preserve in Sonoma County, California. Populations of *E. caput-medusae* established in areas with documented occurrences of several rare plant species including *Fritillaria liliacea* and *Calochortus uniflorus. Elymus caput-medusae* amounted to as much as 90% cover within the most densely infested areas which were designated as burn units for Rx fire. Good fire was introduced during optimal flowering periods of *E. caput-medusae* in May of 2020 and again to an adjoining field in May of 2021. Data was recorded in April of 2020, 2021, and 2022 to determine effects to species composition and biodiversity pre and post Rx fire.

Jason M. Mills, 415.497.1050
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#Ecological restoration, #prescribed fire, #Medusa Head, #California grasslands

11:05 **Restoration strategies following eucalyptus removal** Mary Paul and Andrea Woolfolk

With agencies and organizations looking to remove eucalyptus to address their ecological impact and reduce fuel load for wildfires, many are working to restore former eucalyptus groves to native habitats. The Elkhorn Slough Reserve has been removing eucalyptus since the 1990s and has been utilizing different methods for tree removal as well as various approaches for processing the wood generated from the eucalyptus removal, and several follow up restoration strategies. The Reserve recently completed the removal of 13 acres of eucalyptus and are restoring these groves to native oak woodland, wet meadow, and freshwater wetland habitats using historical data, reference site data, and restoration data from the last 30 years. Some lessons learned from these restoration strategies include: (1) follow up herbicide treatment on stumps in groves with 100-300 trees required 9 applications over 3–4 years for complete control, (2) Wood chip mulch has been effective as weed suppression but has been labor intensive for planting in areas with extremely thick mulch, resulting in using various strategies for re-vegetation including use of both container plants and planting acorns and (3) biochar production was experimented with on a small scale to determine the potential of using for both carbon sequestration and as a soil amendment in restoration sites and inspired larger scale biochar production locally with the Elkhorn Slough Foundation's Highlands Biochar pilot project. These strategies and on-going monitoring have provided many lessons and information for the continued adaptive management and restoration of these former eucalyptus groves to native habitats.

Mary Paul[1] and Andrea Woolfolk[2].
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11:25 **Building a Living Shoreline in San Francisco's Heron's Head Park** Nina Omomo, Eliz Ismailoglu, and Alijah Mestayerorallo

Literacy for Environmental Justice (LEJ) is an ecological restoration, environmental education, and workforce training organization in Southeast San Francisco's Bayview neighborhood. LEJ has been working to restore the Heron's Head Park wetland, one of the last remaining wetlands in the county, in partnership with the Port of San Francisco and San Francisco State University. LEJ prepares the site by removing invasive species, grows and plants all of the native plants for this project, performs follow-up monitoring, planting, and maintenance, and trains local, underrepresented BIPOC young adults in every phase of this process.

This talk will feature the 5-year project at Heron's Head Park and discuss the technical work involved in growing salt marsh plants in the nursery and in the field, youth and community engagement through stewardship activities, and workforce development training toward green careers.

The project at Heron's Head Park yields an array of ecosystem and community benefits. Building a living shoreline helps to make the Bayview community more resilient against rising sea levels, as a living shoreline can adapt to and absorb the impact of rising tides. LEJ has seen invasive *Limonium ramosissimum* (LIRA) inundate the wetland at Heron's Head Park and destroy vital habitat for shorebirds and other wildlife. LEJ has found ways of removing LIRA without the use of herbicides, through hand-pulling and follow-up maintenance. We have also successfully grown and reintroduced over 300 *Suaeda californica* plants, an endangered species. In partnership with San Francisco State's Estuary and Ocean Science Center, LEJ has participated in cutting-edge research focused on building an intact native wetland in Heron's Head Park. We'll reveal some of our processes in the field and in the nursery to build out the living shoreline. Through this work, LEJ has established a pipeline for underrepresented young adults to establish green careers.

Restoration Coordinator, Nina Omomo, has worked at Literacy for Environmental Justice since February 2020. She found LEJ through the Environmental Studies program at SFSU and decided to volunteer on Saturdays. During her last semester of school, she was hired as a part-time intern through the Eco-Apprentice program. She ended up really enjoying the work at LEJ and after graduating, decided to continue at LEJ full-time. One aspect that really drew her in was the intersectionality of goals within the work, specifically the connection

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between social justice and science-based practices. Nina is an affiliate of the Board for SERCAL, serving as the Diversity Chair for the 2023 conference.

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#Invasive species removal, #wetland restoration, #endangered species, #Bayview Hunters Point

Managing Invasives: Supporting Species Recovery

Session Lead: Barry Nerhus, Endemic Environmental *Listed in order of presentation*

Saturday 1:30p – 3:00p with 10 minutes Q&A for all presenters at the end

1:30 ***Arundo* may be silent killer of pond turtle populations** Barry Nerhus

Pond turtle populations may be negatively affected by *Arundo donax*. We researched a population of pond turtles after a large *Arundo* removal project was completed. After 4 years of sampling a southwestern pond turtle population at Aliso Creek in Orange County, CA. The data suggest that the pond turtle population structure experienced a change from a bimodal distribution to a normal distribution. The results indicates an increase in turtle recruitment and survivorship, thus the entire population. Given the recent habitat restoration efforts, the southwestern pond turtle population may be recovering from years of decline from large stands of *Arundo*.

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#Arundo donax removal, #wildlife recovery, #wildlife ecology, #stream restoration

1:50 **Thatch Management Using Mowing and Grazing to Benefit the Behren's Endangered Butterfly (*Speyeria zerene behrensii*), Manchester, California, USA** Terra Fuller

The Behren's silverspot butterfly (*Speyeria zerene behrensii*) is a federally endangered coastal butterfly found in Mendocino County. Behren's silverspot occupies early successional coastal terrace habitat containing the caterpillar's host plant — western early blue violet (*Viola adunca* subsp. *adunca*) — as well as adult nectar sources and suitable adult courtship areas. The host plant is patchily distributed on moist coastal terraces and sand dunes and can tolerate frequent disturbances. Research has shown, Behren's silverspot larval development to pupa depends on high densities of *Viola*. Manchester State Park, has documented butterfly detections and currently contains scattered patches of *Viola*. Invasive perennial grasses now occupy the park due to farming and the absence of historic disturbances of fire and Roosevelt elk (*Cervus canadensis roosevelti*).

State Parks initiated two vegetation management treatments from 2016 to 2020, to improve habitat for *Viola* by reducing invasive grass thatch. Treatments consisted of rotational grazing and mowing and monitoring data was collected that provided insight into treatment effects. Monitoring consisted of *Viola* counts, optical grass density monitoring and Behren's silverspot counts. Results from monitoring efforts found increases in *Viola* numbers post-treatments compared to controls. Optical density measurably decreased immediately post-treatment; however, there was no measurable change after the following grow season or compared to controls. Behren's Silverspot remains likely rare to absent at Manchester State Park.

Treatments did reduce thatch and increased the number of *Viola* plants; however, non-native grasses, including bent grasses (*Agrostis* sp.) whose dominance was more apparent post-treatment, will likely be a long-term management challenge in restoring Manchester's native plant diversity.

Terra Fuller, Senior Environmental Scientist (Specialist), Sonoma-Mendocino Coast District, California State Parks, Terra.Fuller@parks.ca.gov

#Behren's silverspot, #butterfly, #grasslands, #Viola

2:10 **Worth the Fight: Urban Preserve Management** Angie Harbin

The Crosby at Rancho Santa Fe Preserve was created in 2006 in accordance with County of San Diego Habitat Management Plan (HMP) guidelines to mitigate for the associated residential development. The Crosby HMP provides a framework for management of the Preserve and protection and enhancement of its natural areas in perpetuity. The Preserve includes vernal pool, riparian, and coastal sage scrub habitats that support sensitive plant and animal species such as coastal California gnatcatcher, least Bell's vireo, and rare plants. Management of the 170-acre Preserve includes annual tasks such as invasive species removal, biological surveys, public outreach, and reporting. The Preserve is part of the San Dieguito River

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watershed that provides habitat for hundreds of plant and animal species. Lateral connectivity between this river corridor and adjacent upland habitat areas is important for reducing habitat fragmentation and allowing for a natural progression of habitat types. Healthy and continuous native plant communities are essential to encouraging the movement of wildlife and maintaining populations of sensitive species in this urbanized setting. The Preserve provides an open space corridor, recognized in the San Diego Multiple Species Conservation Plan as a "Biological Linkage" area, which conserves natural habitats and protects linkages for wildlife movement. The ongoing restoration in this segment of the San Dieguito River watershed is aimed at improving and enhancing the overall habitat of the Preserve. The fundamental goal of the Preserve is to work with local organizations to maintain the continuous native riparian corridor along the river and upland canyons. Serious challenges to management of the Preserve and associated river corridor are presented by adjacent developments with conflicting land uses. Invasive wildlife (bull frog and brown headed cowbird) and weed species management requires a greater level of effort every management year. Changing climate conditions have extended the duration of annual brush management efforts and invasive species diversity has increased. Nonetheless, annual sensitive species survey and monitoring efforts have also detected an expansion of rare plant and wildlife populations at the site. A federally listed species not previously documented at the Preserve, light footed Ridgway's rail, was detected during 2022 survey and monitoring efforts. Conversely, the brown headed cowbird population increased by 95% in 2022. This shows the importance of preserving wildlife corridors and continuing to actively manage Preserves. It also highlights the challenge of invasive species management, particularly in the face of adjacent source populations that are unmanaged, and indicates that walking away is not an option for our sensitive native species to persist in these settings.

Angie Harbin, Rincon Consultants
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2:30 **Progress in tidal marsh restoration by The San Francisco Estuary Invasive Spartina Project (ISP)** Tobias Rohmer and Jeanne Hammond

In the 1970s, an East Coast cordgrass, *Spartina alterniflora*, was introduced into San Francisco Bay and promptly hybridized with native Pacific cordgrass *Spartina foliosa*. Tall, dense, and fast-growing, the hybrids out-competed other species, overran wetlands and colonized mudflats. Infestation reduced foraging habitat for many species of shorebirds but also provided cover for secretive marsh birds, including the endangered California Ridgway's Rail (RIRA). In 2000, the State Coastal Conservancy established the San Francisco Estuary Invasive Spartina Project (ISP), a regionally coordinated project tasked with eradicating invasive Spartina species from the Estuary and restoring native habitat. Since initiation, the project has reduced hybrid *Spartina* from 805 net acres in 2005 to 20.7 in 2022, a reduction of over 97%.

Since 2011, the ISP has also actively enhanced tidal marsh habitat at more than 40 Bay locations to benefit RIRA and other wildlife. A key component of rail habitat that is under-represented in tidal marshes is cover from predators during high tides, including extreme high tides (king tides). This problem will worsen with climate-change-induced sea level rise and increases in storm severity. To date, the ISP and partners have constructed 82 "high-tide refuge islands" to provide cover during high tides. Project partners have also planted over 570,000 natives, aiming to establish dense patches of taller vegetation to benefit RIRA and other wildlife. ISP's overarching goal continues to be restoration of native tidal marsh — habitat that is critical for wildlife and acts as a buffer against sea level rise for Bay shoreline communities.

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#invasive spartina, #tidal habitats restoration, #San Francisco Estuary

Growing Strong: Recovery, Diversity, & Resiliency in Vegetative Communities

Session Lead: Gregor-Fausto Siegmund, Center for Adaptable Western Landscapes, Northern Arizona University; USGS Southwest Biological Science Center **Saturday 3:30p – 5:05p with 15 minutes Q&A for all at end**

3:30 **Environmental controls on plant regeneration in drylands: a systematic review protocol** Gregor-Fausto Siegmund

Arid and semi-arid ecosystems are broadly distributed throughout the western United States, including in California. In these drylands, active restoration practices after disturbance or changes to land management often involve direct seeding. Public and private restoration efforts are hampered by low and variable rates of plant recruitment from seed, and subsequent plant establishment and persistence. To identify opportunities to improve the outcomes of restoration seedings, we are synthesizing information about how early plant life stages are influenced by environmental variables. We describe a systematic review protocol designed to survey existing knowledge about early life stages of species that are commonly used in direct seeding during restoration on public lands in the western U.S. Specifically, we developed a screening and data collection protocol to integrate information from a wide variety of sources: lab tests, growth chamber and greenhouse trials, and field experiments. The database that we designed is structured to record the experimental design used to study parts of plant establishment, including germination, establishment, survival, and growth. Data on early life stages is connected to data about seed source and environmental variables. Finally, we link environmental variables to plant outcomes to summarize the effect of the environment on different parts of the establishment process. Our synthesis effort builds a database that will be used to describe patterns in research effort; to identify knowledge gaps; and to inform quantitative models for plant establishment to support restoration seedings by federal agency partners.

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#restoration seeding; #plant regeneration; #drylands; #research synthesis

3:40 **Drill-seeding for large-seeded species** Alex Palmerlee

In both cleared and existing blue oak woodlands, there is a lack of new oak recruitment. Problems of this scale require restoration solutions that are cost-effective and scalable. Existing restoration techniques use a litany of interventions (irrigation, caging, tree tubes, weed control) to ensure high survival per individual at a high price per survivor.

We tested the application of drill-seeding to "farm" oaks in rangelands with a low-tech slip-plow attachment. In two consecutive years we planted blue oak acorns under varying conditions, combining drill-seeding with cattle grazing, shade, and herbicide in a paired nested block study.

Our data suggest that drill-seeding large-seeded species may be a viable restoration technique under multiple conditions. After a year and a half, seedlings are at 6% survival with no post-planting interventions. The lack of costly interventions means that even at low percentages, survival is still very cost-effective. Calculated as a factor of equipment and labor time required to collect, treat, store, and plant acorns, the cost per surviving seedling was under $3.

Current restoration challenges, including those posed by climate change, demand that we develop more cost-effective planting techniques that can be applied on thousands of acres per year. Drill-seeding acorns, surpassing recruitment limitations by mass-seeding, may be a valuable addition to the restoration tool box.

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#Drill-seeding, #Trees, #Oaks, #Direct seeding"

4:00 **Utilizing Native Seed to "Fill the Gaps" in Ecological Restoration** Cameron Yackly

SER: "Ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed."

If the goal of ecological restoration is for humans to take an active role in rehabilitating degraded habitats, one would think that entails a comprehensive effort to pull back together all components of that system. However, often times, biologists and restoration ecologists are limited by fluctuating timelines, antiquated success criteria, and the availability of diverse species from their local native plant nurseries. Nature is constantly in flux — and the restoration plans we put together should encapsulate the variability of environments in which we are trying to restore.

If we are to play the role of Mother Nature, we should take the care to foster ALL that she has bestowed upon us, and not those that simply allow us to check a box or fill the bottom line. We cannot overlook the "diminutive," or "ephemeral," species that constitute the natural environment. There must be an effort going forward to utilize native seed to FILL THE GAPS in ecological restoration!

Cameron Yackly,
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4:20 **Daylighting Streams: Restoring stream channels by removing legacy logging roads in Redwood National Park** Elijah Severson

Unregulated logging in Northern California has left once pristine stream channels completely buried under tons of sediment. These channels lack biodiversity, block the movement of salmonids, and create hazardous conditions. Decommissioning these roads and the removal of sediment are essential tasks taken on by groups such as Save the Redwoods League, as well as entities such as California State and National Parks. Redwoods Rising is a collaboration effort between these three groups, and its focus is to put areas disturbed by a history of logging on a trajectory to old growth forest conditions. This presentation, given by Elijah Severson, documents some of the work done by Redwoods Rising employees in the Prairie Creek area of Redwood National Park in the summer of 2022.

Elijah Severson, es360@humboldt.edu

4:45 **Boost Biodiversity with Traditional Methods: Restoration Insights from the Kumeyaay People of San Diego** Katy Chappaz

This presentation summarizes important takeaways for habitat restoration and land management from a year spent studying ecology, history, culture and language with the Kumeyaay people of San Diego and northern Baja at the Kumeyaay Community College.

Key Findings: (1) Policymakers and restoration practitioners today don't know what the land was like before European contact, when it was cared for by Indigenous people. (2) Mainstream ecology is based on non-Indigenous values. We generally protect and restore resources according to non-Indigenous values, not Indigenous ones. (3) By listening to Indigenous people and learning about their relationship with the land, we can adapt our practices to benefit Indigenous people and the land.

Presentation Goals: (1) Show how Indigenous perspectives are missing from mainstream ecological models and how to build them back in. (2) Share learnings and industry applications for the benefit of Indigenous people and our restoration projects. (3) Encourage everyone to undertake their own learning by sharing useful resources.

Long-term Vegetation Changes following Wet Meadow Restoration Kristen M. Kaczynski

Historic and recent modifications have altered the hydrologic processes that sustain montane fens and wet meadows. Over the past 25 years much progress has been made in fen and wet meadow restoration, but few long-term studies exist evaluating restoration success. We examined the long-term restoration success of Drakesbad Meadow, a fen-wet meadow complex in the southern Cascades within Lassen Volcanic National Park. In summers 2017, 2019, and 2022 we resampled 25 vegetation plots and monitored groundwater monitoring wells established in 2002, prior to the 2003 phase one of hydrologic restoration. In 2012, phase two of the hydrologic restoration occurred when ditch networks were filled with sediment and sedges were sporadically planted. Results from the hydrologic restoration were mixed as some plots shifted their dominance towards more facultative species while others shifted towards more obligate wetland species. These shifts were correlated with expected and unexpected changes in the depth to groundwater. Monitoring both the long-term and short-term changes in vegetation after hydrologic restoration gives a more complete assessment when evaluating restoration success.

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#wetlands; #mountain meadows; #hydrologic restoration

SHAPING THE FUTURE BY RESTORING THE LAND.

Hanford's Diversity, Equity, Inclusion, and Belonging (DEIB) committee's mission is to champion, embrace and celebrate the multiculturalism of Hanford's workforce through advocacy, educational opportunities, and fostering unity within the company.

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Fostering Learning and Connection in Natural Spaces

Session Lead: Brad Hoge, Nueva School *Listed in order of presentation*

Friday 10:30a – 12:15p with 15 minutes Q&A of for all presenters at the end

10:30 **The Inspirational Power of Ecological Art to Foster a Sense of Home** Kelsi Anderson

Place-based large-scale ecological installations help to illuminate and activate landscapes, evolving beauty and wonder into our minds and hearts and drawing people into curiosity of place. These Ecological Art pieces can shift our perspectives of how we see the world around us and connect us into deeper kinship with the natural world. When we are connected on an emotional and spiritual level with nature, we feel more highly motivated to take positive action in caring for the earth and ourselves.

Kelsi Anderson, kelsi@wildearthart.co

#ecological art, #public art, #ecological restoration, #place making, #site activation

10:40 **The Native "Landscape": Creating native gardens that are connected, beautiful and, most importantly, alive!** Patrick Montgomery

Exploring how native landscapes, or "gardens", have the power to connect us, support wildlife and provide a place of calm...if they are alive! This presentation aims to place additional value on hardy, successful and beautiful native plants. Moving from a conceptual outlook on successful native landscaping to specific plant recommendations, the goal is to provide a path for anybody to achieve a beautiful and connected native landscape.

Patrick Montgomery, patrick@nativewest.com

#Native Gardens, #Success, #Thrive, #Connection

11:00 **Regenerating a degraded park connects a community to Southern California's native biodiversity** Jennifer Zell

Earvin "Magic" Johnson Park is an urban park renovation connecting an underserved community to nature and providing access to native biodiversity. Located in Los Angeles County in the community of Willowbrook, the park site is a former brownfield with a complicated history including some egregious environmental impacts. For 40 years the land was an open, oil tank storage site. The site's immediate previous use was as a deteriorating park with trees, turf and two large concrete lined recreational lakes. The lake water was degraded with high levels of bacteria, and potable water was used to refill water lost to evaporation and to irrigation the lawns.

Pre-settlement, this area was characterized by willow trees and freshwater wetlands, hence the name Willowbrook. These emergent and freshwater wetland habitats have been restored at the park along the edge of the south lake, which was re-engineered to mimic natural wetland processes of filtering out sediments, cleaning water, and creating new habitat to support native biodiversity in the park.

The water to support the wetlands was found by diverting dry and wet weather flows from the surrounding 375-acre watershed to the park. A new treatment facility treats stormwater through mechanical and biological wetland systems. In addition to emergent and wetland habitats, coastal sage scrub habitat was established at the park. California native plants account for 85% of new plants planted at the park. With this newly established habitat has come sightings of 171 bird species by community scientists on eBird.

Jennifer Zell, jzell@migcom.com

#Regenerative design, #urban biodiversity, #water quality improvements

11:10 **Studying ecological responses to conservation grazing using a student-centered teaching & research approach** Yamina Pressler

Rangelands are biodiversity hotspots, provide critical ecological functions and economic value, and represent the largest land use in California, extending over 58 million acres. California rangelands face combined challenges of non-native species invasion, drought, and land degradation. We are conducting an observational study along a continuum of rangeland restoration to assess the effects of management on above- and belowground ecology in a coastal California grassland. Our study compared ecological responses of one ranch under continuous grazing, one ranch under rotational conservation grazing, and a county park that has been ungrazed for 4 years. This serves as a case study for undergraduate inquiry in restoration ecology in a Natural Resources Ecology course and through student-driven research projects. We quantified plant community composition and biomass, soil nematode abundance and functional diversity, soil microarthropod abundance, spider web activity, animal burrow activity, lichen cover, and soil organic matter content. I will describe how student inquiry advanced the direction and development of the project at several stages. To date, we have identified 74 plant species across the rangeland continuum, of which, 30 species were native to California. We found significantly higher plant species richness under rotational conservation grazing compared to the other two sites. Soil microarthropod abundance was greater under rotational conservation grazing compared to continuous grazing. This work advances restoration ecology education and research to support biodiversity conservation goals in working landscapes.

continued

Yamina Pressler[1], Nora Bales, Stewart Wilson, Charles A. Knight, Anna Buecheler, Cody Cameron, Maxwell Farmer, Sophia Forstmann, Lauren Frost, Kylee Nielsen, Fiona Oneil, Alison Snyder, Carly Sussman, and Nabila Wildman [1]ypressle@calpoly.edu

#rangeland, #soil, #biodiversity, #education

11:20 **Prairie Restoration on School Campuses** Brad Hoge

The Nueva Middle School is planning a project is to restore a portion of the Nueva MS campus to native prairie conditions, and to maintain the prairie as part of the 8th grade science curriculum. The project will be located in an area that will be obvious for students to see each day. Signage will be incorporated to provide educational benefit for the entire MS and LS student body. Students from 8th grade biology will conduct research projects in the prairie as well as serving as conservators. Nueva's 8th grade curriculum already includes a project where students conduct scientific research on the trails adjacent to campus. The trails wind around Sanchez Creek and are covered by oak woodlands encroaching on native Redwoods. This provides a wonderful opportunity for student research. The prairie will provide an additional resource for student research as well as teaching about ecology, sustainability, and environmental citizenship. Two SERCAL ecologists have already consulted on the project, and I hope to make the prairie available for further collaboration and connection to groups and organizations outside of Nueva.

Brad Hoge, bhoge@nuevaschool.org

#Education, #Prairie Restoration, #Environmental Citizenship

11:30 **Revitalizing Communities by Restoring Ecosystems: STRAW (Students and Teachers Restoring a Watershed) 30 Years of Learning and Growth** Alison Pollack

The 'Students and Teachers Restoring A Watershed' (STRAW) program at Point Blue Conservation Science (https://www.pointblue.org/our-work/education/) is a community-focused and student-powered riparian and transition zone habitat restoration leader in Northern California. Through anecdotal, qualitative, and quantitative evidence, we aim to share a replicable case study in successful, community-forward restoration through the story of our 30-year legacy and learnings in student-led restoration. In our three decades of implementing community-based restoration in California, we have engaged over 50,000 students, teachers and community members; restored over 40 miles of riparian corridor; and leveraged over $15M in volunteer resources. We've also grown our model to include co-creation and operation of multiple native plant nurseries to support both our restoration and our community engagement efforts. We currently find ourselves at a growth point, and are using our core structure and values outlined below for guidance. By sharing our story, we highlight and elaborate on what we feel are the three critical components for effective community-centered restoration:

1) Strength-Based Teamwork: A) All opinions are incorporated including dissenting opinions into decision-making. B) There is emphasis on a 'flat hierarchy' model of all people and opinions weighted equally with mutual respect

2) Prioritizing Human Relationships: A) A Multi-visit educational program for racially marginalized schools occurs every school year. B) Our Community College Conservation Internship (CCCI) provides early career training and education for young Black, Indigenous and people of color (BIPOC) to begin environmental careers. C) Long-term partnerships are prioritized with community partners and trust from the community

3) Adaptive Management: A) Adaptive management is used to to guide restoration practices. B) Adaptive management is used to guide programmatic practices (embracing a learners mindset)

These three components account for our working definition of program success. The three interrelated elements naturally form a 'braid', as they must be woven together and fully integrated to support a culture of mutual respect. This braid provides a model for effective work outcomes and could be replicated by other community-focused restoration organizations and individuals who aim to develop inclusive and effective conservation action. We have observed that practicing this trifecta model helps us stay relevant and innovative enough to accomplish effective ecosystem restoration and supports us in making conservation accessible to more communities.

As a network that facilitates student-led restoration, relationships have always been at the heart of STRAW, beginning with its inception in 1992 as the Shrimp Project (https://files.eric.ed.gov/fulltext/ED374963.pdf) and we carry this core tenet to work today with K-12 students. In addition to providing all benefits of any professional-quality habitat restoration planting, STRAW generates and depends on a collaborative of diverse stakeholders — an enthusiastic and unique array of partners — including schools, ranches, businesses, government agencies and nonprofits. We've learned that to heal and sustain a vibrant ecosystem, the local human community also must be respected, reconnected, and restored.

Alison Pollack, Point Blue, apollack@pointblue.org, and Laurette Rogers lrogers@pointblue.org, Celida Moran cmoran@pointblue.org, Alba Estrada Lopez aestrada@pointblue.org, John Parodi jparodi@pointblue.org, Gina Graziano ggraziano@pointblue.org, Jenni Phillips jphillips@pointblue.org, Isaiah Thalmayer ithalmayer@pointblue.org

continued

Fostering Learning and Connection in Natural Spaces *Friday 10:30a – 12:15p*

#Program Case Studies, #Community based restoration, #environmental education, #working with partners, #working with stakeholders

11:50 **Climate Change and California Youth: Partnerships of the Next Generation** Allie Dumas and Nyah Sadler

The Center for Land-Based Learning's (CLBL) new Farm and Climate Program empowers the agricultural community to take a leadership role in addressing climate change through model Carbon Farm Plans, training, research, and projects that demonstrate carbon sequestration benefits, soil health, and habitat restoration. The Farm and Climate Program also dovetails with and builds upon CLBL's flagship youth programs, FARMS Leadership and SLEWS (Student and Landowner Education and Watershed Stewardship). By involving youth in our climate education and demonstration projects, we are ensuring that the next generation of farmers, natural resource stewards, agriculture leaders and policy makers understand the vital role that agriculture can play in mitigating climate change in California. This presentation showcases the progress we've made in the first year of our Farm and Climate Program as well as how our youth programs, which have been going strong for over two decades, are uniquely positioned to build climate-friendly agriculture in California.

Allie Dumas[1] and Nyah Sadler[2].
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#climatesmartfarming, #plantingsolutions, #youthleaders

Dismantling Barriers

Session Lead: Jamie Kneitel *Listed in order of presentation*

Friday 1:30p – 2:45p with 15 minutes Q&A of for all presenters at the end

1:30 **Dismantling Barriers: Pathways to Entry in the Field of Natural Resource Conservation** Christopher Gardner and Jennifer Neale

For all the good work it does, the field of resource conservation is lacking in diversity of human participants due to high barriers of entry. These barriers exist in academia in the form of course requirements, times offered, modality and availability. Other barriers to entry into professional work exist in the form of low-pay or unpaid internships and entry level jobs, seasonal or temporary jobs, and onerous degree requirements. It falls on academia, agencies and NGOs to adjust how they operate in order to recruit from a broader base and eventually generate more capable and diverse talent in the field. This will, in turn, bring in new ideas, strategies, and techniques to help solve our daunting conservation challenges. The partnership between the ARC Natural Resources Department and The City of Davis Open Space Program could be one step toward bringing down those barriers, but it's not there yet. The internship does provide practical real-world experience, on a flexible schedule that is designed for students of all backgrounds. However, the position is uncompensated and located in a different county than the ARC campus, requiring students to incur significant transportation costs. One idea to address this issue is to work with administrators at both organizations to identify outside funding opportunities for student work experience. We could then further refine the internship positions at the City to meet those opportunities and compensate interns for their time.

Christopher Gardner[1] and Jennifer Neale[2]. [1]Open Space Lands Manager, City of Davis, cgardner@cityofdavis.org
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#dismantling barriers, #diversity, #students, #new professionals

1:40 **Applying a Racial Equity Lens to Trout Stocking** Richard Muñoz and Haya Johnson

A key component of the California Department of Fish and Wildlife's mission is to provide for the use and enjoyment of fish and wildlife resources by the public. We as an agency understand that all Californians have a right to fishing access and opportunities. Inland fisheries overseen by CDFW impact the economic opportunities, health, and environment of many communities, including underserved communities. CDFW fisheries programs and policies have the potential to play a large role in advancing environmental justice and equitable distribution of services and resources to individuals, families, businesses, and communities. Recognizing this, it is critical to acknowledge the role of CDFW in perpetuating inequities through prejudicial regulations and policies. Through this work we are seeking to rectify the harms of systemic racisms. By sharing our past and holding ourselves accountable, we can identify ways to move forward for a better future for all Californians.

From 1971 until it closed in 1990, Channel catfish were stocked extensively from the Imperial Valley Warmwater hatchery (IVWH). In 1990 CDFW closed the IVWH for reasons not clear at this time. However, it is critical to note that IVWH

continued

was CDFW's last warmwater hatchery and its closure represents a disinvestment in the production of warmwater fish. This was the most productive warmwater hatchery operated by CDFW. Since then, CDFW's inland gamefish production has focused solely on raising trout and other cold-water species. This investment in cold-water species production benefitted white rural communities while excluding and creating barriers to participation for communities of color. The closure of the Imperial Valley Warmwater hatchery in 1990 is one example of CDFW perpetuating harm to low-income and Black Indigenous People of Color (BIPOC) communities.

As a pilot effort, a racial equity tool was used to examine stocking allocations in CDFW's North Central Region. The Justice Equity Diversity & Inclusion (JEDI) taskforce employed the Racial Equity Tool as part of CDFW's participation in a multi-agency effort called the Capitol Collaborative on Racial Equity. The data on North Central Region production hatchery allocations revealed racial disparities within current stocking allocations. While examining this data, the JEDI taskforce began looking at historical documents to understand how this racial disparity developed and became established.

Richard Muñoz[1], Haya Johnson[2], Sarah Musselman[3], Farhat Bajjaliya[4], Jeremy Valverde[5], Jennifer Ikemoto[6], Tina Cole[7], Dave Feliz[8], and Dylan Wood[9].
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#equity, #trout, #racial equity, #Fish and Wildlife, #community engagement

2:00 **Fulbright Scholar Program: What you need to know!** Jamie Kneitel

The Fulbright Scholar Program's mission is to foster mutual understanding between nations, advance knowledge across communities, and improve lives around the world. To this end, it funds research and/or teaching proposals for international collaborations and strives to ensure that it reflects the diversity of the U.S and societies abroad. In this talk, I will present the why, how, what, and impact of my experience as a Fulbright Scholar. Additionally, I will present the different kinds of awards available, as well as provide insights and strategies to approaching the pre- and post-application process.

Jamie Kneitel, kneitel@csus.edu

#Fulbright Scholar Program, #international opportunities, #research and teaching

2:20 **Serve or Partner with the California Conservation Corps Watershed Stewards Program in partnership with AmeriCorps** Jody Weseman and Jason Lopiccolo

Information session for attendees to learn more about WSP, particularly potential WSP Corpsmember applicants and WSP Placement Site partner applicants.

Jody Weseman[1] and Jason Lopiccolo[2].
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#Join WSP, #Partner with WSP

Listening to Traditional Ecological Knowledge

Session Lead: Michelle Stevens, CSU Sacramento *Listed in order of presentation*

Friday 3:10p – 4:00p with 10 minutes Q&A of for all presenters at the end

KNOWING

3:10 **Eco-Cultural Restoration: Traditional Ecological Knowledge and Western Ecological Knowledge in a Novel and Highly Disturbed Urban Corridor** Michelle Stevens

Bushy Lake is located within the lower American River floodplain, Sacramento, CA, and is in the traditional territory of the Nissenan, Maidu and Miwok peoples. The Bushy Lake Eco-Cultural Restoration Project, initiated in 2015, has a primary goal of restoring culturally significant plants and wildlife habitat in a highly disturbed novel ecosystem. Our hypothesis is that culturally significant plants are fire resilient due to thousands of years of Traditional Fire Management (TFM) provides site resiliency to wildfires. A 2021 wildfire burned the entire site to the water's edge; this enabled us to test our fire resiliency hypothesis. We will present results of our post-fire monitoring of culturally significant plants and wildlife. Extensive data pre- and post-fire allowed us to determine the resiliency of the cultural keystone species white root (*Carex barbarae*), mugwort (*Artemisia douglasiana*), and creeping wild rye (*Leymus triticoides*). We are also restoring a sacred pollinator/pinole garden. While Western Ecological Knowledge (WEK) offers a strong foundation for restoration of species assemblages and ecosystems, Traditional Ecological Knowledge (TEK) and TFM offer critical species tending and management practices that can help to restore both cultural and ecological integrity. In this talk, I will discuss opportunities to introduce TFM into the lower American River urban watershed to build fire resiliency, vital cultural access and tending, and public

education. The Bushy Lake Eco-Cultural Project demonstrates that WEK–TEK restoration can be linked to honor cultural integrity and nurture a "Sense of Place" and reciprocity for Native Californians and others.

Michelle Stevens, stevensm@csus.edu, 916.765.7397

#Traditional Ecological Knowledge, #Fire Resiliency, #Eco-Cultural Restoration, #Cultural Keystone Species

3:30 **Acorn is Medicine, Restoring Reciprocal Relationships with Black Oaks and People** Irene Vasquez

Black oak groves in Yosemite Valley are experiencing poor recruitment and recent drought and windstorms have caused more stress and over-toppling of mature trees. Black oaks have the most flammable litter of all the native oak species in California and historically American Indian people in Yosemite managed oak groves with fire and other methods. We are restoring these ancestral caretaking relationships through tribal stewardship to allow for the passing and generation of Traditional Ecological Knowledge while also reducing heavy fuels, planting saplings and reintroducing prescribed low-severity fire with the intention of reducing abundant pests observed in the acorn, effecting the nutritional value and seedling viability.

Irene Vasquez, irene_vasquez@nps.gov

#TEK, #Indigenous Partnering and Stewardship, #Native Science, #Reciprocal Relationships, #Cultural Keystone Species

3:40 **Oak and Elderberry Agroforestry Project at the American River Ranch** Charles McClain

Soil Born Farms, a community-supported agricultural project, organic farm, and environmental education center, recently received a grant to fund design, permitting, and construction of the Oak and Elderberry Agroforestry Project (project) within the 55-acre American River Ranch. The project will be located in the Lower American River Parkway within the City of Rancho Cordova, California. The project proposes to restore approximately 2.84 acres of land formerly dominated by yellow starthistle (*Centaurea solstitialis*) and establish a mix of drought-tolerant California native plants, including oaks (*Quercus* spp.), blue elderberry (*Sambucus mexicana*), plants that benefit native pollinators, and various other native, woody and herbaceous species. The project seeks to integrate multiple benefits that include: increased riparian habitat acreage and connectivity; increased habitat for the federally-threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) and declining native pollinator species like the Monarch butterfly and bumblebees; a source of sustainable food crops (e.g., acorns and elderberries) that require minimal irrigation, fertilizer, and other resource inputs; a source of plant materials for Native American medicinal and cultural uses; and increased education and interpretation opportunities for the local community, including opportunities to partner with nearby Cordova Senior High and Mills Middle schools.

Our 10-minute presentation will provide an overview of the design, planning, and permitting processes for this unique project, highlight challenges and solutions, discuss our outreach and collaboration efforts with local Native American Tribes, and provide suggestions for others interested in similar, multi-benefit restoration projects that provide both ecological and community benefits."

Charles McClain[1], Matt Wacker[2], Shawn Harrison[3]. [1]cmcclain@harveyecology.com, H. T. Harvey & Associates
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#agroforestry, #community health, #indigenous wisdom, #riparian habitat restoration

How to Successfully Work with Local Tribes on Restoration Projects

Brook Thompson and Ivan R. Senock, with Allegra Bukojemsky

Friday 4:00p – 4:45p with Q&A

The parsed, task-based nature of consulting contracts and systematic racism results in strained relationships with tribes on projects. While there is required tribal consultation during permitting and CEQA, if this is the first outreach to a tribe it may cause strained relationships. Early outreach to tribes on ecological restoration projects can result in stronger designs and collaboration opportunities. This discussion will show you how to find and contact your local tribes, how to communicate with tribal partners, and how to build long-lasting partnerships. We will also cover the basics of tribal business language and common words and phrases that may be offensive. The goal is to leave you energized to work with tribes in future projects.

Brook Thompson[1], Ivan Senock[2], and Allegra Bukojemsky[3].
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[2]M.A., Tribal Historic Preservation Officer/Cultural Resources Director, Buena Vista Rancheria of Me-Wuk Indians
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Brook M Thompson — I am a Yurok and Karuk Native American from Northern California. I am a PhD student at UC Santa Cruz in Environmental Studies. My thesis is about how to better integrate of Indigenous knowledge into California Water Policy. In 2022, I received my Master's from Stanford University in Environmental Engineering, focusing on water resources and hydrology. In 2020 I graduated from Portland State University's Honors College with a degree in Civil Engineering and a minor in Political Science.

Currently, I work as a restoration engineer for the Yurok Tribe. I have interned for the City of Portland, the Bureau of Environmental Services, The U.S. Senate Committee on Indian Affairs, West Yost Associates Engineering, the California Water Resource Control Board, and Save California Salmon. I am a 2022 Native Journalism Award Winner, UNITY 2020 25 Under 25 Recipient, a 2017 Undergraduate AIGC Student of the Year Awardee, and Gates Millennium Scholar, among other honors.

My goal is to bring together water rights and Native American knowledge through engineering, public policy, and social action. Current fights for me include undamming the Klamath River, Murdered & Missing Indigenous Women & Children (MMIWC) awareness, supporting Traditional Ecological Knowledge (TEK), and encouraging women and Natives in Science, Technology, Engineering, Art, & Mathematics (STEAM) fields.

Ivan R. Senock — Ivan is the Tribal Historic Preservation Officer and Cultural Resources Director who oversees the protection of Buena Vista Rancheria of Me-Wuk Indians (BVR) heritage and cultural resources in the ancestral territory of the Tribe. Ivan has a Master of Arts Degree in Anthropology from the California State University, Sacramento. Ivan's Master's Thesis research is on the lived experience of a terminated California Indigenous community and their intimate connections to landscape. Ivan has worked with California Tribes on cultural resource protection, claims of ancestry, and Federal recognition legislation. Ivan has experience in cultural resource management, archaeological monitoring, and documenting oral histories for Tribes in California for heritage and cultural practice restoration. Ivan works to protect, preserve, and continue the spiritual and cultural resources of the Buena Vista Rancheria of Me-Wuk Indians.

The Buena Vista Rancheria of Me-Wuk Indians Tribal Historic Preservation Office (THPO) assumed the responsibilities of the California State Historic Preservation Officer on Tribal Lands and oversees multiple projects to represent and expand the integral culture of the Tribe. BVR THPO consults with federal, state, and local agencies within the ancestral territory on preservation and tribal cultural resources. The THPO continually works to maintain, develop, and create spaces for cultural practice and traditional knowledge. These projects include Tribal Museum Collections, Language Programs, archaeological site protection, Tribal Library, Upusani Cultural Center, Traditional Ecological Knowledge, and Repatriation. Each project advocates the Tribal history and culture within the ancestral territory and surrounding lands.

M.A., Tribal Historic Preservation Officer/Cultural Resources Director, Buena Vista Rancheria of Me-Wuk Indians, ivan@bvtribe.com

Allegra Bukojemsky — I am a designer and design conservation and mitigation banks, nature interpretive areas, as well as consult on urban ecology. My focus is on designing the framework for ecological function, but human perception, interface, and aesthetic considerations play an important role in some of my projects as well. I like to say that my clients are the bugs and bunnies. *Allegra is a Landscspe Architect at Westervelt Ecological Services, is a member of the SERCAL Board of Directors, and served as President from 2021 to 2022.*

Uplifting Urban Ecosystems

Session Lead: Rachel Davis, UC Davis Arboretum & Public Garden *Listed in order of presentation*

Saturday 10:15a – 12:00p with 15 minutes Q&A of for all presenters at the end

10:15 **Ecology for Health: Linking biodiversity actions to human health in cities** Karen Verpeet and Jenny Symonds

Increasing biodiversity and improving human health are two frequently cited benefits that urban nature provides. But how can we plan, design, and build communities to maximize both human health and biodiversity? We present a framework for understanding how these services are provided in urban environments and practical design guidance for accentuating these services in urban planning and design. We aim to facilitate greater collaboration between advocates for biodiversity and human health in the built environment, informed by a synthesis of literature from the public health and ecology fields as well as work on the ground advising partners in the San Francisco Bay Area.

Through a review of existing urban ecology literature, the San Francisco Estuary Institute (SFEI) developed an urban biodiversity framework consisting of seven elements essential for maintaining biodiversity in cities: patch size, connections, matrix quality, habitat diversity, native plants, special resources, and management. Using this framework, we reviewed public health literature on urban greening to identify connections between urban biodiversity and human health and develop design guidance for fostering healthier biodiverse communities. This session presents the design guidance developed by our interdisciplinary team of scientists, planners, and designers to inform the planning and design of a variety of urban spaces at the site scale. These actionable recommendations seek to leverage synergies and manage tradeoffs between supporting human health and biodiversity, allowing cities to maximize the benefits provided by their projects.

Karen Verpeet[1] and Jenny Symonds[2].
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#Urban ecology, #landscape architecture, #human health, #urban biodiversity

10:25 **Redefining Restoration Realms: Can urban gardens function as ecological restoration sites?** Lara Hsia and Rachel Davis

Ecological restoration aims to recreate, initiate, or accelerate the recovery of an ecosystem that has been disturbed. Anthropogenic disturbance via urban development and resulting habitat loss is among the greatest threats to remaining biodiversity. Amid this unprecedented biodiversity loss, restoration practices are beginning to evolve in urban habitats, considering the potential for species resilience in already-developed landscapes. At the UC Davis Arboretum and Public Garden, past, present, and future initiatives have adopted this new restoration concept in an effort to maximize the ecological function of gardens. Some of our past and present initiatives have focused on creating habitat corridors and ameliorating the urban matrix for native pollinators in Yolo county, CA. Recent and future initiatives address climate readiness, using climate models to inform tree introductions from hotter, more arid climates. Restoration in this urban sense does not aim to return these spaces to their natural state, but instead create functional landscapes that allow diverse wildlife communities to coexist with human ones. At the crux of this coexistence is engagement with the local community; education and outreach efforts have proven crucial to the success of our projects. This work has shown that managing the intersection of human wellbeing and biodiversity protection in a changing climate requires collaborative community building, accessible and buildable learning resources, and futuristic planning.

Lara Hsia[1] and Rachel Davis[2].
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#biodiversity, #urban gardens, #community building, #climate-readiness

10:45 **Experimental Investigation of the Social and Ecological Effects of a Green Roof Environment on California Grassland Plants** Summer Santich and Natan Euol

As urbanization expands and continues to displace natural habitats, elevated ecosystems, particularly green roofs, offer a way to restore biodiversity and improve human well-being. The UC Davis Green Roof Research project is a multidisciplinary study exploring the ecological and social benefits of California native grassland plants in green roofs. The site, located outside the third floor of the UC Davis Student Health and Wellness Center, is adjacent to a public area for students and members of the UCD community. The project trials untested grassland plants for their adaptability to a green roof environment and their potential to mimic local native habitats and support pollinators. It additionally examines the social significance of planted natural spaces within urban landscapes. Data collected, including plant growth and vigor, floral display, and pollinator abundance, along with qualitative assessments obtained through surveys and observations, will ultimately contribute to a better understanding of the ecological impact of grassland plants and their relationship to pollinators such as bees, hummingbirds, and butterflies within the urban environment.

Summer Santich[1] and Natan Euol[2].
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#Green Roof, #Native Grassland Plants, #Urban Environment

continued

10:55 **Grants for Restoring Urban Streams** Esther Tracy

The Urban Streams Restoration Program funds projects and provides technical assistance to restore streams affected by urban development to a more natural state. The Program aims to bring people together around projects that foster community relationships while ensuring the community's interests are incorporated into the project's planning, design, and outcomes.

Esther Tracy, Esther.Tracy@water.ca.gov

11:05 **Opportunities in Ecologic Restoration — Helping Humans and the Ecosystem** Andrew Smith

Not often considered, erosion control projects can provide opportunities for improving or restoring ecological processes. We provide two examples of projects in the San Francisco Bay Area to improve erosion issues, one to support storm water drainage infrastructure and another to protect a children's learning facility. Neither project started as a restoration or habitat improvement project; however, both projects involved work in riparian and aquatic habitats and opportunities evolved during the planning process. The community of designers, permitting specialists, landowners, and regulators rallied to the cause. This talk will discuss the opportunities for addressing erosion and infrastructure problems with ecologic solutions and options available in steep narrow stream channels with conflicting stakeholder interests. We will review the hydraulic modeling necessary for permitting and design then share photographs during construction and recent storm events.

Andrew Smith,smith@wra-ca.com

#RiverRestoration, #Erosion, #CulvertDaylighting

11:15 **Berkshire Creek Rehabilitation Project** Brent P. Maue, PE, and Marc T. Blain

The City of Pasadena's (City's) award-winning Berkshire Creek Area Improvements Project (Project) is transforming the ecological and recreational/interpretive conditions on 4.7 acres within the Oak Grove area of the City's approximate 1,300-acre Hahamongna Watershed Park (HWP). The Project site is located in the northwest portion of the City, immediately north of SR-210, in the general vicinity of NASA Jet Propulsion Laboratory. The Project is within a heavily used park bordering an urbanized area.

The primary focus of the Project was the rehabilitation of the formerly severely degraded/incised Berkshire Creek, including replacement of a existing 30-inch-diameter drain pipe (culvert) at the inflow point, with flow diversions into two separate drain pipes of different sizes, lengths, angles, and outfall locations: One for low flows, and one for high flows. High flows are directed underground the length of the Project reach via new infrastructure, and low flows proceed above ground in replaced soil within the re-naturalized creek. A massive amount of locally obtained natural boulders, cobbles, and coarse woody debris were placed within the rehabilitated creek in a naturalistic manner—to 'hide' the concrete infrastructure elements, and also to provide beneficial niches/perches for wildlife and select native plants. Erosive conditions have been corrected and beneficial riparian habitat is now flourishing via invasive vegetation and trash removal, installation of native container plants and seed mixes, and long-term maintenance. In addition to the creek bed rehabilitation, the Project included the construction of an artful wooden bicycle/equestrian/pedestrian bridge that spans the creek—affording beneficial views of the tranquil creek area.

Outside the immediate creek area, habitat enhancement was also performed in nearby natural portions of HWP, including degraded oak woodlands, chaparral, and coastal sage scrub habitats. Prior to planting/seeding, a large volume of invasive trees, shrubs, and annual/perennial weedy vegetation was removed from the habitat areas. Psomas' retained S&S Seeds, Inc. and California Botanic Garden to collect and propagate approximately 100 species of native plants, seeds, and cuttings from local watershed areas to (1) assure genetic continuity with local plant populations, and (2) address the highly variable planting conditions (sun-dry; shade-moist) within the Project areas. The pre-existing oak woodlands in HWP exhibited very low rates of natural recruitment, which—left unaddressed—would have likely resulted in the depletion of local oak woodland resources over time, as the existing stands senesce and die-back. The goal of the oak woodland enhancement is to (1) provide dozens of new oak plantings (coast live oak, rare Engelmann oak, etc.) in protective cages as 'facilitated recruitment' to introduce new individuals to eventually replace the existing oaks, and (2) improve botanical diversity in the oak woodland understory, including planted native shrubs, subshrubs, vines, perennial herbs, native ferns, and seeded annual wildflowers. Cuttings of native cacti were planted to diversify vegetation resources and to serve as natural barriers to deter pedestrian access to sensitive or unsafe areas/slopes.

Moreover, the engineering solution solved the geo-morphology issues invisibly so the surface of the creek has a natural appearance. The Berkshire Creek Area Improvements Project was recognized as a BEST award winner by the American Public Works Association in 2020.

Brent P. Maue, PE[1] and Marc T. Blain[2]. [1]City of Pasadena, bmaue@cityofpasadena.net [2]Psomas, marc.blain@psomas.com

#Stream rehabilitation; #innovative engineering solutions; #botanical diversity; #interpretive values; #aesthetic improvements; #oak regeneration

Thinking Outside the Box: New Approaches to Current Challenges, Part 1

Session Lead: Madeline Sides, School of Design, Carnegie Mellon University *Listed in order of presentation*

Saturday 1:30p – 3:00p with 10 minutes Q&A of for all presenters at the end

1:30 **Transition Design: Design thinking for Ecological Restoration** Madeline Sides

Ultimately, I would like to lead an interactive workshop for the CA ecological restoration community to learn and think critically together about the potential that design thinking, and specifically, tools from the emerging field of Transition Design, has to offer the challenges of ecological restoration. I am a PhD candidate in Transition Design, but my research is based in the context of ecological restoration in Northern California. I believe that the field of design, particularly the emerging Transition Design approach has a lot to offer the multifaceted challenges of restoration, particularly: framing problems in new ways, creative methods for research with diverse groups of people, developing multiple solution concepts (that interact) and articulating desirable futures in creative ways.

Madeline Sides, msides@andrew.cmu.edu, 650.690.5029

#design thinking, #design for transition, #ecological design, #design theory, #workshop

1:50 **A Multi-Faceted Approach to Reducing Catastrophic Wildfire in California** Angela Chongpinitchai

A combination of factors has led to an increase in large-scale and high severity wildfires in the western United States. California has experienced its top eight largest wildfires (individual fires and complexes) since 2017. Increased tree mortality from continued drought, climate change, and insect infestations coupled with decades of fire suppression and previous forest management activities have resulted in changed vegetation structure and composition. The departure from historic fire regimes and natural range of variation in ecosystems has compromised health and resilience and sets the stage for future catastrophic wildfires. Managing forested and chaparral ecosystems to effectively reduce hazardous fuels buildup, promote native habitat, and restore landscapes impacted by recent wildfires is a multi-jurisdictional undertaking before, during, and after a wildfire. From federal and state agencies to non-government and private owned lands, the pace and scale of work needed to reduce the threat of catastrophic wildfires involves all entities across all lands. SWCA Environmental Consultants is partnering across California to achieve this common goal through an interdisciplinary and strategic approach. Featured work includes wildfire mitigation planning for utility companies and assets, a common source of wildfire; CEQA compliance and planning for vegetation management on state and local lands; project development and NEPA compliance for post-fire restoration in the 2021 Caldor Fire; and community wildfire protection plans for counties, communities, and fire departments.

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#wildfire, #fuels management, #ecosystem resilience

2:10 **Cutting the Green Tape: Benefits and Outcomes of the Restoration Management Permit Program – A Case Study from Malakoff Diggins State Park** Geoff Smick and Leigh Patterson

In 2020, the State of California started its Cutting the Green Tape initiative aimed at increasing the speed and reducing the costs for implementing habitat restoration projects. The overall goal of the Cutting the Green Tape initiative is to increase the efficiency and applicability of many aspects of the environmental approval process for restoration projects as well as increasing the scale of restoration projects to help achieve the State's 30x30 goals. One particular outcome of the program is streamlining the state regulatory permitting process for restoration projects. In this talk we will discuss several of the goals and outcomes of the overall Cutting the Green Tape program with special emphasis on the benefits and process of CDFW's Restoration Management Permit (RMP) program and how it can help speed up the regulatory permitting process. We'll also talk about how this program and its benefits resulted in California State Parks increasing the scope of a water quality improvement project at Malakoff Diggins State Park in the Sierra Nevada foothills to include additional habitat restoration elements in order to qualify for the RMP program. The result is a project with significantly more environmental benefits that is going to be able to be implemented this year due to the expedited permitting process. Without this fast-tracked permitting process, the project would likely have been delayed a year due to the traditional permitting timeline. In addition, fewer permits were needed for the project which saved the project proponents $70,000 in permit fees. The benefits and applicability of this new permitting program for restoration projects across the state provides schedule and financial benefits to restoration projects throughout the state while also resulting in more and larger restoration projects likely being implemented.

Geoff Smick[1] and Leigh Patterson[2].
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#cutting the green tape, #restoration permitting, #california state parks, #endangered species habitat restoration, #water quality

continued

Thinking Outside the Box: New Approaches to Current Challenges, Part 1 *Sat. 1:30p – 3:00p*

2:30 **Developing a Comprehensive Cross Border Resource Conservation and Management Program on the San Diego/Tijuana International Border** Christina Schaefer, Clayton Tschudy, and Teddy Cruz

In this presentation, we explore the institutional opportunities and constraints faced by the regional biological conservation and management efforts in. Specifically, we examine the impacts of international border policy and practice, efforts to foster science-based, multi-jurisdictional biological management and monitoring, funding constraints, and the challenges to include the recreating public, private properties, underserved communities, and indigenous peoples. The San Diego/Tijuana border region is a recognized biodiversity hotspot and home to the first science-based, regional, multi-species conservation program, the Multiple Species Conservation Program (MSCP). Driven by federal and state environmental regulations, this conservation program stops at the border albeit the habitats it intends to conserve do not. The massing of political, economic, and climate refugees in canyon slums on the Mexico side of the border is a humanitarian crisis with rapidly intensifying environmental and climate consequences for the critically important Tijuana Estuary on the US side. While isolated scientific communication and collaboration exist across the border, there is no comprehensive conservation and management approach to foster cross-border collaboration. Addressing this juggernaut of social, environmental, and political conflict requires a unified socio-ecological model where environmental solutions are also social solutions and there is a willingness from authorities on both sides of the border to work together with local communities to craft and fund integrated social/environmental policy.

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#cross-border region, #biological conservation and management, #socio-economic impacts, #comprehensive conservation program

Thinking Outside the Box: New Approaches to Current Challenges, Part 2

Session Leads: Joanna Tang and Stepanie Ma Lucero, UC Santa Barbara *Listed in order of presentation*

Saturday 3:30p – 5:05p with 15 minutes Q&A of for all presenters at the end

3:30 **Calculating Least Bell's vireo credits for the Otay River Mitigation Bank Project** Courtney Casey

The Otay River Mitigation Bank Project will improve existing Least Bell's vireo (LBV) habitat and restore historical LBV habitat currently not providing the minimal functions needed to support LBV use. The Mainstem floodplain areas are expected to support an increased number of territories. These areas are not currently supporting LBV and will be restored to meet LBV target quality requirements (for foraging and breeding). These mainstem areas currently exist in a heavily degraded state including high levels of invasive species (tamarisk, eucalyptus, non-native grasses), limited hydrology/water-connectivity, proximity to quality upland habitat, and disturbed terrain. Based on the absence of LBV in these areas and the known site conditions, it is presumed that these areas currently do not support adequate foraging and nesting habitat within a reasonable proximity, thereby precluding successful long-term occupation by LBV.

Recent modeling by USGS identified several important features common to LBV habitat, such as having >60% riparian vegetation, little to no slope, and being within 130 meters of water; identifying only 6% of the riparian habitat in California as suitable for the LBV. The target restoration elements benefiting LBV are as follows:

- Restoration of native riparian vegetation with canopy and shrub, supporting both nesting and foraging.
- Restoration of adjacent upland habitat buffer for foraging.
- Restoration of active floodplain habitat for improved foraging
- Funding and implementing a cow-bird trapping program for the Bank limit.

The following steps were used to generate the final LBV credit estimate.

Step 1: A qualitative estimate of current LBV territory condition was completed on the 2021 territories

Condition classification was based on existing native/invasive riparian vegetation, adjacent native upland buffer, elevation, and proximity to water. This classification was based on existing onsite information and best professional judgement regarding the key features identified by the USGS as being critical for nesting and foraging habitat. The post-restoration mainstem habitats were based on a variety of data including groundwater, 5-year inundation extent, existing vegetation, current delineation, and observations from pre-bank and surrounding "reference" habitat.

Step 2: Habitat predicted to occur in the mainstem Otay River post-restoration was modeled.

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Four major categories were evaluated, including Riparian Forest, Riparian Scrub, Seasonal/Emergent Wetland, and Riparian Transitional.

• Riparian Forest = Moderately tall, winter-deciduous riparian forests with broadleaved trees and several tree willows. Understories consist of shrubby willows.

• Riparian Scrub = Riparian zones dominated by small trees or shrubs, lacking taller riparian trees. Encroaching into some coastal saltmarsh habitats.

• Seasonal/Emergent Marsh = Occurs in areas where water tends to accumulate and supports emergent plant species.

• Riparian Transitional = Cottonwood forest bordered by alkali wetlands that transition to sage scrub in the foreground. Common species include spiny rush, spikerush, and San Diego marsh elder.

Step 3: Calculate Average Reference LBV Territory Size

The acreage of the higher quality 2021 LBV territories were evaluated to determine a reference size for predicting the number of post-restoration LBV territories that could be supported in the mainstem. The average territory size is 3.24 acres and the median is 2.97 acres. In order to be conservative in the estimate of post-restoration territories, the average will be used.

Step 4: Calculate Post-Restoration LBV Territory/Acreage Potential (credits)

• Total post-restoration LBV mainstem habitat (104.08) divided by the average reference territory size (3.25)

104.08/3.24 = 32.23

Post-Restoration Mainstem Territory Potential = 32 territories

• Deduct the current (2021) number of territories in the mainstem (7 territories, e.g. baseline) from the post-restoration mainstem territory potential (32 territories)

Post-Restoration Additional (credits) Mainstem Territories = 32-7 baseline territories = 25 territories

Post-Restoration Additional (credits) Mainstem Acreage = 25*3.25 acres = 81 acres

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3:40 **New Statewide Tools to Accelerate Aquatic Habitat Restoration Permitting** Stephanie Falzone

The major laws created to protect the environment — while essential — do not provide a separate approval process for advancing beneficial projects that fix environmental problems. Without alternative pathways in place, restoration projects are subject to the same regulatory procedures as development projects. It can be a very expensive, lengthy and complex process and sometimes a major disincentive to getting this important work done. Project proponents desire more regulatory certainty, efficiency, and partnership with the agencies to achieve their collective environmental goals.

To help address this challenge, Sustainable Conservation worked in partnership with the U.S. Fish and Wildlife Service, NOAA Restoration Center, U.S. Army Corps of Engineers, and the State Water Resources Control Board, with input from the California Department of Fish and Wildlife, to develop two statewide simplified and coordinated authorizations for a common set of environmentally beneficial aquatic and riparian restoration project types, including those with multiple benefits, and without specific project size limits.

These new authorizations, completed in August 2022, were designed to complement existing programmatic authorizations, including NOAA Restoration Center Programmatic Biological Opinions and related Consistency Determinations with the California Coastal Commission, to promote a more efficient and cost-effective process for both project proponents and agencies.

Sustainable Conservation will provide a high-level overview of these new statewide authorizations, how they complement other permitting pathways, and technical resources available to help project proponents and agency staff utilize these new regulatory tools.

Stephanie Falzone[1] and Erika Lovejoy[2]. Sustainable Conservation. [1]sfalzone@suscon.org [2]elovejoy@suscon.org

#Programmatic, #permitting, #aquatic, #riparian

3:50 **Determining Revegetation Success — Comparing Multispectral UAV Analysis to Traditional Field Transect Data Collection** Sundaran Gillespie

In 2019, WRA completed the planting of the Devil's Gate Mitigation Site Revegetation Project located at Petersen Ranch, currently the largest wetland mitigation bank in California. To determine if success criteria are being met over the agency-required 5-year period, WRA was tasked with quantifying absolute cover of vegetation within the designated planting areas. In order to do this, several belt transects were set across the site at the end of construction. These belt transects only capture the vegetation data within a 2.5m x 50m area. After three years of monitoring, transect data collection indicated that success criteria might not be met for absolute vegetation cover. In order to address this issue, WRA deployed a multispectral UAV (drone) to map the whole mitigation site rather than just the analyzing the transects. Using color infrared imagery, spectral signatures of the targeted planted species were extracted in GIS and mapped across the site. Comparing the mapping of the whole site with the UAV to the specified transect locations, we found absolute vegetation coverage to be 30–40

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percent higher resulting in achievement of target cover. Additionally, GIS staff extracted vegetation elevation profile data for the different species of the site. This is beneficial in terms of tracking vegetation cover complexity for critically threatened species that utilize the site. Overall, the use of the multispectral UAV added far more robust data for a clearer picture of the success of the restoration site.

Sundaran Gillespie, gillespie@wra-ca.com

#UAV, #Drone, #Multispectral, #GIS

4:00 **Digitizing the Workflow: Why I NEVER print datasheets** Robert Fitch

Collecting biological data in the field is challenging for variety of reasons and so, researchers are focused on upstream issues—rapidly and accurately collecting data to save time and costs—often without considering downstream issues of data formatting. Broadly, field ecologists use a standard workflow: collect data on physical datasheets, transcribe those sheets into a digital format, and then reformat the data for statistical analysis. What if I told you there is a better way? As mobile technology's computing power, storage capacity, and battery life improve, these types of devices are becoming much more common in a field ecologist's tool kit. Here, I present a study comparing the time, costs, and accuracy of different field data collection techniques from monitoring data taken over three years. Using a digital work flow was far more efficient and accurate. I also compare the benefits and limitations of techniques, and lastly, I humbly offer an example workflow for fellow practioners and researchers to utilize. Designing your data collection process so that it incorporates digital methods, an understanding of data structure/formatting, and knowledge of the end state for analysis, will save time, money, and heartache.

Robert Fitch, robertfitch@ucsb.edu

#data collection, #mobile technology, #workflow, #planning for success

4:10 **What's the easiest way to take data? Survey123!** Joanna Tang and Stephanie Ma Lucero

Tired of losing your crumpled paper data sheets? Ever forgotten to print out more sheets for your field crew? Done with wrangling different forms from different people and different survey methods? Run out of money to pay interns to decipher last field crew's handwriting to painstakingly enter in numbers by hand, and to hire someone else to correct typos? Looking for ways to streamline your workflow and easily share your data with collaborators, citizen scientists, and your future coworker who will take over your monitoring data and will need access to your mountain of historical datasets that you won't ever have time to organize properly? Survey123 is the solution for you!

Survey123 is an ArcGIS app that is specifically designed to easily create, take, and analyze ecological survey data. We will show you how to create your own survey online, and then how to take ecological data on your phone. We'll demonstrate how you can collect monitoring data (animal, plant, environmental), geospatial data, imagery, wildcard data, etc., with metadata connected to each data entry, and how to easily store, share, and integrate data in ArcGIS maps and other apps. Come join the fun with the newest, best, accessible way to take data!

Joanna Tang[1] and Stephanie Ma Lucero[2]. [1]PhD Candidate at UCSB, joannatang@ucsb.edu [2]PhD Candidate at UCSB, sama@ucsb.edu

#Survey123, #data collection, #ArcGIS, #digital data, #collaboration

Poster Session with Hosted Reception Friday 4:45p – 6:30p

Poster Chairs: Cassie Pinnell and Rachel White, Vollmar Natural Lands Consulting

Bothin Marsh Open Space Preserve: Tidal Marsh Adaptation and Resilience Mario Accordino

This poster will present ongoing planning and engineering studies evaluating options to improve habitat quality and sea-level rise resilience at the Bothin Marsh Open Space Preserve, on the shore of Richardson Bay in Marin County, California. This work is funded by Marin County Flood Control Zone 4, Marin County Parks Measure A, philanthropic support from One Tam members and Measure AA through the San Francisco Bay Restoration Authority.

Originally open water and mudflats, the Preserve contains a diverse range of habitats, formed through numerous man-made interventions including berm construction, creek channelization and wetland filling. The 109-acre Preserve is now home to a popular segment of the Bay Trail and special status species that rely on high marsh, tidal channel, and high soil salinity transition-zone habitats. Due to a limited sediment supply, these habitats are at risk of submergence and shoreline erosion as sea levels rise.

The project evaluated several alternatives for connecting the adjacent Coyote Creek to Bothin Marsh to enhance sediment delivery to the marsh. Geomorphic modeling was linked to 2D sediment transport modeling to estimate creek and estuarine deposition, and the resulting change in tidal marsh habitat area for each alternative. Additional near-term project measures to improve marsh resilience include inlet channel widening, thin lift sediment placement, coarse-grained beaches, and improved marsh interior tidal circulation. An adaptive management framework was developed to guide future interventions based on periodic monitoring of future sea-level rise projections, rates of marsh accretion, and watershed sediment yield.

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Resilience, Sea-Level Rise, Sedimentation, Tidal Marsh, Estuary

Steelhead Habitat in Jalama Creek: Assessing an Untouched Southern California Stream Carter Adamson

Jalama Creek is a stream located within the Dangermond Preserve in Santa Barbara County. The preserve was purchased by the Nature Conservancy in 2017 and is now considered one of the few areas within the Conception Coast Biogeographic Population Group that remains relatively untouched by human development. However, due to this recent acquisition, little is known about Jalama Creek's ecology and the suitability of its aquatic habitat for endangered southern steelhead (*Oncorhynchus mykiss*). The creek is documented to have historically supported an *O. mykiss* population, but there have been no confirmed sightings in the past 20 years. We assessed 11 miles of Jalama Creek from the estuary to its natural barrier to anadromy for suitable habitat for *O. mykiss*. No *O. mykiss* were observed during the survey. The data we collected, including water temperature, instream cover, spawning substrate, pool depth, and more, indicated generally suitable *O. mykiss* habitat in perennially flowing downstream reaches. We identify specific locations that would be the most ideal for any future *O. mykiss* relocation efforts to invigorate this struggling or absent population. Additionally, we provide recommendations for specific habitat restoration measures to take near these pools based on the stream channel's characteristics. Finally, five manmade barriers were identified along the *O. mykiss* migration corridor. We identify which are the highest priority for removal. Future efforts should focus on carrying out these recommendations and investigating their applicability to similar nearby Conception Coast with struggling *O. mykiss* populations.

Carter Adamson[1], Brandon Badal[1], Breanna Symens[1], Adrienne Ung[1], Casey Horgan[2], and Dane St. George[2]. [1]Watershed Stewards Program, Carter.Adamson@wildlife.ca.gov
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Steelhead, habitat, barriers, migration

A Natural and Low-cost Approach to Remediation Stelios Androulidakis and Ashley Kosak

When we tackle a problem, we tend to attack it head-on, using our resources to get the most out of a project and expecting a fast return. Using physics and chemistry we advance our technology and simply "get things done" so we can move on to the next project or opportunity that proves worthwhile.

The same goes for land or water remediation. When we are faced with such a challenge, our natural inclination is to clean it up as soon as possible, most times with an alarming urgency. Whether for concern over nature, the prospect of a future lawsuit, or just a general need to see things through or rid ourselves of a problem piece of property as soon as possible, we usually force things. From oxidizer injections in groundwater plumes to removal and replacement of soil or underground iron filing walls, the choices are many for a fast remediation. Unfortunately, not a single one of these solutions are low cost, so they are reserved for high priority cases. If the plot of land is valuable enough, or if forced by a lawsuit or government regulatory action, then the cost is justified.

What if we can lower the ROI of a contaminated plot of land by keeping the remediation low cost? This would of course require minimal equipment and/or machinery while still being effective in significantly lowering contaminant concentrations.

Let me introduce you to the small but dedicated community of phytoremediation

continued

consultants utilizing plants for natural attenuation and remediation at low cost. Though the concept and basic ideas are now around 30 years old, some time was required to hone and perfect the science behind the idea. We now have extensive research and references to fall back on, allowing for low-cost remediation of land or water using natural attenuation.

This brings such actions back into the range of affordability and allows for a return on investment of contaminated land that was not previously available as an option. The technology is currently fully functional, but a couple of small issues made its widespread implementation difficult in the past, the most prevalent of which was a lack of incentive.

Our goal at Green Aero is to connect landowners and businesses with the teams that will get this done.

We plan to do this by creating a repeatable framework for land phytoremediation processes and cross-training teams for background research and soil sampling, as well as delivering an educational library which will be used to provide Phase 1 historical analysis in a manual and eventually automated method for connecting phytoremediation teams to customers in need of this service.

A planned repeatable framework will allow for rapid iteration based on feedback from customers and teams in the field.

Stelios Androulidakis[1] and Ashley Kosak[2]. Green Aero [1]Director of Remediation [2]Green Aero CEO, ash@greenaero.org

phytoremediation, underserved communities, brownfields

Coastal grassland plant community shifts along a grazing management continuum Nora Bales

Rangelands cover the majority of the land area in California — approximately 60%. California rangelands represent a multi-billion dollar industry and are of vital importance from both an economic and ecological standpoint. Rangelands are comprised of a variety of habitats, but the habitat type with both the highest concentration of grazing and highest output of forage are grasslands. Along with their economic importance, California grasslands are reservoirs of biodiversity — grasslands alone support about 40% of California's total native plant species. Further, 90% of California's rare and endangered plant species are found in grasslands. California grasslands face challenges from non-native species invasion, drought, and land degradation. Restoration of this critical plant community and working landscape is needed to continue to support its vital ecological and economic functions. We conducted an observational study along a grazing management continuum to assess management impacts on plant community composition. Our study compared plant and soil responses of three ranches: one under continuous grazing management, one under rotational conservation grazing management, and a county park that has been ungrazed for 4 years. We hypothesize that rangelands managed under conservation grazing will have greater cover of native species and lower cover of nonnative species, and that the rangelands managed under conservation grazing will have plant communities more similar in structure and composition to intact native grasslands. We quantified plant communities by assessing cover and several aspects of the surface soil environment. We found significantly higher plant species richness under rotational conservation grazing compared to the other two sites. We found significantly higher diversity under continuous grazing compared to the other two sites. Average cover of native taxa did not differ between the sites. Naturalized plant cover was lowest at the county park with no recent grazing, and not different between the other two sites. We will evaluate whether soil properties or management are stronger drivers of these community shifts. Our results indicate that it is possible to support biodiversity and conservation goals in working landscapes.

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Rangelands, community ecology, restoration ecology, coastal grasslands

Lower Walnut Creek Restoration: 1 Year Post Construction Stephanie Bishop and Eve Pier Kieli

This poster will present the results of the first year of post construction monitoring of the Lower Walnut Creek Restoration Project located along the southern shoreline of Suisun Bay at the mouth of Walnut Creek. The design targeted restoration of a complex degraded estuarine landscape, creating a diverse range of habitats and integrating pre-existing habitat areas with newly restored landscapes. The project aimed to maximize habitat enhancement potential along the estuarine-upland interface including upland scrub, seasonal alkali meadow, sandy alkali playa flat, and tidal brackish marsh. A matrix of habitats was designed to interact as dynamic ecotones that provide valuable ecosystem functions under current conditions, and will evolve to continue as critical elements of the landscape in response to sea level rise and climate change.

ESA is actively engaged in monitoring key ecosystem parameters pursuant to the project's Monitoring and Adaptive Management Plan. The first year of monitoring results show the site performing as anticipated in most areas. The channels are on their way to becoming fully tidal, with channel and marsh development starting to adjust post-construction. The site has high vegetative cover as the project was designed and constructed to keep much of the existing vegetation in place. Despite consistent management of weeds since construction, weeds are expected to remain a primary challenge at the site. The site documented a significant increase in wetland conditions as shown in pre- and post-construction CRAM scores. The site will continue to be monitored for 10 years.

Stephanie Bishop[1] and Eve Pier Kieli[2]. [1]SBishop@esassoc.com [2]epierkieli@esassoc.com

#lowerwalnutcreek

continued

Building networks to inform the practice of assisted gene flow Benjamin Blackman, Daniel Runcie, Jason Sexton, and James Thorne

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

Benjamin Blackman[1], Siobhan Brady[2], Nicolas Kooyers[3], Daniel Runcie[4], Jason Sexton[5], and James Thorne[6].
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climate change, networking, assisted gene flow

Restoration of Ecosystem Services in Post-Fire Chaparral Landscapes Neda Brehm and Jorge Renteria

Fire in chaparral landscapes has a major impact on native vegetation and the ecosystem services that it provides, consequently post-fire restoration is sometimes implemented to promote chaparral integrity. To date, however, there is little data to indicate the impacts of restoration on ecosystem services and function. In this study, we assess restoration on the Piru Fire (2003), in Los Padres National Forest and ask how services recover with restoration. We applied the Postfire Restoration Prioritization Tool to the fire to identify areas with low natural regeneration capacity and established 16 plots (4m x 4m) for restoration and 16 adjacent controls. We planted 837 plants using a palette of 18 native species (January 2022) and recorded: monthly data on mortality; plant height, canopy cover, presence of non-native species, and bare ground (April 2022); invertebrates using pitfall traps and sweep nets (May 2022); extracted soil cores (October 2022); and buried tea bags to assess decomposition rates. Restored plots were watered (2 gallons per plot/month) from June to October. Initial results show after six months, the majority of species had over 70% survivorship with *Artemisia californica* and *Elymus condensatus* at 99% and 98% respectively, while *Quercus berberidifolia* had the lowest survivorship (7%). Mortality in chaparral species started in July and slightly delayed to August for coastal sage scrub species. The second field season is planned for Spring 2023. Our findings are intended to be of value to USDA Forest Service resource managers involved in decision-making relating to restoration.

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Post-fire, Chaparral Restoration, Environmental Services, Los Padres National Forest

Effect of grazing regimes on spider web and animal burrow abundance Anna Buecheler

California hosts many diverse systems including rangelands which harbor significant biodiversity, provide economic value, and support important ecological functions. With over 58 million acres, it represents the largest land use in California. California rangelands on the central coast, face many challenges including drought, non-native species invasion by non-native annual grasses, and land degradation. Our study is comparing the ecological responses of three sites in the Central Coast under three different types of management. One ranch is under continuous grazing, one ranch is under rotational conservation grazing and one county park has been un-grazed for 4 years. Our research question is does grazing effect arachnid activity and burrowing animal activity? Our hypothesis was that rotational grazing would increase both arachnid activity and burrowing animal activity. Data was collected in the span of a month from 3 pastures where we sampled 3 different sites at each site, we generated 3 random points. We set up 100 meters transect lines and counted the burrows and spider webs in a one-meter width on one side of the transect. We analyzed the data in R. There was a significant difference in the abundance of spider webs with significantly more spider webs in site that practiced rotational conservation grazing, and the least amount of spider webs found in the county park site. We found the opposite to be true about animal burrow abundance where the highest abundance was found in the county park, and the least abundance in the continuous grazing site.

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continued

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Rangelands, Arachnids, burrowing animals

Promoting Natural Recruitment for Ecosystem Resilience in Process-Based Floodplain Habitat Restoration Jennifer Burt

The growing emphasis on multi-benefit flood risk reduction projects is leading to new and exciting opportunities to restore critically important riparian floodplain ecosystems. Simultaneously, climate instability elevates the need to examine and improve our approaches to restoring resilient ecosystems at scale. While horticultural (i.e., actively planted) restoration approaches have been most commonly employed in recent decades, using a facilitated natural-recruitment approach to vegetation establishment in riverine and floodplain restoration offers a cost-effective and likely more naturally adaptable solution. Here, we review and compare multiple Central Valley restoration sites to highlight the benefits of harnessing natural recruitment in process-based habitat restoration. We will illustrate how this approach may help meet challenges that intensify with our changing climate (such as extended droughts, heat stress, severe floods, and plant pathogens). We also describe critical factors that affect the likelihood of successful restoration using an assisted natural recruitment approach, by reviewing commonalities among successful process-based floodplain habitat restoration projects and describing how site selection and management approaches may vary from the traditional horticultural restoration mindset. In summary, this presentation is intended to serve as a practical guide for process-based restoration application to promote dynamic and diverse ecosystems that are highly resilient to the effects of ongoing perturbances and climate change.

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process-based, floodplain, recruitment, riparian

Habitat Restoration at Hidden Valley Wildlife Area following long-term Arundo management Christiana Conser

Riverside County Regional Park & Open-Space District and HANA Resources will restore and enhance native habitat in Hidden Valley Wildlife Area (HVWA) in Riverside, California. Riverside County Regional Park & Open-Space District (Parks District) obtained funding in 2020 from the California Wildlife Conservation Board (WCB) to develop a conceptual restoration plan for ecosystem restoration, with a focus on removing giant reed (*Arundo donax*) and other high-priority invasive plants (castor bean, saltcedar, tree tobacco, poison hemlock, and perennial pepperweed) and restoring approximately 980.88 acres of native riparian and upland habitat. The project builds on the success of a 30-year effort by Parks to remove giant reed within HVWA. Parks District has been managing giant reed at HVWA since 1991, when it covered approximately 90 percent of the riparian habitat along the Santa Ana River (SAR) in Prado Basin. At HVWA and throughout the watershed, efforts continue to remove giant reed stands and continue to treat resprouts and new infestations following wildfire and flooding. Large giant reed "scars", areas where giant reed was removed, are not recovering and remain devoid of vegetation. Disturbance in these scarred areas will continue to facilitate re-invasion of giant reed and other invasive plants. In these denuded and degraded areas where large giant reed infestations were removed, active restoration is needed to reestablish the native riparian and upland vegetation. Passive restoration (enhancement) is appropriate in areas where smaller, less dense stands of giant reed were removed. The project will reduce wildfire risk through fuel reduction through the removal of giant reed biomass and the creation of fuel breaks by planting cactus in upland habitats bordering the surrounding residential neighborhoods. The project will improve and increase breeding habitat for least Bell's vireo (*Vireo bellii pusillus*) and provide co-benefits such as improved habitat and habitat connectivity for other special-status species that inhabit or could potentially inhabit HVWA.

The project will be executed in five phases. Phase 1, which was funded by the California Wildlife Conservation Board (WCB), will be completed in 2022. Phase 1 tasks include Project Management, Outreach & Planning Meetings, Habitat Restoration Plan (HRP) & Designs, GIS/Aerial Imagery, and finalization of the Environmental Review and Management Plan Outline (WCB 2021). The California Environmental Quality Act (CEQA) compliance tasks associated with this phase include securing CDFW's approval of the Statutory Exemption for Restoration Projects (SERP) and conclusion of technical studies (biological and cultural resources). Data from the technical studies (soils, hydrology, vegetation, wildlife, and special-status species) was used to describe the existing site conditions to inform the restoration design.

The project will be executed in five phases. Phase 1, funded by the Wildlife Conservation Board, will be completed in 2023. Phase 1 tasks include environmental compliance and development of a habitat restoration plan (HRP). Project implementation will occur in Phases 2–5. Each implementation phase will be five years in duration and the entire project will be completed within 20 years. Phase 2 is projected to start in 2022 and will consist of giant reed biomass removal followed by planting Mulefat Scrub. Phase 3 consists of Willow Riparian and Southern Cottonwood/Willow Forest planting. Phase 4 will consist of Riparian Scrub and Riversidean Alluvial Fan Sage Scrub planting. Phase 5 includes Coastal Sage Scrub/Cactus planting. Management of

continued

giant reed resprouts and seedlings will be performed throughout all phases. Targeted management of high-priority invasive plants will be performed in the restoration areas within each phase

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#HVWA, #arundo, #Santa Ana River, #riparian

Community Engagement in Sea Level Rise planning on the North Richmond Shoreline Linnea Cutler-Tucker

The North Richmond Living Levee project, funded by the San Francisco Bay Restoration Authority, focuses on sea level rise adaptation planning for the West County wastewater treatment plant along the North Richmond shoreline. The project proposes a living levee to protect resources at risk from sea level rise as well implement improved accessibility to the coastline for community members. The project falls within a larger effort to restore five miles of North Richmond coastline to improve habitat, community access, and sea level rise adaptation planning. The North Richmond Living Levee project will eventually serve as a demonstration project for the larger shoreline restoration. The project is an opportunity to implement various design elements which are proposed in the larger five-mile plan without the barriers that exist in larger scale planning efforts such as fragmented land ownership and multi-use landscapes. The project has prioritized developing community partnerships throughout the planning process and has incorporated a robust community led design effort by gathering insights from the North Richmond community through small focus group discussions, monthly working meetings, site visits, conversations with local indigenous leaders and online surveys. The discussions served to educate the community on the impacts of sea level rise in their communities as well as gather insights into the preferences and priorities of community members with regards to amenities, access to the shoreline and workforce development as the Living Levee design progressed. This feedback allowed designers prioritize features that were most important to community members in the proposed design.

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#NorthRichmond, #LivingLevee, #CommunityEngagement, #NorthRichmondSLR

South Fork Preserve: A Wild Home Away From Home Amanda Farnsworth

Putah Creek South Fork Preserve is a 120-acre public access preserve, featuring remnant and restored riparian habitat, as well as restored upland shrub and oak savannah systems, which was completed by the Army Corps of Engineers in the late 90s. It is located in Davis, California, and is under the management of the City of Davis' Open Space department. Fostering a sense of place at South Fork Preserve is a priority of the Open Space department which has utilized several strategies to achieve this goal, resulting in greater use of the site by the public and very positive public feedback, indicating the value of this site is being recognized widely. Thoughtful improvements to the site to increase accessibility, inclusion of the public and partners for habitat and site improvement projects, and regular engagement with visitors have created a space in which visitors feel a strong sense of connection and are inclined to engage in stewardship activities. This will ultimately serve to preserve the site's ecological value and functions through continued site improvement and, hopefully, renewal of Measure O which funds the Open Space Program. Fostering a sense of place is not something that happens just because a place exists, but rather is a long term effort which requires a considerable amount of planning and work.

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Putah Creek South Fork Preserve, City of Davis, Open Space, Fostering a sense of place in Davis

Propagation Protocol Review: Testing Methods for Efficacy in Mojave Desert Species Mazy Hardell and Kyle Foster

In light of a rapidly changing climate, land use change towards human development, and the intrusion of non-native plant species into habitat — the need for sources of native seed is increasing. To address this, smaller wildland seed collections are being cultivated to "bulk up" reserves while limiting the effects of collection on their point of origin. However, this process is difficult as existing propagation protocols have varied efficacy between collections of the same species due to the local adaptations those populations have developed overtime. In other cases, there exist few recorded propagation trials for specific species adding further difficulty when considering best practices for cultivation. To this end, Victor Valley College (VVC), in partnership with the Bureau of Land Management, has conducted field and propagation trials for several plant species using seed collected from various eco-zones within the Mojave Desert. For the year 2023, VVC has conducted propagation trials for the species: *Acmispon rigidus*, *Hymenoclea salsola*, *Senecio flaccidus*, and *Xylorhiza tortifolia* — testing existing protocols and methods for cultivation of these species for future restoration and seed bulking field trials.

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Mojave Desert, Native seed increase, National Seed Strategy, Victor Valley College

Experimental Enhancement Plantings of Torrey Pines in their Native Habitat Christa Horn

Torrey pines (*Pinus torreyana* ssp. *torreyana*), one of North America's rarest trees, faces increased threats from bark beetle infestations in tandem with drought stress at Torrey Pines State Natural Reserve (TPSNR). Recruitment at TPSNR appears to be lower than the *P. torreyana* ssp.

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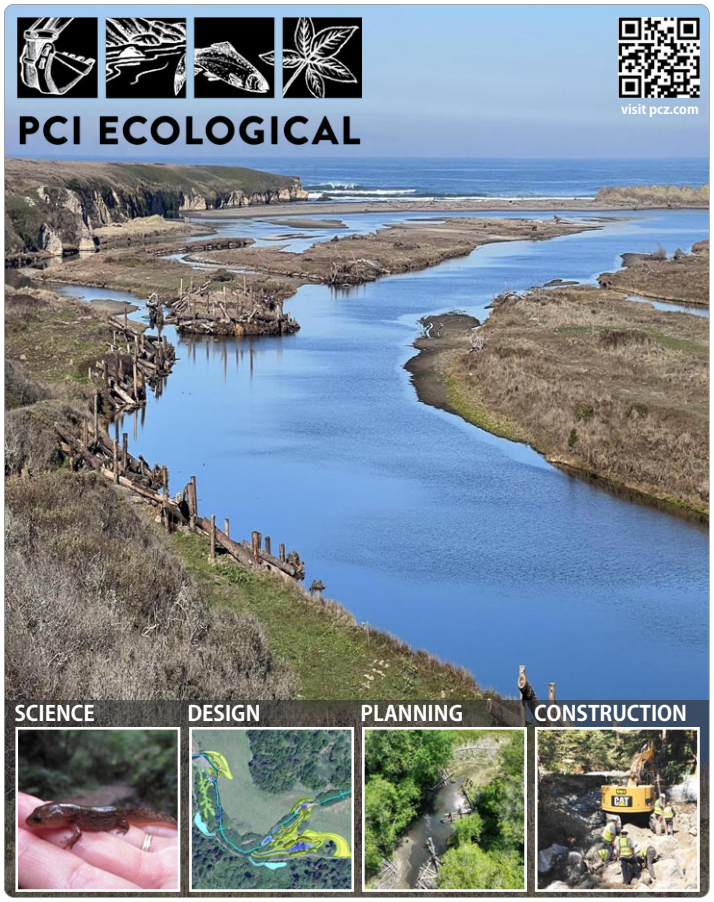
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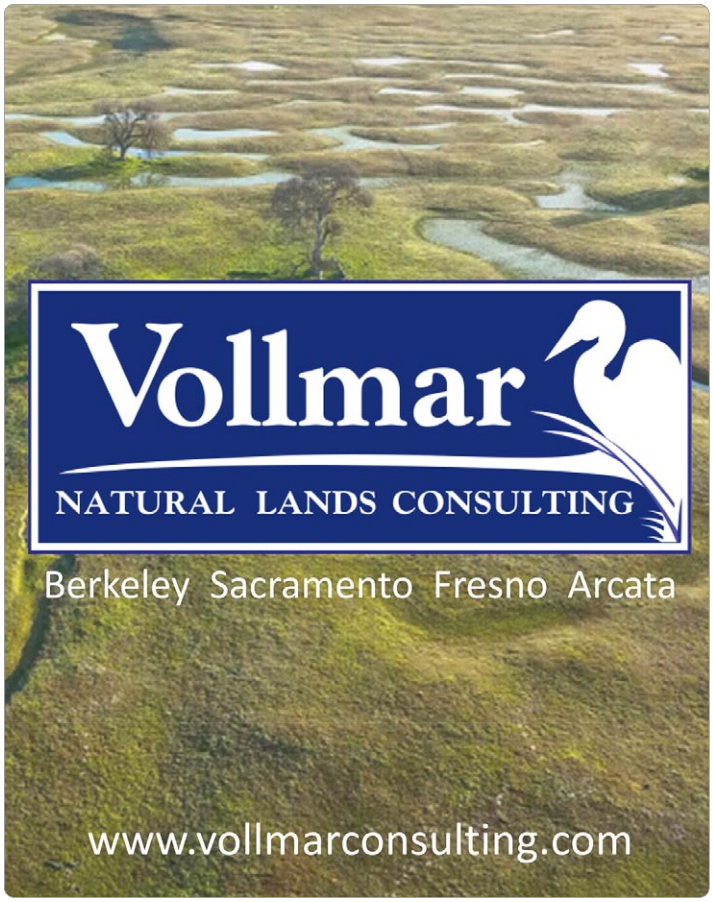
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"Conservation is a state of harmony between men and land."
Aldo Leopold
SANTA CLARA VALLEY
HABITAT AGENCY
https://scv-habitatagency.org/


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insularis subspecies and in areas where it is naturalizing outside of its native range. Thus, to counter losses from bark beetle, we are working with State Parks to implement small-scale enhancement plantings within an adaptive experimental framework to learn about the conditions and microsites most conducive to seedling success. Initial plantings in 2021 and 2022 across three treatment types (existing stands, restoration of beetle-impacted areas, and novel areas) suggested size was more important in existing stands than in other treatment types and that light and soil characteristics differing between treatments influenced survival and growth. Restoration sites fared best, with high light and higher nutrient availability (from decomposing trees). Logistical problems with watering, paired with drought conditions, highlighted the importance of water during recruitment. Adapting knowledge from early results, additional plantings are occurring in areas with a higher water table, and we are adding mulch to novel areas in an attempt to increase nutrient availability in these high light plots. Results from all efforts, paired with other research into variables impacting adult stand susceptibility to various threats will inform a long-term restoration plan for TPSNR.

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rare tree, experimental restoration, enhancement planting, Torrey pine

Kendall-Frost Marsh Reserve: The warp around which wetland "ReWilding" is woven Isabelle Kay

The remnant one percent (40 acres) of tidal marsh in Mission Bay, San Diego, California has played a pivotal and outsized role in the training of wetland scientists since half the acreage became a founding unit of the UC Natural Reserve System, in 1965. In the past three decades it has increasingly become a focus for the increasingly consequential choices the city makes regarding climate response and resilience because of the first-hand experiences of natural habitat restoration by large numbers of community volunteers. This poster will describe both the transition zone habitat restoration that could only have been achieved with the long-term, significant contributions of hands-in-the-mud work, but also the weaving of a county-wide coalition of UCSD NRS staff, scientists, and students; wetland neighbors; local environmental NGOs; indigenous Kumiai; students from kindergarten to post-doctoral standing; recreational businesses; churches; and labor unions, all demanding large-scale wetland restoration in Mission Bay Park. This ReWild Mission Bay coalition calls on the city to maximize the benefits for the community in terms of the restoration of an indigenous cultural presence, water quality improvements for non-contact and contact beneficial uses, endangered species habitat expansion, buffering the city's infrastructure from sea level rise, carbon sequestration, and most importantly, a chance for people to actively steward their coast.

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tidal marsh, volunteers, Kumeyaay (Kumiai), Rewilding

Barren Marshland: A result of low ammonium and fine-grain soils Elijah Khan

This study is focused on an area of Kendall-Frost marsh that is completely devoid of vegetation cover. This area was compared with adjacent, healthy (fully vegetated) areas of the marsh across a number of environmental variables. Our initial hypothesis was that eutrophication was occurring in this area due to the fact that water often pools there. Measurements of salinity, pH, temperature, water content, grain size distribution, and Ammonium and Nitrate content were taken at a series of random points across both the barren and healthy areas. The data from these measurements were then run through an Analysis of Variance test and an ad-hoc Tukey's Honest Significant Difference test where applicable. These statistical analyses showed that the healthy areas of the marsh had significantly higher ammonium content than the barren areas. It is unlikely then that our initial hypothesis was correct, as we would expect the barren areas to have more ammonium than the healthy areas if eutrophication was occuring. Additionally, we found that the barren areas had significantly finer soil grains than the healthy areas. It was also found that the healthy areas had significantly higher water content than the barren areas. This combination of results lead us to the possible conclusion that the barren area consists of mostly dense clay, which prevents the permeation of water into the soil.

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salt marsh, comparative study, San Diego, soil science

UCI Masters in Conservation and Restoration Sciences Noreen Mabini

The University of California, Irvine Masters in Conservation and Restoration Sciences (MCRS) is a professional graduate program in which students earn their degree while gaining real world experience in restoration. This program is designed for individuals with varying degrees of experience in ecology and facilitates their growth as scientists. During their second year, students are required to complete a group capstone project. Current capstone project topics include Beach Wrack Diversity, White-tailed Kite Population, and Marine Mammal Gillnet Entanglement. These projects involve fostering a relationship with community partners and local organizations through which students learn to design, develop, conduct, and implement a project. Post-graduation, MCRS alumni have gone on to work in government agencies, environmental consulting firms, and non-profit organizations.

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Southern California, Master's Program, MCRS

Project Grow: Training The Next Generation of Restoration Leaders Noreen Mabini

Project Grow teaches student volunteers ecological concepts through a tiered learning structure. The primary program staff are graduate students who share their experience and knowledge with students of all ages to inspire the next generation of ecologists. Through this hands-on educational experience, Project Grow leaders simultaneously carry out restoration projects and practice project coordination, management, and communication with the public.

With Project Grow, undergraduate student interns develop deep connections with their environment while growing their ecological knowledge and habitat restoration skills. During our events, volunteers physically connect with the earth, which spurs interest in restoring and protecting the environment in the Newport Bay Area. Incoming student educational backgrounds range from biology, earth science, environmental science, to political science and economics. Through consistent (weekly) stewardship and involvement, student interns gain a sense of ownership and pride in our restoration and mitigation sites.

Staff grow alongside their high school and undergraduate partners as they prepare for higher level positions in the environmental field. Project Grow acts as a place for all to connect with each other and learn from the environment around us.

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Volunteers, Education, Training

The dirt on wet meadow restoration: changes in carbon sequestration Sabrina Nielsen

Drakesbad meadow has been subject to restoration over the past two decades after hydrologic modifications before and after its incorporation into Lassen Volcanic National Park. Wet meadows provide many ecosystem services, one of which is carbon sequestration. While research has been done on the short-term changes in groundwater and vegetation composition, we were interested in examining the longer-term changes in soil carbon. Soil carbon was initially measured in 2004 and we resampled using the same methods in summer 2022, 18 years later. We analyzed and compared percent carbon and organic matter. Post restoration, under ideal circumstances we would expect an increase in carbon levels over time. Our analysis demonstrates that across the meadow, measured carbon has decreased. We infer that ground water level changes resulting from two historic droughts over the course of our study could be linked to the decrease in carbon. Long-term studies and continued monitoring of restoration sites is critical to ensuring restoration is effective and continues to bring benefits to the ecosystem.

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soil carbon, wet meadow, ecosystem services

Soil Nematode Community Responses to Rangeland Grazing Regimes Kylee Nielsen

Soil nematodes are a diverse group of organisms that respond readily to changes in their environment making them a valuable measure of soil health. Rangelands are highly diverse ecosystems in which nematodes react to the conditions of the environment around them. Within the scope of this study, nematodes were examined across three ranches representing three different grazing regimes: continuous, rotational, and 4 years of grazing exclusion. Nematode diversity was assessed by functional groups based on feeding habits including bacteria feeding, plant feeding, fungal feeding, omnivorous, and predatory nematodes. Using this approach, we can derive clues about the state of the ecosystem being studied based on the groups of nematodes present. Nematodes react to the amount of substrate and prey around them, to the physical and chemical properties of the soil, and to the other organisms in the soil food web. In this study, nematodes were extracted from the water films in soil samples using the Baermann funnel technique. The specimens were then preserved in formalin and quantified. The first 150 were sorted into trophic groups and their relative abundance was applied to the rest of the sample. Data analysis is ongoing, but initial results show that nematode abundance decreases significantly in the continuous grazing regime compared to rotational and non-grazing sites. While nematode communities did not differ significantly between pastures within each ranch, they did vary significantly between the ranches. Going forward, a community analysis of the nematode population will provide more information about how the grazing regimes have affected both the nematodes and the health of the soil ecosystem as a whole.

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rangeland, soil, nematodes, biodiversity

Digitizing California Rapid Assessment Methodology Taylor Paez

Data collection takes up much of the already limited time and budgets scientists have in the field and often requires additional time to digitize. The California Rapid Assessment Method (CRAM) for wetlands is a methodology that involves the

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collection of data in the field, traditionally requiring multiple books and many pages of paper, sometimes in remote locations. The EcoScan™ application has been developed to meet the needs of wetland assessors. EcoScan™ is a cost-effective, field-tested, and practical software that allows users to efficiently perform CRAM assessments, reduces errors, and improves overall data accuracy and consistency.

Traditionally, researchers recorded CRAM observations on paper recording forms and used digital cameras and hand-held GPS devices to capture images and record locations. Then notes were manually entered into spreadsheets, which are then linked to images and GPS waypoints. The EcoScan™ digitization of CRAM involves the integration of remote sensing data, geospatial information systems (GIS), and field-based assessments. High-resolution aerial imagery and satellite data are used to identify and delineate wetland boundaries. Field teams then collect data on physical, biological, and hydrological attributes of the wetlands, which are then entered into via smart phone or tablet to a digital database. This information is processed using specialized algorithms to generate numerical scores representing the overall ecological condition of the assessed wetlands.

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#CRAM, #wetlands, #remotesensing #riverine

Salmonid Habitat Restoration at San Geronimo Creek Lily Partida and Lucy Montgomery

San Geronimo Creek is located in Marin County within the Lagunitas Creek watershed, which is home to the southernmost viable independent population of coho. A recent restoration project was led by the Salmon Protection and Watershed Network to restore fish passage and improve summer and winter rearing habitat for coho and steelhead. Habitat at the project site was impacted by multiple stressors including a former golf course purchased by The Trust for Public Land and an ineffective fish ladder, which caused emigrating smolt mortality and prevented movement of juveniles. The work we are presenting investigates biotic and abiotic features related to salmon survival for four reaches of San Geronimo Creek. Reaches 1 and 2 have experienced recent restoration projects and Reaches 3 and 4 have restoration projects in the process of being designed by Environmental Science Associates through a Technical Advisory Committee process convened by Trout Unlimited. Reach 1 is the location of the fish barrier removal and a fish passage project with the goal of restoring fish passage for all salmonid life-stages on San Geronimo Creek. The numerous constraints for the design and implementation of this new fish passage project included significant adjacent cultural resources, existing land use, and

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downstream landowner access issues. To achieve fish passage within the context of these constraints, significant riparian tree removal was necessary. It was determined that the short-term project impacts of riparian tree removal were acceptable in order eliminate the existing significant mortality occurring to smolts and juveniles. A replanting program was put in place to restore the riparian zone long term. The goals of restoration for Reach 2 are increasing summer and winter habitat complexity. This is achieved through creation of secondary channels, tree islands, installing large woody debris structures, and biotechnical bank stabilization. The water quality information from Reaches 1 and 2 is being used to determine the best restoration and maintenance options to improve both wet and dry season habitat for Reaches 3 and 4.

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Lagunitas Creek Watershed, Habitat Restoration, Anadromous fish

Cordilleras Health System Project: Native Landscaping in a Mental Health Setting and as Mitigation for Construction Impacts Todd Easley

Native landscaping is being used in a new mental health facility to promote awareness of, and interaction with, the natural environment and aid in the healing process. The current Cordilleras Mental Health Rehabilitation Center building in San Mateo County is aged and does not provide adequate facilities to treat people with Serious Mental Illness. The Project Development Unit in the San Mateo County Manager's Office is replacing the building with a state-of-the-art campus to meet the community's needs. The project is set in a canyon near the headwaters of Cordilleras Creek and is very constrained by topography. Several designs and alternative sites were evaluated by the County to minimize impacts. Project mitigation includes protection of rare plants, creek enhancements, both on and off-site, and a predominantly native palette in the project landscaping. The native palette also melds the campus into the surrounding environment, and brings the surrounding environment into the healing space, so that the facility feels very connected to nature. RHAA landscape architects developed the landscape design, and called on MIG biologists to help them understand which plant species would be suitable for the site. The landscaping includes an expanse of native oak woodland and meadow between the main building and four group living centers. The centers have courtyard gardens that are intended to be sensory, but that also need to be safe. These walled gardens provide opportunities for touch, smell, and taste that are important to bringing people into contact with their surroundings. Because the landscape ties well with the surrounding habitats, many wildlife species are expected to use the habitats seamlessly, particularly birds, further enhancing the experience.

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Native Landscaping, Mental Health, Mitigation Strategy, Healing

Native Seed Production and Optimization: Mowing and Burning Techniques on Agricultural Fields of *Stipa pulchra* Mary Sand

Native seed growers continually optimize their farming techniques to grow quality seed that establishes successfully and can reseed over multiple generations. Growers have even mimicked natural interactions such as animal herbivory and prescribed burning to improve stand health and production. In this experimental design, mowing, burning, and swathing trials are tested on replicated plots of the study species *Stipa pulchra*. The observed effects are compared to 'old growth' control fields where the grasses are left untreated in the field through Fall dormancy. Examined response variables include inflorescent counts and seed production per individual compared to the control fields. This study is currently underway, and data is expected to be collected and analyzed by April 2023.

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#grasslands, #seedproduction, #Stipapulchra, #restoration

Rekindling Ties, Restoring Habitats David Self

I'm working to rekindle human relationships with useful plants of suburban Davis in ways that used to sustain stewardship of plants and habitats and related uses and culture in places around the world. I'll present a few of the uses and stewardship activities I've tried here, others I wish to try, and the types of artisans, scientists and others who could help enrich, refine and share practices and help nurture local stewardship, celebrations and sense of place.

David Self, landoc@mac.com

Ethnobotany, foods and crafts, stewardship culture, suburban restoration

Microarthropod Abundance and Taxonomic Diversity in Coastal Rangelands Carly Sussman

We aimed to investigate the abundance and taxonomic richness of microarthropods in coastal rangelands in San Luis Obispo, CA. This research focused on the relationship between the grazing regime at a site and microarthropod abundance and diversity. Rangelands are a common land use across California, particularly the Central Coast, and microarthropod biodiversity can be used as an indicator of soil and ecosystem health. Soil microarthropods are a diverse group of small invertebrates including insects, mites, and spiders. As decomposers, they are essential to soil organic matter formation, nutrient cycling, and soil structure. We

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FLOWING GROWING KNOWING

collected soil microarthropods at rangeland sites categorized under 3 different grazing regimes. One site is continuously grazed, the second is rotationally grazed, and the third site has not been grazed for 4 years. We hypothesized that microarthropod taxonomic richness and overall microarthropod abundance would be related to the grazing regime. We expected the continuously grazed site to host the lowest abundance of microarthropods compared to the rotational and ungrazed sites. Soil samples were collected from field sites to capture microarthropod samples using a modified Tullgren funnel for microarthropod extraction. We scanned the microarthropod samples using an Epson Perfection V600. Using R, we performed an ANOVA test across the 3 grazing treatments and found a statistically significant decrease in microarthropod abundance for the continuously grazed rangelands. The findings suggest that grazing regime has a significant impact on microarthropod abundance in coastal rangelands. Going forward, we will perform analysis to see if there is a statistically significant difference between grazing regime and microarthropod taxonomic richness, with a focus on collembola and acari.

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#microarthropods, #rangelands, #restoration, #biodiversity

Characterizing Red-eared Slider Upland Habitat Use at Bushy Lake in Sacramento, California Alexandra von Ehrenkrook

The Red-eared slider (*Trachemys scripta elegans*) is a freshwater turtle native to the eastern United States. The species has been released and become established in California waterways through the pet trade and other means. It is the second-most invasive reptile globally. It is believed to be outcompeting California's only native freshwater turtle, the Western Pond turtle (*Actinemys marmorata*). Increased data on Red-eared slider habitat usage in California is needed to better understand competition mechanisms.

This study utilizes telemetry to monitor Red-eared sider terrestrial habitat use at Bushy Lake, a highly disturbed urban environment on the lower American River, in Sacramento, California. Two years of mark-recapture, basking, and nesting surveys have identified populations of 7 resident, healthy adult Northwestern Pond turtles (*Actinemys marmorata marmorata*) and 290 Red-eared sliders.

This study's goal is to answer 4 questions: 1) What terrestrial movement patterns do Red-eared sliders exhibit during the nesting season; 2) do sliders have preferred macro and microhabitats; 3) how far do sliders travel from the water; and 4) do male and females exhibit different movement patterns. The movements of 8 male and 8 female sliders will be monitored from April through August 2023. The macro- and micro-habitats will be assessed in upland locations of prolonged stay. Macrohabitats will be assessed in 10-meter radii utilizing elevation and vegetation type. Microhabitats will be assessed in 5-meter radii utilizing vegetation composition, vegetation relative cover, and ground substrate. The total travel and straight-line travel distances of turtles will be measured in ArcGIS Pro.

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Red-eared Slider, Northwestern pond turtle, Bushy Lake, Telemetry

Preliminary quantification of Pacific lamprey in Big Sur River Sophie Wong

Pacific lamprey (*Entosphenus tridentatus*) are one of the most widely distributed anadromous fish in the Pacific, with a historical range stretching from the Bering Sea to Mexico. Despite not being federally listed, Pacific lamprey have been classified as Imperiled by the Pacific Lamprey Conservation Initiative and are a growing conservation concern due to large reductions in abundance and distribution. Pacific lamprey are present in the Big Sur River, but the abundance, life history, and ecological role of this species in this watershed is not well understood. Utilizing four years of opportunistic counts of Pacific lamprey redds collected along the lower 7.8 miles of the Big Sur River between fall 2017 and spring 2022, as well as environmental parameters of river discharge, water temperatures, and precipitation indices, we were able to complete preliminary estimates of lamprey populations and characterizations of lamprey spawning behavior within the lower watershed. In 2022, a total of 468 lamprey redds were observed along this reach of the Big Sur, which represents approximately 31% of the river available to Pacific lamprey, with peaks in spawning in April and May. The redd counts for *E. tridentatus* appear to be independent of the native steelhead (*Oncorhynchus mykiss*), although there are greater numbers of lamprey redds in areas where fewer steelhead redds are reported, indicating that the two species utilize separate spawning habitat. Lamprey redd counts did not show a relationship with the environmental parameters included in this study. Anecdotal observations of a lack of lamprey larvae or overwintering adults shows the potential for a unique life history of these Pacific lamprey in Big Sur, and future research may identify a valuable refugia habitat for this species along the Big Sur coast.

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Pacific lamprey, Big Sur, Redd survey

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