

Think BIG start small Restore NOW

Planting Diversity in Our Projects and Communities

SERCAL 2022 Hybrid Conference
Carmel Valley * Livestreamed * Recorded
11-13 May at Palo Corona Regional Park

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Please tag us! #ThinkBigStartSmallRestoreNow
#InspireAndBeInspired #RestorationInOurBackyard
#RestorationForAll #sercal #DiversityPlantingDiversity

Many thanks to the generous support of our amazing community

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Our Dedicated Conference Team

Conference Chair

Thor Anderson *Burleson Consulting, A Terracon Company*

Session Chairs

Bruce Delgado *BLM*

Eddie Divita *ESA*

J.P. Marie *CNGA & UC Davis*

Joanna Tang *UC Santa Barbara*

Laura Moran *SWCA Environmental Consultants*

Lauren Huff *SWCA Environmental Consultants*

Wolfgang Schweigkofler *Dominican University of California*

Fieldtrip Leaders

Beth Febus, *Big Sur Land Trust*

Dash Dunkell *Elkhorn Slough Foundation*

Jackie Nelson *Monterey Peninsula Regional Park District*

Kevin Contreras *Elkhorn Slough Foundation*

Laura Lee Lienk *Return of the Natives Restoration
Education Project*

Rachel Saunders *Big Sur Land Trust*

Special Event Chairs

Cassie Pinnell *Vollmar Natural Lands Consulting*

Greg Andrew *Career Panel (virtual)*

Lindsay Teunis *Open Mic, Raffle & Silent Auction*

Will Spangler *Career Panel (in-person)*

*The In-Kind Donations of these marvelous
local businesses:*

Central Coast Entertainment

Fire on Wheels Pizza

*And last, but certainly not least, the
incredible support of the Terracon
Foundation and the Victor & Susan Schaff
Family Foundation... mil gracias!*

SERCAL 2022 Schedule at a Glance

Think **BIG** start small **Restore NOW**

	Fiesta Room <i>Recorded / Livestream</i>	Merienda Room <i>Recorded</i>	Discovery Center <i>Recorded</i>
Wed 11 May: Day 1 Hosted Breakfast & Exhibitor / Poster Setup beginning at 7:30am			
8:30-10:00	Esselen Tribe Blessing, Welcome, Announcements, & Plenary Panel		
10:00-10:30	Hosted Coffee Break		
10:30-12:00	Restoring the Coastal Zone	Thinking Big about the Carmel River	Posters & Mentoring
12:00-1:30	Hosted Lunch		Career Panel (12:30-1:30)
1:30-3:00	Restoring the Coastal Zone	Thinking Big about the Carmel River	Posters & Mentoring
3:00-3:30	Hosted Coffee Break		
3:30-5:00	Restoring California's Grassland Ecosystems	Planning for Success	Posters & Mentoring
			Walking Tour: Carmel River (3:15-5:15)
5:00-7:00	Poster Session & Reception		
Thu 12 May: Day 2 Hosted Breakfast beginning at 7:45am			
8:30-10:00	Restoring California's Grassland Ecosystems	Letting the River Flow	California Grown: Updating Nursery Practices
10:00-10:30	Hosted Coffee Break		
10:30-12:00	Planting Community	Letting the River Flow	California Grown: Updating Nursery Practices
12:00-1:30	Hosted Lunch with Awards and Raffle Drawing		
1:30-2:00	DRONE Photo <i>(this is going to be awesome)</i>		
2:00-3:30	Planting Community	Planning for Success	
3:30-4:00	Hosted Coffee Break		
4:00-5:00	Open Mic, Closing Words, Esselen Tribe Blessing		

Fri 13 May: Day 3 Fieldtrips: Elkhorn Slough, Carr Lake and Salinas Creeks, and San Jose Trail

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.

Wednesday 11 May Schedule

Welcome (Back) to Restoration's Finest Annual Gathering!

Please mind the wet paint as we enter the world of livestreaming, simultaneous in-person and virtual attendance, and doing our best to make our conference a safe space for all concerned... whether that means establishing protocols for promoting and uplifting diversity (see page 42) or for preventing the transmission of Covid among attendees.

This conference program is a work in progress — one of the casualties of this new era is that most of us are facing more challenges than ever before — and no matter how well we are able to pivot while juggling, there are some deadlines that are not achievable in the timeframe we've set aside for them. That said, we will send you a complete digital conference program when we release the session recordings later in May.

At that time, we'll be able to appropriately acknowledge and appreciate our Plenary Panel — Jackie Nelson and Caine Camarillo (Monterey Peninsula Regional Park District), Abbie Beane (Carmel River Watershed Conservancy), and Jeannette Tuitele-Lewis (Big Sur Land Trust) for their eloquence in setting the stage for the next two days of *Thinking Big, Starting Small, Restoring Now AND Planting Diversity in our Projects and Communities*. We'll also be able to tell you more about the presentations and participants from the Esselen Tribe. We are grateful for their presence and for their Blessings.

Thor Anderson began dreaming up this conference three years ago at our 2019 conference in Santa Barbara. Huge gratitude goes out to him for staying the course so graciously and enthusiastically.

Restoring the Coastal Zone

Session Chair: Eddie Divita, ESA

Fiesta Room 10:30a–12:10p Wednesday

- 10:30 **Special Status Species Mitigation at Marina Dunes Preserve: How “Thinking Big” Led to “Restoring Now”** Lizzy Eichorn*, Thor Anderson, Jackie Nelson*, Matt Brown*
- 10:50 **Coastal Salt Marsh Revegetation Design Using Predicted Tidal Inundation Under Restored Conditions** Sunny Loya*, John H. Bair
- 11:10 **Lower Walnut Creek Restoration Project — Lessons from the Design and Implementation of the Pacheco Marsh Restoration** Eddie Divita*, Jill Sunahara, Eve Pier Kieli, Len Liu*
- 11:30 **Going Big: 25 Years of Restoration in the Moro Cojo Slough Watershed** Ross Clark*, Kevin O'Connor*, Sarah Stoner-Duncan, Cara Clark
- 11:50 **Dutch Slough Tidal Marsh Restoration Project: Restoration Design Approach** Mark Lindley*, Edward Divita, Derek Sergison, Ann Borgonovo, Michelle Orr

Fiesta Room 01:30p–03:00p Wednesday

- 01:30 **Restoring Coastal Prairie in San Luis Obispo County** Mindy Trask*, Katherine Brown, Jennifer Moonjian
- 01:50 **The Otay Mesa Vernal Pool Restoration Project, Phase I** Meagan Olson*
- 02:10 **Amphibians, Eucalyptus, and Persistence: The 15-year Saga to Protect a Key Parcel near the Elkhorn Slough** Dash Dunkell*, Kevin Contreras*
- 02:30 **Adaptive Solutions for Restoring San Diego's Coastal Transition Ecosystems** Katy Chappaz*
- 02:50 **Q&A/Discussion**

Restoring California's Grassland Ecosystems *continued May 12*

Session Chair: JP Marie, CNGA & UC Davis

Fiesta Room 03:30p–05:00p Wednesday

- 03:30 **Harnessing Native Plant Resilience for Increased Weather Extremes** Vic Claassen*
- 03:50 **Restoration Outcomes of California Coastal Grasslands** Justin Luong*, Daniel Press, Karen Holl
- 04:10 **Restoring Conservation Grazing to Vernal Pools: A Success Story!** Dr. Julia Michaels*, Dr. Kenneth Tate, Dr. Valerie Eviner
- 04:30 **Panel Discussion**

Wednesday 11 May Schedule

Thinking Big About the Carmel River

Session Chairs: Laura Moran and Lauren Huff,
SWCA Environmental Consultants

Merienda Room 10:30a–12:00p Wednesday

- 10:30 **Carmel River Floodplain Restoration Project**
Lauren Huff*, Laura Moran*, Katrina Harrison, Scott
McBain, Caine Camarillo, Tom Gandesbery
- 11:00 **TARGETS: Evaluating Proposed Carmel River
Restoration Effects on the Early Establishment of
Willows and Cottonwoods** John H. Bair*
- 11:30 **Revegetation Design Strategies for a Channel
and Floodplain Restoration Project at the
Rancho Cañada Unit of the Palo Corona Regional
Park** Amy Livingston*, John Bair

Merienda Room 01:30p–03:00p Wednesday

- 01:30 **Native Peoples — Partners With the Land** Linda
Yamene
- 02:00 **CRFREE: Carmel River Floodplain Restoration
and Environmental Enhancement** Tarick Abu-Aly*,
Shandy Carroll*, Melanie Beretti*, Rachel Saunders,
Nicole Nedeff
- 02:30 **Carmel River Floodplain Restoration and
Environmental Enhancement (CRFREE) Project:
Restoring Connectivity in the Lower Carmel
River** Shandy Carroll*, Nicole Nedeff

Walking Tour of Carmel River 03:15p–05:15p

Planning for Success *continued May 12*

Session Chair: Joanna Tang, UC Santa Barbara

Merienda Room 03:30p–05:00p Wednesday

- 03:30 **Navigating Restoration in an Ever-Changing
World** Trina Ming*, Ryan Phaneuf*
- 03:50 **Integrating Traditional Ecological Knowledge
from Local Indigenous Tribes into Restoration
Projects** Courtney Casey*
- 04:10 **Synthesizing Restoration in the California Delta
at the Landscape Scale** Dylan Chapple*, Jennica
Moffat
- 04:30 **Visual Examples of Maritime Chaparral
Restoration on a Military Installation** Shawn
Wagoner*

All day Wednesday, the **Discovery Center** will be dedicated to The Next Generation — for the Poster Session and Reception, the Career Panel, and as a dedicated meeting space for Mentors and Mentees. Posters will be moved to the common areas after Wednesday night in order to accommodate Thursday's sessions.

Poster Session

Chair: Cassie Pinnell, Vollmar Natural Lands
Consulting

*Discovery Center ALL DAY Wednesday with Poster
Reception Wednesday evening, 5–7pm*

Career Panel

Chair: Will Spangler, Gold Ridge Resource
Conservation District and Santa Clara Valley
Habitat Agency

*Grab your lunch and join us in the Discovery Center
12:30p–01:30p Wednesday*

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

SERCAL's Leadership Team — Growing our organization's capacity and envisioning new ways of supporting our members & industry

Annual Sponsoring Members — For their generosity and commitment, for helping us stay nimble and resilient

Session Chairs & Fieldtrip Leaders — For their vision, leadership, and good will

Mentors and Mentees — For sharing their perspectives and experience, for creating a more robust future for all of us

Volunteers — For keeping the engine humming and the way smooth

The Next Generation Stipend Awardees — For putting themselves out there and making it happen. We already owe you big time.

Thursday 12 May Schedule

Restoring California's Grassland Ecosystems *continued from May 11*

Session Chair: JP Marie, CNGA & UC Davis

Fiesta Room 08:30a–10:00a Thursday

- 08:30 **Heritage Growers—A New Restoration Seed and Nursery Program of River Partners** Pat Reynolds*
- 08:50 **Biodiversity, Fuel, and Grazing: Ecological Management in Central Coast California** Jenna Allred*, Jackson Brooke, Rodrigo Sierra Corona
- 09:10 **Ag to Coastal Grassland: Adapting Mechanized Farming Methods to Native Habitat Restoration** Cara Clark*, Jonathan Pilch
- 09:30 **Panel Discussion**

Planting Community

Session Chair: Bruce Delgado, BLM

Fiesta Room 10:30a–12:00p Thursday

- 10:30 **Introduction** Bruce Delgado
- 10:35 **Planting a Dream: A Community-Designed Urban Park Connects People and Nature** Chelsea Neill*, Rachel Saunders, Beth Febus*
- 10:55 **Modified Rant: Plant Blindness, Super Blooms, Public Perception... Let's Talk Solutions** Lindsay Teunis*
- 11:15 **Hands on the Land: Re-imagining Land Stewardship at a Local Scale** Brooke Wainwright*, Margot Flynn, Alana Luzzio, Sophia Simon, Dylan Moore*
- 11:35 **Q&A/Discussion**

Fiesta Room 02:00p–03:30p Thursday

- 02:00 **Introduction** Bruce Delgado
- 02:05 **The Seed Pile Project: Using a Community Science Framework to Identify Viable Native Species for Urban Seed Dispersal** William Krimmel, Haven Kiers, Caroline Larsen-Bircher*
- 02:25 **Yellow Starthistle Management through Timed Mowing** Nina Orellana*
- 02:45 **Community-Centered Restoration in Creeks of Salinas & on Fort Ord National Monument** Laura Lee Lienk*
- 03:05 **Q&A/Discussion**

Letting the River Flow

Session Chairs: Laura Moran and Lauren Huff, SWCA Environmental Consultants

Merienda Room 08:30a–10:00a Thursday

- 08:30 **Policy Updates & Opportunities — Restoration Industry Perspective** Sara Johnson*
- 08:55 **Implementing Multi-Benefit Floodplain Restoration Projects: Challenges and Solutions on the Central Coast** Jenny Balmagia*, Ross Clark
- 09:20 **Restoring Now? How about Restoring in Advance! Lowering and Pre-planting the Chorro Creek Floodplain and Riparian Corridor in Advance of an Expected Channel Migration** Amber Inggs*, Andy Collison*
- 09:45 **South Cypress Salmonid Habitat Rehabilitation Project, Sacramento River** Benjamin Taber*, Chris Campbell

Merienda Room 10:30a–12:00p Thursday

- 10:30 **Peters Canyon Wash Transformed from Ornamental Forest into Wildlife Haven** Cort DiStanislao*, Richard B. Lewis, III*
- 11:00 **Five years later: Assessing Performance of Riverbank Restoration Projects on the Merced River** Erin Dickman*, Catherine Fong, Anna Puchkoff
- 11:30 **Restoration Effectiveness Monitoring One Year Post-Project on the Hallwood Side Channel and Floodplain Restoration Project, Lower Yuba River** April Sawyer*, Kirsten Sellheim*, Chris Hammersmark, Sam Diaz, Joseph Merz, Philip Colombano, Aaron Zettler-Mann, Tyler Goodearly, Paul Cadrett, Jeff Mathews

Planning for Success *continued from May 11*

Session Chair: Joanna Tang, UC Santa Barbara

Merienda Room 02:00p–03:30p Thursday

- 02:00 **Nurse Plants Show Potential in Aiding Chaparral Restoration** Stephanie Ma Lucero*, Carla D'Antonio
- 02:20 **Design Drawings to Plants in the Ground: Lessons Learned from Bridging the Gap between Design and Practice** Emma Havstad*, Alicia Beverage, Keshia Chapman, Isabel Lawrence, Francis Ulep
- 02:40 **Slippery Slopes in the Orinda Formation: A Recurring Problem Meets a Multi-Year Solution** Debra Lemke*
- 03:00 **Thinking Small: A Refined Design Approach to Create Habitat for the Threatened Santa Ana Sucker** Nicholas Deyo*, Brendan Belby, Heather Dryer

Thursday 12 May Schedule

California Grown... Updating Nursery Practices

Session Chair: Wolfgang Schweigkofler,
Dominican University of California

Discovery Center 08:30a–10:05a Thursday

- 08:30 **California Sycamore Restoration: Genetic Testing and Propagation Techniques** Ryan Hegstad*, Diana Benner*, Deanna Giuliano*, Matt Quinn, Will Spangler
- 08:50 **Rapid Growth of Southern California Black Walnut (*Juglans californica*) through Stump Salvage and Transplantation** Richard B. Lewis, III*, Kai T. Palenscar, PhD*
- 09:10 **A Fern Establishment Strategy for an Oak Woodland Habitat Creation Site in Southern California** Richard B. Lewis, III*, Anthony Perez*, Billy Sale*
- 09:30 **Heritage Growers Nursery Operation: Your Partners in Habitat Restoration** Michele Ranieri*
- 09:50 **Q&A/Discussion**

Discovery Center 10:30a–12:00p Thursday

- 10:30 **Improved Steaming Options for the Disinfection of Potting Mix using a Manifold** Vernon Huffman*, Wolfgang Schweigkofler*
- 10:50 **A First Look on the Effects of Steaming on Soil Microbiome and Chemistry** Wolfgang Schweigkofler*, Vernon Huffman, Sharifa Crandall
- 10:55 **Soil Substrates Have a Huge Impact on Irrigation Water Splash, Choose Wisely** Wolfgang Schweigkofler*, Nilwala Abeysekara, Vernon Huffman, Karen Suslow
- 11:00 **The Importance of Testing in Producing Phytophthora-free Nursery Plants** Tedmund J, Swiecki*, Elizabeth A. Bernhardt
- 11:20 **Best Management Practices to Prevent Plant Pathogen Introductions on Restoration Nursery Stock: Searching for the Best Recipes** Kristina Weber*, Diana Benner*, Susan Frankel
- 11:40 **Q&A Discussion**

Esselen Tribe Presentations

Discovery Center 02:00p–03:30p Thursday

Presenters were not able to attend; we'll try to reschedule with them soon!

Thursday is going to be AWESOME

During Lunch, we'll present awards and draw for raffle items and announce the silent auction winners.

AFTER Lunch, we want EVERYONE to join us to spell out SERCAL on the grounds for a drone video and photo shoot!

And after the afternoon sessions, we'll all return to the Fiesta Room for Lightning Talks, Open Mic, and a Closing Blessing.

It doesn't get much better than this! Oh wait... there's THREE Fieldtrips on Friday...

Community-Centered Restoration at Carr Lake and the Creeks of Salinas

Eucalyptus Removal, Wetland Restoration, and Maritime Chaparral Protection at Elkhorn Slough

San Jose Creek Hike

Didn't sign up and all the trips are full? Don't worry — come to registration and put yourself on the waiting list. There are usually openings after folks get the urge to head home Thursday night. :-)

One last very important note...

You're going to get an online survey within a week of the conference. Please fill it out; it's super simple: What are we doing best? What could we be doing better? What should we be doing?



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Palo Corona Regional Park, Carmel Valley, CA*

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- Mitigation and Conservation Banking
- Mitigation Feasibility Assessment
- Biological Surveys / Assessments
- CEQA / NEPA Assessment / Documentation
- Wetland and Stream Delineation
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Thinking Big about the Carmel River

Session Co-Chairs: Laura Moran and Lauren Huff, SWCA Environmental Consultants

Listed in order of presentation

Carmel River Floodplain Restoration Project (Merienda Wed 10:30a)

Lauren Huff*, lauren.huff@swca.com

Laura Moran*, laura.moran@swca.com

Katrina Harrison, Scott McBain, Caine Camarillo, Tom Gandesbery

The State Coastal Conservancy and Monterey Peninsula Regional Park District (MPRPD) are currently working to restore an approximately 1-mile reach of the Carmel River for the Carmel River Floodplain Restoration Project in the Rancho Cañada Unit, Palo Corona Regional Park in Carmel Valley, Monterey County. The project is approximately 185 acres in size and spans both banks of the Carmel River. It is part of a concerted effort by federal, state, and local government to restore migration and spawning of steelhead in the Carmel River watershed. Ultimately, the project will reconnect the Rancho Cañada portion of the Carmel River with historic floodplain habitat. The main goals of the project are to identify practical and feasible floodplain and riparian corridor restoration approaches that are consistent with MPRPD planning efforts for public use and access, and to restore and enhance floodplain and channel function and processes in the Carmel River to foster sustainable riparian and salmonid habitat consistent with MPRPD General Plan and recreational access and trail needs, including those for MPRPD and Santa Lucia Conservancy. The project involves a large Technical Advisory Committee (TAC) that consists of resource experts from federal and state wildlife agencies, non-profits (e.g., Santa Lucia Conservancy), and MPRPD staff, who are intricately involved in development and refinement of 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, Park users, and Native American tribes. This project is the first phase of a regional goal to restore Rancho Cañada as a critical wildlife linkage to Palo Corona to the north and Big Sur to the south. Future project phases may restore habitat for California red-legged frog, native coastal scrub, and create native habitat islands of refugia for wildlife passage, including a wildlife underpass beneath Carmel Valley Road.

TARGETS: Evaluating Proposed Carmel River Restoration Effects on the Early Establishment of Willows and Cottonwoods (Merienda Wed 11a)

John H. Bair*,
john@mc bainassociates.com,
707.834.4008

The mainstem Carmel River through the Rancho Cañada Unit of the Palo Corona Regional Park has experienced episodic channel incision since black cottonwood establishment on the terraces adjacent to the active channel. The incision resulted in hydrologic disconnection between the channel and its forested riparian floodplains. The property was a former golf course purchased by the Monterey Peninsula Regional Park District with the intent of restoring hydrologic connectivity between an active channel and a frequently inundated floodplain. Two restoration alternatives were developed in 2021. The Tool for Achieving Riparian Germination and Establishment of Target Species (TARGETS) model was used to evaluate riparian hardwood initiation patterns on existing and proposed channel floodplains and terraces. TARGETS is a cross-section-based, one-dimensional model that predicts the bank location where seed germination and first-year establishment (i.e., initiation) could occur in response to annual streamflows. Black cottonwood, arroyo willow, and narrowleaf/dusky willow were selected to

use in the model because their seed dispersal periods collectively encompass the entire willow and cottonwood seed dispersal season. Overall, TARGETS predicted that both alternatives will increase willow and cottonwood recruitment from seed when the project is complete. While Alternative 2 has a larger footprint, Alternative 1 had more predicted seedlings because Alternative 2 includes more inundated area, and therefore the model predicts less seedling initiation. Seed dispersal timing affected what types of water years classes had the greatest number of predicted seedlings for each species. Arroyo willow was the least successful of modeled species, perhaps because the early spring seed dispersal period occurs before late spring floods in many years. The highest number of predicted arroyo willow seedling locations were associated with Dry and Extremely Dry Water Year types, when the river typically goes dry in the late winter and early spring. Narrowleaf/dusky willows had the second highest number of predicted seedling locations with the greatest number of dusky and narrowleaf willow seedling locations being associated with Extremely Wet and Wet Water Year types, when the river may continue to flow into the summer months. Black cottonwood had highest number of predicted seedlings of the three modeled species with the greatest number of black cottonwood seedling locations being associated with Wet, Normal, and Dry Water Year types, when streamflows continue into the early summer. Regardless, the TARGETS results suggest that either alternative will increase the number of willow and cottonwood seedlings that survive the first year by at least 270%, when compared to existing conditions.

Thinking Big about the Carmel River *Listed in order of presentation*

Revegetation Design Strategies for a Channel and Floodplain Restoration Project at the Rancho Cañada Unit of the Palo Corona Regional Park

(Merienda Wed 11:30a)

Amy Livingston*,
amy@mcbainassociates.com

John Bair, john@mcbainassociates.com

The Rancho Cañada Unit of the Palo Corona Regional Park is a former golf course now owned by the Monterey Peninsula Regional Park District. The Carmel River within the Rancho Cañada Unit is highly altered. The river has experienced channel incision and sections of the channel margins have been protected with rip-rap to prevent bank erosion. In its current condition, the Carmel River channel is laterally constrained and vertically disconnected

from its historic floodplain. The inability of the channel to migrate has prevented new floodplains and riparian vegetation from establishing. A floodway restoration design is currently underway at the Rancho Cañada Unit with the goal of improving floodplain connectivity, fluvial processes, and aquatic and terrestrial habitats in the Carmel River. To inform our revegetation design, we needed to understand the processes that led to the existing vegetation patterns. We combined topographic and groundwater elevation data with a detailed existing vegetation map to create a depth-to-groundwater Digital Elevation Model (DEM) for the project design. We used this information to predict where plant communities would be most likely to thrive based on the topography of the new channel and floodplain design (connectivity with the

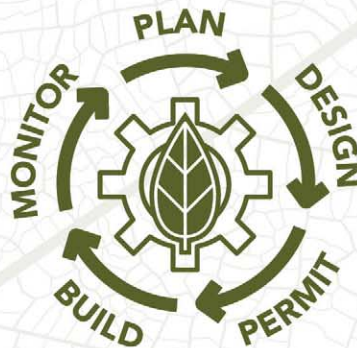
stream), as well as anticipated future groundwater elevations (connectivity with soil moisture). The analysis we performed informed our arrangement of proposed plant communities on the new ground surfaces based on the relationship of plant communities to anticipated future groundwater elevations. Using this analytical approach to revegetation greatly improves our understanding of where different plant communities will likely establish within a design and leads to more successful and cost-effective revegetation.

continued

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Thinking Big about the Carmel River *Listed in order of presentation*

Native Peoples — Partners With the Land (Merienda Wed 1:30p)

Linda Yamene, Rumsen Ohlone master basketweaver, artist and tribal scholar, rumsien123@yahoo.com

Cultural practitioners from local tribal communities can contribute their traditional ecological knowledge and personal experience to enhance restoration projects and help perpetuate the survival of ecologically and culturally important plants and places. The presenter will share some of the cultural connections she has with the project area, which sits just downstream of her ancestral village of Tucutnut.

CRFREE: Carmel River Floodplain Restoration and Environmental Enhancement (Merienda Wed 2p)

Tarick Abu-Aly*, Balance Hydrologics, tabu-aly@balancehydro.com

Shandy Carroll*, Monterey County, CarrollS@co.monterey.ca.us

Melanie Beretti*, Monterey County, BerettiM@co.monterey.ca.us

Rachel Saunders, Big Sur Land Trust, rsaunders@bigsurlandtrust.org

Nicole Nedeff, Big Sur Land Trust, nnedeff@bigsurlandtrust.org

The Carmel River Floodplain Restoration and Environmental Enhancement (CR FREE) Project is one of the largest and most important hazard mitigation, coastal resiliency, and habitat restoration projects on California's Central Coast. The 135-acre CR FREE Project has two interdependent components: Floodplain Restoration, and Causeway Construction. Floodplain restoration involves creating a network of distributary overbank channels on 100 acres of former farmland, revegetation with riparian species, and notching the existing levees to allow 5-year stream flows onto the floodplain and restore lateral connectivity between the

river and the floodplain. Causeway construction consists of replacing a portion of the Highway 1 roadway embankment with an overflow bridge (causeway). The causeway will be constructed 500 feet south of the existing Carmel River Bridge and will provide space needed to convey moderate and high stream flows in distributary channels beneath the highway, thus creating longitudinal connectivity between the river, the upstream floodplain, and the south arm of the Carmel River Lagoon. The causeway will also facilitate wildlife movement and the development of a trail network that links neighboring Palo Corona Regional Park with the Carmel River State Beach.

Carmel River Floodplain Restoration and Environmental Enhancement (CRFREE) Project: Restoring Connectivity in the Lower Carmel River (Merienda Wed 2:30p)

Shandy Carroll*, Management Analyst III, Advance Planning-Land Use, Housing and Community Development Department, Monterey County, 831.784.5643, carrollS@co.monterey.ca.us

Nicole Nedeff, Associate Director of Conservation, 831.625.5523 x107, 509 Hartnell Street, Monterey, CA 93940 (Mailing Address: P.O. Box 4071, Monterey, CA 93942)

Monterey County and Big Sur Land Trust are partners in the \$45 million Carmel River Floodplain Restoration and Environmental Enhancement (CR FREE) Project, which has been supported by federal, state, and private funders committed to seeing the Project carried out. Extensive coordination between the Big Sur Land Trust, and local, State and Federal entities has led to the CRFREE Project achieving project approval in 2021.

The CR FREE Project is one of the largest and most important hazard mitigation,

coastal resiliency and habitat restoration projects on California's Central Coast. It uses a green infrastructure approach to restore lower watershed functions and values, and reduces flood hazards to surrounding businesses, residences, and important grey infrastructure. The 135-acre CR FREE Project has two interdependent components: Floodplain Restoration, and Causeway Construction. Floodplain restoration involves creating fluvial topography on 100 acres of former farm land, revegetation with riparian species, and notching levees to convey 5-year stream flows and restore lateral connectivity between the river and the floodplain. Causeway construction consists of replacing a portion of the Highway 1 roadway embankment with an overflow bridge (causeway). The causeway will be constructed south of the existing Carmel River Bridge and will provide space needed to convey moderate and high stream flows in distributary channels beneath the highway, thus creating longitudinal connectivity between the river, the upstream floodplain, and the south arm of the Carmel River Lagoon. The causeway will also facilitate wildlife movement and the development of a trail network that links neighboring Palo Corona Regional Park with the Carmel River State Beach.

In 2020 the Monterey County Board of Supervisors certified the CRFREE Environmental Impact Report. In 2021, the CRFREE Project was approved. In late 2022, the Project will begin the implementation phase, with the initial floodplain restoration work on the east side of Highway 1. The pipeline undergrounding for the Carmel Area Wastewater District (CAWD) Treatment plant is tentatively planned for 2023, and work on the causeway and west side of highway 1 is scheduled for 2024.



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Letting the River Flow

Session Co-Chairs: Laura Moran and Lauren Huff, SWCA Environmental Consultants

Listed in order of presentation

Policy Updates & Opportunities — Restoration Industry Perspective

(Merienda Thu 8:30a)

Sara Johnson*, Executive Director, California Ecological Restoration Business Association (CalERBA), sjohnson@hirschlerlaw.com

This policy update session will: i) Introduce CalERBA & CalERBA's Principles for Nature-Based Solutions, ii) Cover key regulatory and legislative opportunities for the ecological restoration industry in California, such as annual appropriations and "Cutting Green Tape" dedicated funding and permitting updates, and iii) Include an overview of CalERBA positions and current policy priorities.

Implementing Multi-Benefit Floodplain Restoration Projects: Challenges and Solutions on the Central Coast

(Merienda Thu 8:55a)

Jenny Balmagia*, jenny.balmagia@sjsu.edu

Ross Clark, ross.clark@sjsu.edu

Restored floodplains can provide many environmental and community benefits such as habitat creation, water quality enhancement, flood mitigation, groundwater recharge, and recreational opportunities. In the agriculturally productive Lower Salinas Valley, the benefits of restoring floodplains are widely recognized and these projects are being considered as management options to help achieve compliance with several regulations including the Sustainable Groundwater Management Act, the Irrigated Lands Regulatory Program General Permit (Ag. Order 4.0), and local MS4 permits. Despite being win-win opportunities for so many stakeholders in the region, it is difficult to take these projects from concept to implementation, and even more difficult to do so on a

watershed scale. This is in large part because each floodplain restoration project requires a willing landowner to provide the land, usually a farming operation in this region which needs to be adequately compensated through fair land valuation and regulatory relief.

Unfortunately, funding for negotiating land acquisition of prime farmland is difficult to come by through the usual grant cycle channels, and there is no existing mechanism for providing regulatory credit. Through over 20 years of working in the neighboring Moro Cojo watershed, we have successfully addressed these challenges and restored over 120 acres of upland and wetland habitat. We are now building on the successes in this pilot watershed to achieve similar success, over a shorter timeline, in the Lower Salinas Valley. To do this, we are working with a broad coalition of stakeholders to: 1) Define what regulatory relief agricultural landowners can expect for participating in floodplain restoration, 2) Develop institutional structures to coordinate with landowners on a sub-drainage scale to fairly distribute the costs and benefits of these projects, and 3) Identify alternative funding options for participating in land acquisition negotiations.

Restoring Now? How about Restoring in Advance! Lowering and Pre-planting the Chorro Creek Floodplain and Riparian Corridor in Advance of an Expected Channel Migration

(Merienda Thu 9:20a)

Amber Inggs*, ainggs@esassoc.com

Andy Collison*, acollison@esassoc.com

Chorro Creek is a steelhead-bearing stream in San Luis Obispo County. The creek drains to Morro Bay, which has experienced accelerated infilling with sediment due to historic watershed issues.

Morro Bay National Estuary Program (MBNEP), has completed numerous watershed, creek, and floodplain restoration projects to reduce sediment-loading and improve the ecological health of the Bay and its watershed. The MBNEP-led project described in this presentation is unusual in that it was intended to restore a floodplain in advance of a channel avulsion (dramatic jump in channel alignment). If the avulsion had occurred in an unplanned way (as was expected to happen in the next decade or so, depending on flow rates and the ongoing erosion of an informal agricultural berm), we anticipate that the creek would have persisted in a degraded form for many years due to channel incision and lack of tree cover or topographic complexity on the site, which was until recently a grazed sheep pasture. By "pre-restoring" the floodplain, grading it down towards the water table, grading sinuous pilot channels, and planting a riparian corridor before the avulsion, we could fast track recovery of the creek for steelhead and other species, and avoid eroding a large volume of sediment to Morro Bay. The project site is owned by California Department of Fish and Wildlife and the project was a collaboration between CDFW and MBNEP, with ESA as the restoration designer.

The project was implemented in 2019, involving construction of 1,200 feet of secondary pilot channels in the expected avulsion pathway, lowering of the surrounding floodplain and introduction of topographic complexity and roughness, and planting 4.8 acres of riparian trees to kickstart the growth of a riparian corridor. As part of the project, ESA is monitoring the site topography using drones to assess floodplain geomorphic and ecological processes. In 2021 the creek overflowed into the new floodplain for the first time,

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and over time more overflows are expected until the creek avulses permanently into the new alignment. Following the first inundation event, around a 10-year event, there was considerable geomorphic change to the site elements. As anticipated in the design, the channel experienced some channel downcutting (0-2 feet) but much less than would have occurred had the floodplain not been lowered in advance, resulting in better floodplain connectivity and less erosion of sediment to Morro Bay. The degree of lateral migration (about 12 feet) was more than expected for a well-established channel, but consistent with a newly replanted bank. A series of willow baffles and log structures — installed to provide immediate floodplain roughness while the floodplain plants became established — performed as intended, though some structures were outflanked by the migrating channel. The project provides an interesting example of “preemptive restoration” by creating a topographic and ecological template into which a creek can migrate or avulse and then passively restore itself with less disturbance than an unplanned channel shift.

South Cypress Salmonid Habitat Rehabilitation Project, Sacramento River (Merienda Thu 9:45a)

Benjamin Taber*, cbec eco engineering, b.taber@cbecoeng.com, 530.306.5573

Chris Campbell, cbec eco engineering, c.campbell@cbecoeng.com, 916.231.6052

This multi-objective project funded by The Central Valley Improvement Act (CVPIA) and the U.S. Bureau of Reclamation (USBR) addressed the need for establishing off-channel, juvenile salmonid rearing habitat on the Upper Sacramento River. The project is in the heart of the City of Redding where the river has been disconnected from its

floodplain due to urbanization and flow regulation from Shasta and Keswick Dams. The project site is located on City of Redding property, in the Nur Pon Open Space where the City has been working on improving the area for public use for nearly a decade. The existing site conditions consisted of numerous timber mill ponds and showed evidence of aggregate dredging. The ponds provided habitat for predatory, non-native fish and would connect with river at high flows which would exacerbate stranding for juvenile salmonids as flows receded. The project created a three-quarter mile long perennial side channel to connect the existing ponds to the river at multiple locations and minimize stranding in the floodplain. Due to the urban nature of the project location, the habitat design had to consider numerous stakeholder and landowner constraints and objectives for open space recreation, maintenance access for utilities and facilities, fire and rescue services, and flood conveyance. In addition to the pond and channel improvements, one pedestrian, one utility bridge, and one arch culvert were installed to connect the existing road and walking path network to the newly created island.

This project is a prime example of Federal, State, and local governmental agencies working together to achieve multi-objective goals.

Peters Canyon Wash Transformed from Ornamental Forest into Wildlife Haven (Merienda Thu 10:30a)

Cort DiStanislao*, Sr. Environmental Resources Specialist, OC Mitigation and Construction Compliance, County of Orange, OC Public Works Department, cort.distanislao@ocpw.ocgov.com

Richard B. Lewis, III*, Sr. Restoration Ecologist, Psomas, richard.lewis@psomas.com

OC Public Works implemented off-site habitat mitigation for impacts to jurisdictional areas associated with

vegetation management tasks (to maintain flood control capacity) in San Diego Creek. A total of 14.96 acres of habitat enhancement occurred in a 1.15-mile reach of Peters Canyon Wash that supported large gum trees (*Eucalyptus* spp.) and other exotic trees. A total of 681 exotic trees were removed in addition to non-native shrubs and weedy herbs. Biological surveys and monitoring were performed to ensure the avoidance of adverse impacts to sensitive natural resources. The State- and federally listed Endangered least Bell’s vireo (*Vireo bellii pusillus*) (vireo) was documented to occur upstream and downstream of the site prior to mitigation implementation. However, habitat resources for the vireo were limited within the subject reach. As the result of (a) the large-scale removal of gum trees and other non-native vegetation; (b) strategic plantings of native container species, willow cuttings, and the application of native seed mixes (local genetic origin), a total of 13 territories of the vireo were observed on the site in 2019. The federally listed Threatened coastal California gnatcatcher (*Poliophtila californica californica*) and other special status species have also been observed on the site. ‘Canyon Fire 2’ burned a 4.4-acre portion of the site in October 2017; however, OC Public Works directed its contractors to perform intensive weeding tasks during the following growing seasons. By performing pro-active, careful, post-burn maintenance tasks, weed infestation was avoided and good native vegetation cover and diversity were retained after the wildfire.

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Five years later: Assessing Performance of Riverbank Restoration Projects on the Merced River (Merienda Thu 11:00a)

Erin Dickman*, erin_dickman@nps.gov, 209.347.9156

Catherine Fong, catherine_fong@nps.gov

Anna Puchkoff, Anna_Puchkoff@nps.gov

The legendary Merced River flows through the heart of Yosemite Valley, but has been impacted by over a century of historic practices, development, and visitor impacts. The Merced Wild and Scenic River Management Plan, passed in 2014, called for moving infrastructure away from the river and restoring riparian habitat along ripped or denuded riverbanks. Starting in 2016, the National Park Service has completed riverbank restoration projects annually following a master restoration plan for the river that includes a suite of actions spanning the length of Yosemite Valley. In this presentation, we will summarize monitoring results five years into this long-term plan to restore the Merced River.

Restoration Effectiveness Monitoring One Year Post-Project on the Hallwood Side Channel and Floodplain Restoration Project, Lower Yuba River (Merienda Thu 11:30a)

April Sawyer*, cbec, inc. ecoengineering@cbecoeng.com

Kirsten Sellheim*, Cramer Fish Sciences, kirstens@fishsciences.net

Chris Hammersmark, cbec, inc. ecoengineering@cbecoeng.com

Sam Diaz, cbec, inc. ecoengineering@cbecoeng.com

Joseph Merz, Cramer Fish Sciences, jmerz@fishsciences.net

Philip Colombano, Cramer Fish Sciences, philip.colombano@fishsciences.net

Aaron Zettler-Mann, South Yuba River Citizens League, aaron@yubariver.org

Tyler Goodearly, South Yuba River Citizens League, tyler@yubariver.org

Paul Cadrett, United States Fish and Wildlife Service, Anadromous Fish Restoration Program, paul_cadrett@fws.gov

Jeff Mathews, Yuba Water Agency, jmathews@yubawater.org

Anthropogenic actions on the Lower Yuba River dating back to the Gold Rush altered geomorphic and hydraulic conditions, and subsequently the available habitat for rearing juvenile salmonids. The Hallwood Side Channel and Floodplain Restoration Project was developed to address the U.S. Fish & Wildlife Service Anadromous Fish Restoration Program's goal to double natural production of anadromous fish in Central Valley rivers. Specifically, the Project was designed to restore and enhance ecosystem processes, focusing on juvenile rearing fall- and spring-run Chinook Salmon and California Central Valley (CCV) steelhead. The Project is supported by numerous agencies and stakeholders, and leverages relationships with aggregate mining landowners to facilitate economically efficient habitat enhancement. The design process targeted increasing inundation frequency and duration during the rearing period in a network of perennial and seasonally inundated side channels, removing large, unnatural constraints separating the main channel from its floodplain, and reducing non-native predator habitat. Two-dimensional hydraulic models and habitat suitability indices were used to predict habitat benefits, including an increase in suitable acreage for rearing and wetted edge habitat. After several years of planning, design, permitting, and pre-project monitoring, Phase 1 was

implemented in 2019–2020 and created/enhanced 89 acres of seasonally inundated floodplain, 1.7 miles of perennial channels, and 3.7 miles of seasonal channels. Phase 2 was completed in November 2021, creating 34 acres of seasonally inundated floodplain habitat and 1.6 miles of perennial channels. During Phases 3 and 4, an additional 34 acres of seasonally inundated habitat will be created.

The Project included a robust monitoring program that measured the effect of restoration on a range of ecological parameters thought to influence salmonid habitat use and productivity and riparian ecosystem function using a Before-After-Control-Impact study framework. Specifically, we monitored salmonid and non-native predator density, juvenile salmonid growth and residence time, predation, invertebrate prey (drift) density and biomass, and changes in acreage of a range of habitat types, including terrestrial and aquatic vegetation. We also examined factors influencing natural riparian tree recruitment following restoration. Results from the first year of post-project monitoring indicate that, even in a dry water year, the Project increased salmonid densities, decreased non-native predator densities and salmonid predation, supported invertebrate prey production, resulted in a shift in habitat types, and supported extensive natural tree recruitment. In addition, adult Chinook Salmon and steelhead were documented spawning on the riffles built in the perennial side channel, providing an additional Project benefit. Future years of monitoring will document Project performance under a broader range of environmental conditions and with subsequent construction phases completed.



Contact:
Ramona Swenson
rswenson@esassoc.com, 916.825.2758

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Restoring the Coastal Zone

Session Chair: Eddie Divita, Environmental Science Associates (ESA)

Listed in order of presentation

Special Status Species Mitigation at Marina Dunes Preserve: How “Thinking Big” Led to “Restoring Now” (Fiesta Wed 10:30a)

Lizzy Eichorn*, Burses Consulting, LE@bursesconsulting.com

Thor Anderson, Burses Consulting, TA@bursesconsulting.com

Jackie Nelson*, Monterey Peninsula Regional Park District, nelson@mprpd.org

Matt Brown*, PG&E, MVB5@pge.com

Marina Dunes Preserve, a public open space owned and operated by Monterey Peninsula Regional Park District (District) in Marina, CA, was once used for sand mining. The District acquired the property in 1988, removed the old sand processing plant, and set to work restoring the land. The preserve is home to several special status species including western snowy plover, Smith’s blue butterfly (SBB), Monterey spineflower, sand gilia, and Yadon’s wallflower. In 2020, the District hired Burses Consulting Inc., A Terracon Company, to update the preserve’s restoration plan. In 2021, Pacific Gas and Electric (PG&E) approached the District looking for areas that could be restored for Smith’s blue butterfly as part of their mitigation program. The recent planning efforts appealed to PG&E and a contract between the District and PG&E is now in place to fund restoration of 31 acres of SBB habitat, 9.3 acres of Monterey spineflower habitat, and one acre of sand gilia habitat. This presentation will give an overview of restoration and planning efforts to date at the preserve and provide insight into how “thinking big” allowed for inter-agency partnerships to make “restoring now” a reality.

Coastal Salt Marsh Revegetation Design Using Predicted Tidal Inundation Under Restored Conditions (Fiesta Wed 10:50a)

Sunny Loya*, sunny@mcbainassociates.com

John H. Bair, John@mcbainassociates.com

Riparian vegetation patterns have been related to height above the groundwater elevation at a particular location on the landscape (Bair et al. 2021). Hydrophytic vegetation grows in landscape locations that have easy access to groundwater (i.e., groundwater is shallower), whereas xerophytic vegetation grows in locations with deeper groundwater. We applied the height above estimated groundwater elevation method that has been used in a riverine environment in a salt marsh setting, using a predicted tidal gradient elevation in place of groundwater elevation. In 2021, we developed and implemented a revegetation plan for a small coastal salt marsh restoration project using the ground surface height above a tidal datum (Mean Higher High Water; MHHW) to identify where low marsh, high marsh, and riparian (i.e., freshwater) vegetation cover types could be successfully established after project completion. Dikes and a top-hinge tide gate previously restricted tidal inundation at the project site on Humboldt Bay. The tide gate was replaced in 2021 with a side-hinged gate with an adjustable opening on the front (i.e., “pet door”) to allow a muted tide cycle to flow upstream through the opening and into the project site. An existing vegetation map that encompassed the project site and a nearby tidal marsh was used to relate vegetation to MHHW using the detrended Digital Elevation Model (dtDEM) method. The vegetation planting elevations in the revegetation design were scaled to the muted tide cycle within the project area. As of winter 2022,

the muted tidal regime was still being introduced slowly due to storm-generated freshwater runoff from the upstream watershed. During December and January king tide events, high salt marsh benches were inundated with a combination of upstream flood waters and muted tide heights. It is expected that inundation frequency and salinity will increase on benches as the adjustable pet door is opened further to let more of the natural tide cycle into the site. Tidal flows alone should inundate benches during summer king tides and freshwater plants should become less prominent on tidal benches as salinity increases.

Lower Walnut Creek Restoration Project — Lessons from the Design and Implementation of the Pacheco Marsh Restoration (Fiesta Wed 11:10a)

Eddie Divita*, EDivita@esassoc.com

Jill Sunahara, JSunahara@esassoc.com

Eve Pier Kieli, EPierKieli@esassoc.com

Len Liu*, Liu@esassoc.com

The Lower Walnut Creek Restoration Project, led by Contra Costa County Flood Control and Water Conservation District (District) in partnership with John Muir Land Trust, and designed by ESA, will restore and enhance coastal wetlands and adjacent habitats at the mouth of Walnut Creek and its tributary Pacheco Creek — improving habitat quality, diversity, and connectivity along four miles of creek channel, and benefiting approximately 296 acres of estuarine habitat in total. This presentation will discuss observations and lessons from the planning, design, and implementation process for this complex project.

The LWC project included a robust collaborative planning process that

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included outreach and engagement with neighboring landowners. We will present the project as a case study of a successful collaborative planning effort. Specifically, these partnerships allowed for the alignment of the restoration project with two adjacent projects (a compensatory mitigation project and a drainage improvements on adjacent private land), which allowed for better hydraulic and ecological outcomes, reduced impacts to sensitive habitats, and greater overall ecological benefits for the Lower Walnut Creek Restoration and the adjacent projects.

The restoration project design achieves restoration of a complex degraded estuarine landscape, creating a diverse range of habitats and integrates pre-existing habitat areas with newly restored landscapes. The design aims to maximize habitat enhancement potential across multiple habitat categories, while accommodating existing land use constraints, including critical utility and transportation infrastructure, and preserving existing protected ecological resources. We will discuss how the design navigates tradeoffs between near-term impacts and anticipated long-term enhancements, the design approach to create ecological complexity and resilience to rising sea levels, and measures to accommodate planned future public access improvements.

The project navigated a complex regulatory landscape to enable construction in sensitive habitats spanning multiple regulatory jurisdictions and potentially impacting several protected species. The project conducted a thorough planning process that included frequent outreach and coordination with regulatory agencies. Through these processes, ESA developed new impact avoidance and minimization measures for protecting special status species including salt marsh harvest mouse and California black rail. ESA also prepared

comprehensive environmental documentation for both near-term and future phases of the project that has allowed the Flood Control District to implement the project in phases as funding becomes available.

Phase 1 of the project was constructed in the fall and winter of 2021. We will present observations and lessons learned from Phase 1 construction, including notes and observations from the construction-period biological monitoring effort. The project developed and applied several innovative measures for protecting key species including salt-marsh harvest mouse and nesting marsh birds. Lessons from the monitoring period include the value of genetic testing to distinguish protected salt marsh harvest mouse from common harvest mouse, recommended modifications to typical methods of wildlife exclusion fence installation to accommodate tidal inundation, and noise impact minimization measures.

Going Big: 25 Years of Restoration in the Moro Cojo Slough Watershed

(Fiesta Wed 11:30a)

Ross Clark*, ross.clark@sjsu.edu

Kevin O'Connor *,
kevin.oconnor@sjsu.edu

Sarah Stoner-Duncan,
sarah.stonerduncan@sjsu.edu

Cara Clark, cclark@mlml.calstate.edu

Over the 20th century, most of the fresh and brackish water habitats of the Salinas Valley and the Moro Cojo Slough were “reclaimed” for agricultural use. The Moro Cojo Slough Management and Enhancement Plan was drafted in 1996 to drive restoration efforts within the estuary and watershed, protect threatened species and manage the resource in concert with adjacent land uses. The Moro Cojo Plan was adopted as a portion of the Monterey County Local Coastal Plan, and Central Coast Wetlands Group (CCWG) staff at Moss Landing Marine Labs, in

collaboration with Coastal Conservation and Research (CCR), have led efforts to implement the Moro Cojo Plan since its drafting. CCWG and CCR have restored more than 100 acres of estuarine and freshwater wetlands and documented improvements to water quality from these restoration projects. Now, 25 years after its original drafting, CCWG and its partners including CCR, Monterey County, RCD of Monterey County, the Greater Monterey IRWMP, Elkhorn Slough Foundation, farmers, and various resource agency staff, are partnering to finalize implementation of the Moro Cojo Plan, and update the management plan to ensure long-term management of the system is preserved.

Dutch Slough Tidal Marsh Restoration Project: Restoration Design Approach

(Fiesta Wed 11:50a)

Mark Lindley*, mlindley@esassoc.com

Edward Divita, edivita@esassoc.com

Derek Sergison, dsergison@esassoc.com

Ann Borgonovo,
aborgonovo@esassoc.com

Michelle Orr, morr@esassoc.com

The Department of Water Resources just reached a major milestone on their Dutch Slough Tidal Marsh Restoration Project, located adjacent to Big Break in Oakley. The project has now completed restoration on two parcels totaling 730 acres, including approximately 485 acres of tidal wetland and riparian habitat to support salmon, splittail, and other endangered fish species. This project is one of the largest multi-benefit tidal marsh restorations constructed to date in the Sacramento-San Joaquin Delta. The project also improves flood protection for adjacent communities with new flood control levees that incorporate broad, flat, transitional ecotone slopes to provide a buffer against sea level rise. The City of Oakley is planning a City Park and looped

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trail at the site which connects to the larger regional trail network at Big Break. The project was partly designed to monitor how native fish respond to differing restoration approaches related to marsh area and elevation to help inform future restoration projects. We will present the restoration approach, including the freshwater marsh and tidal channel network, topographic complexity elements to support high marsh and riparian habitat, and transitional ecotone slopes to support a mosaic of upland, alkali meadow, and high marsh habitats. Because the site was highly subsided, the project required placing over 2.2 million cubic yards of fill to raise low areas to elevations high enough to support tule marsh and to separate the newly created marsh from deeper open water that could attract non-native fish. The project also implemented an extensive revegetation program that included planting more than 40,000 native trees, shrubs, and grasses and over 25,000 tule starts that were grown at an onsite nursery. After planting widely-spaced tule starts, the site was shallowly flooded for almost two years to allow tules to mature and propagate prior to reintroducing tidal action. The two parcels were breached to restore tidal action in fall 2021. A neighboring 436-acre parcel is slated for tidal marsh restoration and uplands to support Swainson's Hawk in the coming years.

Restoring Coastal Prairie in San Luis Obispo County (Fiesta Wed 01:30p)

Mindy Trask*, Caltrans Associate Biologist, mindy.trask@dot.ca.gov

Katherine Brown, Caltrans Landscape Architect, katherine.brown@dot.ca.gov

Jennifer Moonjian, Caltrans Advance Mitigation Specialist, jennifer.moonjian@dot.ca.gov

Due to coastal erosion and sea-level rise, Caltrans District 5 in San Luis Obispo recently realigned a 3-mile stretch of Highway 1 just north of the Piedras

Blancas lighthouse. The road realignment resulted in the need to restore over 75 acres of coastal prairie habitats. Through innovative design, avoidance minimization, mitigation measures, and construction techniques, the project resulted in reduced resource impacts and restoration of coastal lagoons and wetlands. Several design and construction minimization measures were implemented to reduce impacts to 6 federally protected species, over 12 rare or sensitive plant and wildlife species, and over 90 acres of wetlands. Some of the minimization techniques included construction of three floodway-spanning bridges where previously there were undersized culverts, salvaging topsoil and duff, and the retention of wetland hydrology in wetland areas with a type of porous subgrade treatment under the new roadway. Despite the many impact-minimization efforts, the project resulted in about 15 acres of permanent — and 62 acres of temporary — impacts to wetlands, aquatic habitat, and coastal prairie which needed to be offset. As part of the mitigation, the old highway was removed with the goal of restoring it to natural habitats similar to the adjacent landscape. Locally harvested native transplants of wetland species were designed to supplement native, which has been highly successful in the wetter of the wetland areas. Restoration of the roadsides adjacent to the new highway has been far more successful than restoration of the old highway thus far. There have been many challenges with converting a large section of former roadway to natural habitat, some of which are site-specific and some of which convey lessons learned for future, similar efforts.

The Otay Mesa Vernal Pool Restoration Project, Phase I (Fiesta Wed 01:50p)

Meagan Olson*, molson@reconenvironmental.com

In an effort to protect vernal pool resources, the City of San Diego developed

a vernal pool habitat conservation plan (VPHCP) to provide a framework for the restoration, protection, and management of over 80 vernal pool complexes present within the city limits. The Chaparral Lands Conservancy's Otay Mesa Vernal Pool restoration project was one of the first projects to be implemented under this framework. The first of three phases, the 5-acre grant-funded restoration project began in the fall of 2018 and is currently in its 4th year of post-implementation maintenance. Once complete, 15 acres of vernal pool, western burrowing owl, and maritime succulent scrub habitat will be restored in southern San Diego, California. Vernal pool restoration has included non-native biomass removal, topographic grading, seed collection and bulking, and weed maintenance. Restoration of the associated uplands has included trash and debris removal, owl burrow installation, container planting and seeding, weed maintenance, and the thoughtful introduction of sensitive plant species. Ongoing management of the site has included careful consideration of the characteristics of each pool as well as the entire complex, to provide an ecosystem-based approach to restoration of the site.

Amphibians, Eucalyptus, and Persistence: The 15-year Saga to Protect a Key Parcel near the Elkhorn Slough (Fiesta Wed 2:10p)

Dash Dunkell*, dash@elkhornslough.org, 831.320.9212

Kevin Contreras*, contreras@elkhornslough.org

We will outline the Elkhorn Slough Foundation's successful efforts working with CalTrans to protect the 167-acre Elkhorn Highlands Reserve through innovative methods, as well as lessons learned from removing seven acres of eucalyptus and other invasive trees.

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Adaptive Solutions for Restoring San Diego's Coastal Transition Ecosystems (Fiesta Wed 2:30p)

Katy Chappaz*,
kchappaz@reconenvironmental.com,
619.832.3662

San Diego's coastal fog zone hosts a mosaic of vegetation communities, including southern maritime chaparral, live oak woodland, coastal sage scrub, and southern willow scrub. Many of these communities and their species are endemic to the San Diego region and need special attention as they face multiple threats. Restoring these habitats means

addressing layers of historic impacts, including wildfire, invasive species, agricultural uses, and homelessness. Additionally, adaptive management is required to respond to ongoing challenges, including propagating difficult chaparral species, managing adjacent recreational uses, and adjusting the mitigation strategy for evolving vegetation communities. This presentation discusses adaptive solutions used in the context of a mitigation project in the City of Carlsbad. The project involves restoring and maintaining 43 acres of native habitats in the coastal transition zone.

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Planning for Success

Session Chair: Joanna Tang, UC Santa Barbara

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Navigating Restoration in an Ever-Changing World (Merienda Wed 3:30p)

Trina Ming*,
trina.ming@mbakerintl.com

Ryan Phaneuf*,
ryan.phaneuf@mbakerintl.com

The ever-changing field of restoration ecology forces practitioners to constantly problem-solve for new issues that arise. The best way we can learn how to ensure successful restoration is through experience, both our own and from others. In this presentation, we will discuss unique restoration problems experienced, our approach to problem-solving and adaptive management, and the lessons learned for restoration and mitigation projects focused primarily on the Southern California region. Challenges to be discussed include navigating outdated performance standards, habitat conversion, climate change, invasive shot hole borer infestations, extreme weather events, unauthorized site usage, COVID-19, and educational outreach. We will then discuss how our experiences influence our future approaches to restoration. Although lessons learned have been varied, we have repeatedly noticed three primary themes that we will highlight in our presentation. First, we have emphasized a reliance on strong communication and documentation, which form the foundation for planning and executing project success. Second, we rely on creativity and flexibility in our thinking. Finally, we rely on sound scientific principles to inform the decision-making process, examining unprecedented issues through the lens of research and shared technical experience. We will share real world examples of how we have implemented these principles, with the intent of elevating further discussion on best practices for adaptive management and planning for success.

Integrating Traditional Ecological Knowledge from Local Indigenous Tribes into Restoration Projects

(Merienda Wed 3:50p)

Courtney Casey*,
Courtney.Casey@swca.com

Historically, engagement with local tribes during restoration projects has been limited. While avoidance measures, mitigation, and enhancement are required for listed flora and fauna, cultural resources are at most monitored and avoided. Cultural resources are a vital component of human history, and what remains of our local indigenous tribes well informs us of our past. These resources not only need to be protected but enhanced. Resources such as native plant species that were well-utilized by local indigenous tribes inform us of not only what purposes they served (e.g. medicinal, food source, materials), but best represent the environment prior to human impacts. Through the Otay River Restoration Project, our goal is to involve local indigenous tribes to help inform us of the best way to enhance cultural resources throughout the project site, with the goal of creating a space that can be utilized by local indigenous tribes and informs others who visit the site of their local indigenous tribal history. As these actions are not often undergone through restoration projects, we would like to discuss with the group regarding any experience or knowledge on this subject matter. We strongly believe that an increase in engagement with local tribes — and implementation and enhancement of their cultural resources — should be happening with restoration projects and we would like to come together and figure out: 1) Why this is not happening, and 2) How to make it happen.

Synthesizing Restoration in the California Delta at the Landscape Scale (Merienda Wed 4:10p)

Dylan Chapple*,
dylan.chapple@deltacouncil.ca.gov

Jennica Moffat

Effective adaptive management of ecosystem restoration at the landscape-scale requires a detailed understanding of current conditions to support science-based decision-making. To this end, the Delta Independent Science Board identified a need for “a comprehensive map and accompanying database to show where habitat restoration activities are being conducted or planned in the Delta, accompanied by essential information on these projects”. To support achievement of restoration goals and implementation of adaptive management, we are examining the history and future of active and passive process-based ecological restoration in the Delta and Suisun Marsh. Using EcoAtlas and supplemental sources, we present a synthesis of planning and implementation of restoration to date using a coordinated description of restoration types, their processes, and goals, categorized into four project types: tidal wetlands, non-tidal wetlands, riparian habitats, and floodplains. For each of these types, we provide background, a description of restoration processes, and a quantification of the area covered across all projects identified in the Delta and Suisun Marsh. For each project, we identify acreage, whether the restoration was intentional or unintentional, lead agencies, funding sources, and project phase (completed, in-progress, and planned). In total, we identified 30 tidal wetland restoration projects totaling 18,799.1 acres; 12 unintentional levee breaches that have passively restored 7,650 acres of fully tidal and muted wetlands; 20 riparian projects

Planning for Success *Listed in order of presentation*

totaling 1,132.86 acres; 9 floodplain projects totaling 1,898.14 acres; and 17 non-tidal wetland projects totaling 3,601.71 acres. We discuss implications for facilitating landscape-scale restoration efforts and highlight research and management gaps.

Visual Examples of Maritime Chaparral Restoration on a Military Installation (Merienda Wed 4:30p)

Shawn Wagoner*,
sw@burlesonconsulting.com

Habitat restoration on military lands in a Mediterranean climate presents an opportunity to visually track revegetation success. Fort Ord is a former U.S. Army base which operated from 1917 to 1994 on the Monterey Bay peninsula. Soil remediation activities were conducted after base closure on approximately 62

acres of land, encompassing 19 Historic Areas (HAs). Habitat restoration is required within all 19 HAs, with the objective of revegetating these areas based on specific restoration criteria documented in the Site 39 Habitat Restoration Plan (HRP). Restoration procedures such as seed broadcast, container plant installation, minor erosion control repair, and irrigation were implemented to facilitate restoration success. We established photo points and collected percent-cover data at all HAs to track vegetation growth and cover over time. Here we present the results of photo-point and percent-cover data to showcase examples of maritime chaparral succession and revegetation on former Fort Ord as a case study of successful restoration on military lands.

Nurse Plants Show Potential in Aiding Chaparral Restoration (Merienda Thu 2:00p)

Stephanie Ma Lucero*, sama@ucsb.edu

Carla D'Antonio, dantonio@es.ucsb.edu

Chaparral in southern California, with its evergreen, sclerophyllous shrubs, has long been considered resilient to wildfire disturbances and tolerant of climate stressors (e.g., drought). However, these ecosystems can become degraded due to anthropogenic stressors (e.g., the introduction of invasive species, an increase in fire frequency). As these communities become degraded, the need for restoration arises. In this study, we aimed to determine if native seedling establishment can be facilitated by early successional soft-leaved shrub species that recruit within degraded sites. These shrubs could act as nurse plants, reducing stressful abiotic conditions (i.e., high solar radiation), thereby leading to increased seedling survival. To test this hypothesis, we planted 3- to 5-month-old seedlings of *Salvia apiana*, *Ceanothus oliganthus*, *Rhus ovata*, and *Heteromeles arbutifolia* within established stands of *Malacothamnus fasciculatus* (MAFA) in a degraded chaparral site in Piru, California. We implemented three canopy treatments: no, half, and full MAFA canopy removal. MAFA shrubs were removed at their base and treatments were maintained. We planted in January 2019 and followed seedling survival to April 2022. *H. arbutifolia* had greatest survival in half removal plots. *S. apiana* had greatest survival in full removal plots. Nurse plants seemed to have no effect on *C. oliganthus* and *R. ovata* survival. Our results suggest the nurse plant affect is species-specific, where nurse plants may facilitate establishment of shade tolerant species (e.g., obligate resprouters), interfere with sun-tolerant species (e.g., obligate seeders), and, for some species, may not be beneficial enough to overcome challenging abiotic conditions.



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Design Drawings to Plants in the Ground: Lessons Learned from Bridging the Gap between Design and Practice (Merienda Thu 2:20p)

Emma Havstad*,
ehavstad@riverpartners.org

Alicia Beverage,
abeverage@riverpartners.org

Kesha Chapman,
kchapman@riverpartners.org

Isabel Lawrence,
ilawrence@riverpartners.org

Francis Ulep, fulep@riverpartners.org

The design process for habitat restoration projects incorporates various environmental and bureaucratic considerations, often resulting in years of planning. While River Partners knows first-hand the challenges of the restoration design process from years of experience in habitat restoration across California, it also has taken on the bid of implementing projects designed by its engineering partners. As a result, River Partners identified major design challenges by implementing such projects. These challenges included ecological considerations, irrigation expectations, and timeline estimates. By presenting the lessons learned from projects we have implemented in the Sacramento Valley and San Joaquin Valley, we will discuss how River Partners and other restoration practitioners can better support the development of future habitat restoration design packages.

Slippery Slopes in the Orinda Formation: A Recurring Problem Meets a Multi-Year Solution (Merienda Thu 2:40p)

Debra Lemke*, dlemke@ncenet.com

In April of 2010, a 22.5-foot-wide metal pipe in San Pablo Creek collapsed, creating a sinkhole the size of two Olympic swimming pools, along Via Verdi road in Richmond, California. The sinkhole blocked access to an 85 single-family home subdivision and eventually a 400-foot-long box culvert was constructed. Seven years later, on February 20, 2017, over 200 feet of the Via Verdi road embankment had migrated toward San Pablo Creek and indicated a larger landslide was in motion. The NCE engineering team was tasked with finding a solution that would keep the Orinda Formation at bay. Environmental documentation and two years of environmental agency coordination was necessary to secure environmental clearances for construction. In June 2021, construction of the Via Verdi Slope Stabilization project commenced. This presentation will present the eight alternatives and the preferred solution of a 19-foot high, 24-foot wide, and 350-foot-long culvert in San Pablo Creek to halt the Orinda Formation. Additionally, the presentation will discuss the creation of a natural roughened channel bottom in a 750-foot-long culvert, installation of skylights for fish passage, on-site seeding, shrub and tree planting, willow staking and brush mattress installation, and off-site mitigation requirements. Construction will be completed in 2022 and the City was responsible for ensuring compliance with more than 225 environmental permit conditions.

Thinking Small: A Refined Design Approach to Create Habitat for the Threatened Santa Ana Sucker

(Merienda Thu 3:00p)

Nicholas Deyo*, ICF, nick.deyo@icf.com

Brendan Belby, ICF

Heather Dryer, San Bernardino Valley Municipal Water District

The heavily urbanized Santa Ana River (SAR) watershed comprises the largest river system in Southern California. Dams and increasing water demands have put pressure on endemic fish species, including the threatened Santa Ana sucker (*Catostomus santaanae*). The U.S. Fish and Wildlife's recovery strategy calls for active habitat restoration for the species.

Upper SAR Tributary Restoration projects are being developed to restore and create high-quality habitat for the sucker. Four restoration sites have been selected near Riverside and will result in over 3 miles of enhanced/created channel and 50 acres of restored riparian habitat. This talk focuses on the Hidden Valley Creek site, which is currently an ephemeral channel that will receive treated wastewater to provide perennial flows for the sucker.

The design for this site requires creating channel morphology and habitat structures that will function in a low flow and low gradient system. This presentation will cover the use of reference sites to determine habitat criteria for the Santa Ana sucker. Design and modeling approaches to guide habitat creation in these fine-scale and novel systems will be discussed in detail. As water resources in the West become scarcer due to population growth and climate change, similar approaches may be required to maximize habitat benefit with limited water.



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Restoring California's Grassland Ecosystems

Session Chair: J.P. Marie, California Native Grasslands Association & UC Davis

Listed in order of presentation

Harnessing Native Plant Resilience for Increased Weather Extremes

(Fiesta Wed 3:30p)

Vic Claassen, vpclaassen@gmail.com

Native grasses and forbs have survived through tough growing conditions in the past. Now, weather extremes are becoming more commonplace. The plant/soil interactions that allow natives plants to be resilient to weather stresses can help guide designs for working landscapes such as earthen bridge approaches and canal banks. Some common slope surface failures are shown and their probable causes and remedies are shown. The 'grow slow' approach is generally more stress-tolerant, as well as tending to include more biodiversity in native species.

Restoration Outcomes of California Coastal Grasslands

(Fiesta Wed 3:50p)

Justin Luong*, jluong4@ucsc.edu

Daniel Press, Karen Holl

There are large monetary investments for restoration globally, and achieving goals are important for limiting biodiversity loss, but outcomes are not often assessed. Combing ecological and management surveys, we assessed the outcomes of 37 restored California coastal grasslands along a 1,000-km N-S climate gradient, three to 30 years post-implementation. Restoration efforts are successful at achieving original project goals and a standard metric for native cover, but management interviews suggest practices could lead to regional biotic homogenization. Invasive species were indicated as the largest barrier to achieving project goals, which was further supported by a relationship between non-native cover and post-implementation project age. High labor investment resulted in projects with higher native richness and lower non-native cover. Future restoration efforts may benefit

from regional government restoration agencies that coordinate species use across projects to limit biotic homogenization.

Restoring Conservation Grazing to Vernal Pools: A Success Story!

(Fiesta Wed 4:10p)

Dr. Julia Michaels*,
juliam@hedgerowfarms.com

Dr. Kenneth Tate, Dr. Valerie Eviner

Over the last few decades, it has become well understood that California vernal pools can benefit from low-density grazing. But in vernal pools that have been shut out from grazing for many decades, can the negative effects of long-term exclusion can be reversed through careful grazing reintroduction? We compared adjacent vernal pool wetlands under three grazing management strategies: continuously grazed (100+ years), long-term excluded (40+ years), and two years of reintroduced grazing. We found that reintroducing grazing led to both increased diversity and native cover in just two years. We identified several mechanisms related to this pattern, including changes to competitive dynamics that favor small-statured native annuals and increases in hoofprint microdepressions that make soil moisture more available to plants.

Heritage Growers—A New Restoration Seed and Nursery Program of River Partners

(Fiesta Thu 8:30a)

Pat Reynolds*,
preynolds@heritagegrowers.com
(preferred), 916.769.7076 (cell, ok when quick answer is needed)

Launched in early 2022 as a program of River Partners, Heritage Growers (www.heritagegrowers.com) is a new supplier of California native seed and plants of known genetic origin. Heritage Growers' goal is to improve habitat

restoration outcomes by producing new species and new ecotypes of locally sourced plant material to create more resilient and biological diverse restoration projects. This will be accomplished by working closely with partners and collaborators to achieve shared goals of making appropriately sourced plant materials available for restoration projects. The presentation will describe Heritage Growers' operation and avenues for collaboration, partnership, and volunteerism to help serve the habitat restoration community.

Biodiversity, Fuel, and Grazing: Ecological Management in Central Coast California

(Fiesta Thu 8:50a)

Jenna Allred*,
jallred@slconservancy.org

Jackson Brooke, Rodrigo Sierra Corona

The Santa Lucia Conservancy (SLC) manages 20,000 acres of conservation land, either owned (10,000 acres) or through easements (8,000 acres) with a variety of partners within the Santa Lucia Preserve (SLP) in the Central Coast of California. The SLP includes a diverse ecosystem mosaic, including coastal prairie, oak savanna, redwood forest, chaparral, and scrubland. In 2018, in response to the declining grasslands health the SLC developed the Grasslands Initiative, focusing on promoting native biodiversity in its 5,500 acres of grasslands by decreasing brush encroachment, practicing weed management, prescribed fire, and conservation grazing. In total, over 3,000 acres are actively being managed within the SLP by the SLC and the individual landowners.

Restoring California's Grassland Ecosystems *Listed in order of presentation*

Ag to Coastal Grassland: Adapting Mechanized Farming Methods to Native Habitat Restoration (Fiesta Thu 9:10a)

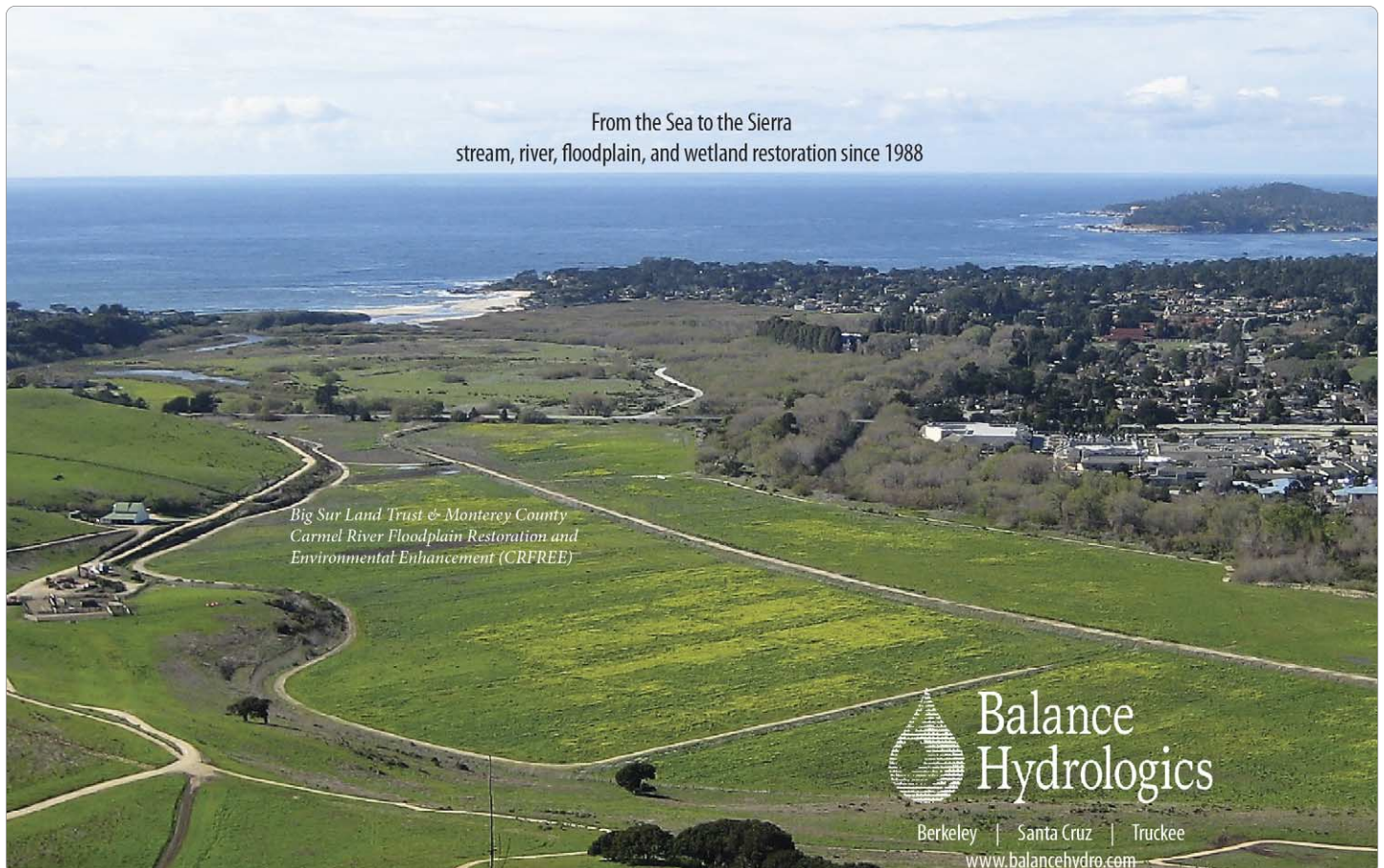
Cara Clark*,
cara@watsonvillewetlandswatch.org

Jonathan Pilch,
jonathan@watsonvillewetlandswatch.org

Watsonville Wetlands Watch (WWW), in partnership with the Land Trust of Santa Cruz County (LTSCC), is restoring an 11-acre former ag field to a native coastal grassland. The field is part of the Watsonville Slough Farms — a mosaic of sustainable organic agriculture and open space habitat owned by the LTSCC. After the field was retired from active production, WWW implemented

grassland restoration with local native species. The growers who lease the active farmlands on the ranch use a mechanical transplanting machine to plant their crops, and we adapted this machinery to plant native species. WWW staff and volunteers collected grass and forb seeds locally and they were sown into plug trays by a commercial seedling producer. WWW worked with local farmers to prepare the field by discing with a tractor. The phased planting started with one acre in 2020, and added an additional two acres in 2021. In the Fall of 2021, more than 87,000 plugs were planted in one day using the mechanical transplanter, which is tractor-mounted with four seats at the back for farmworkers to feed the plugs into the machine. Overhead sprinkler

irrigation was installed on this two-acre area. In addition, those two acres and another three and a half acres were seeded with a broadcast seeder. Follow-up management will include flame weeding, hand weeding, and mowing with appropriate timing to encourage re-seeding by native species while suppressing invasive weeds. This project resulted in many lessons learned. Partnerships were absolutely essential to success. Changing weather conditions and sensitive equipment required adaptability and attention to detail. Future phases will benefit from the insights gained thus far.



Planting Community

Session Chair: Bruce Delgado, BLM

Listed in order of presentation

Planting a Dream: A Community-Designed Urban Park Connects People and Nature (Fiesta Thu 10:35a)

Chelsea Neill*, PG, Balance Hydrologics,
cneill@balancehydro.com

Rachel Saunders, Big Sur Land Trust,
rsaunders@bigsurlandtrust.org

Beth Febus*, Big Sur Land Trust,
bfebus@bigsurlandtrust.org

The Carr Lake basin is a 480-acre historic lakebed situated within the center of the City of Salinas, California. Carr Lake, previously characterized by extensive wetland and freshwater marsh environments, has been farmed since the land was reclaimed for agriculture in the early 1900s and still serves as flood storage capacity for the surrounding City of Salinas.

In 2017, Big Sur Land Trust (BSLT), a nationally accredited land trust, acquired approximately 73.1 acres of lakebed property. BSLT initiated a robust community engagement process, working with residents to envision a new multi-benefit community park for the site. The project is currently in the design phase and includes: 1) A new neighborhood park with a variety of amenities that will benefit local residents, and 2) Restoration of the land to thriving riparian, freshwater marsh, and upland habitat, and offering trails to access the natural environment. The neighborhood park will include picnic areas, basketball courts, a play area, a dog park, and a community center/classroom. The project is designed to provide much-needed parkland to the community and improve access to the many benefits of nature.

The restoration design is based on an analysis of historical and existing

conditions and includes design elements to achieve project objectives. The existing ditched channels and surrounding agricultural land provide very little habitat due to limited vegetation, channel variation, substrate, and temperature.

Design of the restoration area involves rerouting Hospital and Gabilan Creeks out of the existing man-made ditches and into restored ecosystems that mimic historical conditions and create wildlife habitat. Gabilan Creek is designed to be a dynamic, multi-thread stream, which will flow across an inset floodplain. Hospital Creek is designed to be similar to a freshwater marsh ecosystem with backwater channels. A treatment wetland will address water quality issues within the watershed, and a seasonal wetland to mimic the historical conditions of Carr Lake, which had variable extents of open water dependent upon seasonal rainfall patterns. The restoration project is designed to enhance habitat for fish and wildlife and generally improve water quality, while also creating much-needed park and open space area for the residents of Salinas.

It is anticipated that park construction could begin as early as 2023.

Community-Centered Restoration in Creeks of Salinas & on Fort Ord National Monument (Fiesta Thu 10:35a)

Laura Lee Lienk*, llienk@csumb.edu

Return of the Natives Restoration Education Project: Bringing people to nature and nature to people through native plant centered hands-on restoration experiences in urban parks and natural wildlands. Small plants, small hands. Plant diversity, human diversity. Habitats created!

Modified Rant: Plant Blindness, Super Blooms, Public Perception... Let's Talk Solutions (Fiesta Thu 11:15a)

Lindsay Teunis*,
lindsay.teunis@swca.com

"It's a Super bloom!" (black mustard or California poppy); "Why is your yard full of weeds" (native plants); "Don't you dare remove the bamboo from my favorite horse trail!" (arundo); "Look at that beautiful plant!" (castor bean); "Come to the garden store and see our hillside of purple flowers!" (iceplant); "Oh I love all the pretty yellow flowers along the freeway!" (chrysanthemum); "I killed my grass and laid down rock and artificial turf to reduce my irrigation bill" (xeric landscaping). These statements were made by friends, equestrians, my mom, a local plant nursery, my sister, neighbors and each one is a real-life example of someone's view of the world around us. My first reaction to each of these moments was frustration and often anger with perhaps a little education but those actions won't really make change happen. Perhaps we need to begin by acknowledging that most of the general population has grown up with "plant blindness" either not noticing the vegetation around them OR not knowing what vegetation should be there because they have only ever seen the plant palette that settlers/colonizers, developers, home associations, and garden centers have imported and propagated. Although the concept of plant blindness may feel benign when talking to one person, when we expand plant blindness across large populations it can and has resulted in catastrophic impacts to natural areas and will continue to impact the worlds' ability to address climate change. I'd love for you to join me in talking about what actions we can take as individuals, as a community, and as an organization to cure plant blindness. Hopefully bringing

Planting Community *Listed in order of presentation*

the general public into a space where we can collectively increase the rate of restoration in response to global needs.

Hands on the Land: Re-imagining Land Stewardship at a Local Scale

(Fiesta Thu 11:35a)

Brooke Wainwright*,
bwainwright@ucdavis.edu

Margot Flynn*; **mtflynn@ucdavis.edu**

Alana Luzzio*; **aluzzio@ucdavis.edu**

Sophia Simon; **sosimon@ucdavis.edu**

Hands on the Land is a student-run organization founded in 2021 and based in Davis, California, which currently serves Yolo and Lake counties. The goals of this organization are to cultivate a sense of place by engaging in hands-on projects

on the local landscape, ultimately striving to reconnect all people with the land, restore ecosystems and their functions, and honor not only the indigenous people who first stewarded this land but also the land itself. Currently, our efforts are focused on McLaughlin Natural Reserve in Lake County, a 7,000-acre mosaic of oak woodlands, chaparral, non-native grassland, riparian areas, and pristine serpentine grassland, located in the inner coast ranges of Northern California. We organize monthly trips to McLaughlin for students and affiliates, made free by an ever-growing patchwork of funding sources. There, we assist with hands-on restoration projects (e.g., patch-burning, hand-tending, planting), plan and collaborate for future projects, and spend time learning about the ecosystem. While our vision for this organization is vast, we

are still in the early stages of expanding on these multifaceted goals. We hope to host workshops with invited speakers (e.g., restoration ecologists, TEK practitioners, artists, environmental educators). We envision designing and leading free activities for the local community including bird watching, nature journaling for kids, publishing species identification brochures, and leading activities that combine art and nature. Additionally, we plan to devise and test innovative solutions for restoring ecosystems, which will require inclusive conversations among diverse groups of people. We will harness the power of people to restore the local landscape by removing barriers to connecting to the natural world and creating space for people to come together. At its core, our organization is

continued

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committed to being actively anti-racist, promoting diversity within the fields of restoration, ecology, and environmental education, and creating equitable outdoor access. We are eager to learn from and collaborate with those who have experience in, and big ideas for any of these fields, while welcoming those who might simply want to learn more and get their hands dirty.

The Seed Pile Project: Using a Community Science Framework to Identify Viable Native Species for Urban Seed Dispersal (Fiesta Thu 2:05p)

William Krimmel,
billy@miridaelivinglabs.org

Haven Kiers, ahkiers@ucdavis.edu

Caroline Larsen-Bircher*,
caroline@miridaelivinglabs.org

The Seed Pile Project (SPP) is a community science initiative by Miridae Living Labs and UC Davis Landscape Architecture faculty to better understand the dynamics of native plant seed dispersal in human-dominated landscapes like cities & roadsides. It invites community participants to drop free packets of a custom mix of 10 local-ecotype native seeds (e.g. Menzie's fiddleneck, California poppy, turkey mullein) in urban areas where they live or work, then monitor the results through repeated observations over 10 months. As a zero-barriers community science initiative, the SPP educates, engages, and empowers individuals and communities typically left out of the traditional restoration process by providing them with knowledge and resources to help promote healthy ecological development within their own neighborhoods.

By researching the conditions under which certain species of native seeds spread, survive, thrive, or die in disturbed areas, we can gain a better understanding of which native plants to incorporate into the built environment and where to put

them for the greatest ecological benefit and resilience. The project addresses current knowledge gaps in both the restoration and landscaping realms; specifically — which native plants can tolerate the urban environment, be spread inexpensively by seed, and do not need to be trimmed, pruned, fertilized or watered to survive? The 2021–22 SPP distributed ~1800 native seed packets, reaching approximately 1,000 individuals. The seed piles are currently being monitored by individual participants and participant groups such as families, school classes, and Girl Scout troops. We will share our preliminary results, lessons learned, and plans for scaling up.

Yellow Starthistle Management through Timed Mowing (Fiesta Thu 2:25p)

Nina Orellana*,
nina@grassrootsecology.org

Grassroots Ecology is a non-profit with a mission to engage and educate the public to restore local ecosystems. Based in Palo Alto, Grassroots Ecology manages dozens of habitat restoration sites within San Mateo and Santa Clara counties where thousands of community members participate each year to learn about and steward public lands and watersheds.

Grassroots Ecology and Midpeninsula Regional Open Space District began a partnership in 2015 to provide land stewardship and volunteer engagement opportunities at the 79-acre Hawthorns property, part of Windy Hill Open Space Preserve in Portola Valley. One component of the partnership is to manage yellow starthistle (*Centaurea solstitialis*) using strategically timed mowing supplemented by hand-pulling with volunteers. This strategy was developed based on lessons learned by Friends of Edgewood and the California Native Plant Society at Edgewood Park. Additionally, Grassroots Ecology has used timed mowing to reduce yellow starthistle

populations at nearby Arastradero, Byrne, and O'Keefe Preserves. While visual observations showed reduction in yellow starthistle at these project sites, the initiation of a mowing program at Hawthorns offered an opportunity for Grassroots Ecology to collect pre-treatment data and monitor the population annually.

The data collected has produced exciting results. The mean density of all plots in 2017 (baseline) was 30.64 yellow starthistle/square meter compared to a mean density of 0.56 yellow starthistle/square meter in 2020. This is a 98% decrease in average density from 2017 to 2020.

This is a great example of what consistent and strong partnership, community involvement, and investment in monitoring can achieve. Monitoring and hand-pulling is completed annually by Grassroots Ecology summer interns, offering an introduction into vegetation management techniques and outcomes.



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California Grown... Updating Nursery Practices

Session Chair: Wolfgang Schweigkofler, Dominican University of California

Listed in order of presentation

California Sycamore Restoration: Genetic Testing and Propagation Techniques (Discovery Thu 8:30a)

Ryan Hegstad*,
rhegstad@harveyecology.com

Diana Benner*,
diana@thewatershednursery.com

Deanna Giuliano*,
nursery@grassrootsecology.org

Matt Quinn, matthewbq@hotmail.com

Will Spangler, will.spangler@scv-habitatagency.org

California sycamore (*Platanus racemosa*) is a native riparian tree species endemic to California and northern Baja California, and is the dominant species in sycamore alluvial woodland (SAW) habitat, a rare and valuable habitat type. A current threat to remaining California sycamore populations and SAW habitat is a lack of regeneration of California sycamore, particularly from seed. Wild-collected seed can be grown in native plant nurseries. However, efforts to restore California sycamore populations and SAW habitat by growing and installing California sycamores from wild-collected seed in a native plant nursery has become recognized as risky since hybridization with a popular, non-native landscaping tree, London planetree (*Platanus × hispanica*), may be common. Thus, many nurseries have begun propagating California sycamore trees from cuttings. However, success using this method has often been extremely low and it has remained unclear which factors limit successful propagation from cuttings. To further understand this problem and increase the success of propagating California sycamores from cuttings, we genetically tested the commonness of native versus hybrid sycamore trees in the wild, and propagated cuttings from genetically verified California sycamores using five cutting and propagation

treatments in a fully factorial design. Here we present results from this study and highlight the next steps needed to increase the efficacy of vegetative propagation to support restoration of California sycamore populations and SAW habitat.

Rapid Growth of Southern California Black Walnut (*Juglans californica*) through Stump Salvage and Transplantation (Discovery Thu 8:50a)

Richard B. Lewis, III*, Psomas,
richard.lewis@psomas.com

Kai T. Palenscar, PhD*, San Bernardino Valley Municipal Water District,
kaip@sbnwmwd.com

California's native walnut taxa (*Juglans* spp.) are rare and declining across their ranges, and effective methods of regeneration are needed as part of a strategy to retain and restore these species and the plant communities where they dominate (California walnut groves). California walnut species exhibit slow growth from plantings of seed or standard nursery container stock, delaying the establishment of high-functioning woodland habitat characteristics on habitat restoration sites — e.g., broad arboreal canopy, nesting opportunities (including cavities), and substantial fruit production. Alternatively, salvage of whole trees via excavation, root pruning, and establishment in large nursery boxes, is a labor-intensive process.

The development of the Three Oaks tract in the City of Walnut included 61 acres of oak-walnut woodland habitat restoration to mitigate impacts to this habitat type caused by development activities. As part of restoration implementation in 2006, the developer approved the experimental salvage and transplantation of several Southern California black walnut (*Juglans californica*) (walnut) trees, along with coast live oak (*Quercus agrifolia* var. *agrifolia*) (oak) and blue elderberry

(*Sambucus nigra* ssp. *caerulea*). Psomas developed a methodology for the strategic salvaging of individual trees, including: (a) Pruning of suitable specimens to retain a limited portion of stem/trunk; (b) Excavation and removal (via heavy equipment) of the trunks with a substantial amount of crown/root tissue attached; (c) Transplantation into prepared pits and replacement of backfill soil; and (d) Initial maintenance including irrigation and weed control. Some of the transplants were installed within the habitat mitigation site, while others were placed in nearby natural areas in undeveloped portions of the property. The plantings outside the mitigation site did not receive long-term maintenance. The purpose of this experiment was to determine if stump transplantation could be a cost-effective alternative to whole-tree salvage, while yielding superior growth results versus plantings from seed or standard nursery container stock.

The current landowner (Lennar Corporation) provided access to the Three Oaks property in July 2021 for Psomas to evaluate the performance of the salvaged individuals approximately 15 years following transplantation. A total of 12 transplanted walnuts and 2 oak trees were evaluated for canopy diameter/height, trunk diameter at breast height, phenology/fruitletting, and other characteristics. The walnut tree growth was exceptional, with canopies measuring up to 34 feet diameter and trees reaching a height of up to 28 feet. Abundant fruit was present on multiple walnut individuals. Notably, the transplanted oak trees had attained a canopy diameter of up to 23 feet and a height of up to 25 feet and fruit production was observed.

This experimental approach demonstrates that stump transplantation can be an effective method to achieve rapid growth of these native hardwood species with the

additional benefits of conserved local genetics and enhanced habitat complexity (e.g., provision of nesting cavities and inclusion of coarse woody debris).

A Fern Establishment Strategy for an Oak Woodland Habitat Creation Site in Southern California (Discovery Thu 9:10a)

Richard B. Lewis, III*, Psomas,
richard.lewis@psomas.com

Anthony Perez*, Claremont Botanic Garden, aperez@rsabg.org

Billy Sale*, Claremont Botanic Garden,
bsale@rsabg.org

Ferns and their allies are typically absent from planting palettes for woodland/scrub habitat creation sites in the Coast/Transverse Ranges of Southern California. The absence of these taxa can be attributed to the initial conditions (e.g., unsuitable substrates/lack of niches; excessive insolation/drying winds; absent propagules; invasive weed proliferation) and the lack of a fern establishment strategy.

Los Angeles County Public Works retained Psomas to assist with design/implementation of an 8.0-acre coast live oak and sage scrub habitat creation program in Santa Anita Canyon on the coastal slope of the San Gabriel Mountains. A diversity of native seeds/cuttings were collected in the local subwatershed, container plants were propagated/planted, and seeds were applied by various methods. Massive amounts of coarse woody debris, boulders, and native mulch were installed on an unvegetated sediment placement site to enhance the substrate. These features were installed for multiple ecological benefits including the creation of potentially suitable niches for fern establishment.

Psomas retained California Botanic Garden (CalBG) to collect divisions (stems/rhizomes) of several native fern species in coordination with Psomas' restoration ecologists. The divisions were collected from multiple, disjunct populations to capture genetic diversity within the subwatershed. A carefully limited portion of plant tissue was removed to minimize impacts on regeneration of the donor plants/populations. CalBG attempted several different propagation techniques with excellent overall results in health and quantity of stock produced.

Psomas developed a phased, site-specific fern-planting methodology to establish ferns in protected niches starting in 2013. Irrigation was discontinued in 2018. As of February 2022, approximately 600 fern plants have been installed on the site with good survival results despite ongoing drought. Fern regeneration has been observed on multiple individuals/species including sporangia and clonal spreading via rhizomes.

This project demonstrates that ferns can be successfully established on a newly graded landform in a semi-arid locality.

Heritage Growers Nursery Operation: Your Partners in Habitat Restoration (Discovery Thu 9:30a)

Michele Ranieri*,
mranieri@heritagegrowers.com

Heritage Growers (www.heritagegrowers.com), a project of River Partners, is a new supplier of California native seed and plants. Our nursery focuses primarily on California native grasses and forbs species of known genetic origin. We have over two decades of experience growing plants to restore a wide variety of habitats. The presentation will cover our general availability, local ecotype focus, contract grows, monarch kits, Phytosanitary measures/BMPs, and current research endeavors.

Improved Steaming Options for the Disinfection of Potting Mix using a Manifold (Discovery Thu 10:30a)

Vernon Huffman*
vernon.huffman@dominican.edu

Wolfgang Schweigkofler*,
wolfgang.schweigkofler@dominican.edu

Infected nursery plants play an important role for the spread of *P. ramorum*, the causal agent of Sudden Oak Death and Ramorum blight. In order to minimize the risk for disease transmission to new areas, nurseries are inspected regularly for *P. ramorum*; and federal regulations require the eradication of infested plants and disinfestations of nursery soil and equipment. The National Ornamental Research Site at Dominican University of California (NORS-DUC) is a federally funded research nursery devoted to testing and developing environmentally friendly management options for quarantining pathogens of ornamental plants. At the research nursery, thermal inactivation of plant debris, soil, and nursery equipment infested by *P. ramorum* is achieved by steaming using a commercial steaming unit (SIOUX Steam-Flo SF-20) at a minimum temperature of 50°C for 30 minutes by placing a steam sock on top of the item to be steamed, then securing a tarp on top of the steam sock.

This has proven effective for quantities of soil 4 yards or less, but most native plant nurseries need to steam larger quantities of soil and potting mixes, upwards of 15 yards at a time. The time to steam such quantity requires substantial fuel at a high cost, so other methods were needed. NORS-DUC developed a manifold heating system to deliver heat more effectively bottom-up at significant time and cost savings. The use of a manifold can help native plant growers ensure pathogen-free soil is utilized for nursery practices, thereby reducing the risk of *P. ramorum* spreading.

A First Look on the Effects of Steaming on Soil Microbiome and Chemistry (Discovery Thu 10:50a)

Wolfgang Schweigkofler*,
wolfgang.schweigkofler@dominican.edu

Vernon Huffman, Sharifa Crandall

A major concern for plant nurseries and land managers is eliminating pathogens that cause soilborne diseases. Plant pathogens can spread into the environment from potting soil and plants used for out-plantings. For instance, the oomycete pathogen *Phytophthora tentaculata*, was introduced into the California landscape probably through planting sticky monkey flowers (*Diplacus aurantiacus*) at restoration sites. Recent research shows that steaming the soil at high temperatures can effectively kill *Phytophthora* spp., however, few studies investigate how steaming treatments can: (1) Change microbial community identity and function in the soil, and (2) Influence the soil chemistry. It is well-established that beneficial soil microbes facilitate plant growth (e.g. mycorrhizal fungi) while others support disease suppression and soil fertility. We conducted an experiment where nursery soil underwent a steaming event within a rectangular plot (2.04 x 3.55 x 0.25 m) located at the National Ornamentals Research Site at Dominican University (NORS-DUC). Soil samples were collected at five time points before and after the steaming event. Thirty soil samples were collected for DNA extraction and 18 for chemical analysis. 16S-V4 and ITS genetic markers were used to discern the bacterial and fungal soil microbiome. Understanding the soil microbiome and shifts in soil chemistry after steaming will help nursery practitioners decide if it is necessary to add bioproducts and fertilizers to adjust the soil post-steaming and to target the type of amendment to ensure optimal soil health.

Soil Substrates Have a Huge Impact on Irrigation Water Splash, Choose Wisely (Discovery Thu 10:55a)

Wolfgang Schweigkofler*,
wolfgang.schweigkofler@dominican.edu

Nilwala Abeyssekara, Vernon Huffman,
Karen Suslow

In nurseries, plant pathogens can spread via water splash from the surface to plants placed on benches. We used liquid suspensions containing fluorescent microspheres to mimic propagules of *Phytophthora* spp. to compare the vertical water splash resulting from three irrigation methods on five surface types. Using hand-watering, the number of water droplets that splattered to our maximum height of 3 ft. was significantly higher from concrete than from dry bare soil, weed barrier fabric, gravel, and mud puddle. Hand-watering and impact spray generated limited water splash at heights between 2.5 and 3 ft. However, spray sprinklers resulted in no water splash above 2.5 ft. Our results indicate that nursery management practices such as irrigation and surface type can reduce the risk of transmission of waterborne pathogens.

The Importance of Testing in Producing Phytophthora-free Nursery Plants (Discovery Thu 11:00a)

Tedmund J, Swiecki*,
phytosphere@phytosphere.com

Elizabeth A. Bernhardt,
phytosphere@phytosphere.com

Well-validated testing procedures play important roles in the production of *Phytophthora*-free nursery plants for use in habitat restoration. However, to use testing appropriately, practitioners need to understand what tests can and cannot do and how they are best applied. Although various methods can be used to detect

Phytophthora in nursery plants, methods vary in sensitivity and few methods have been validated to determine their efficacy under nursery conditions. Of current test methods, the bench leachate test has multiple advantages. It is a standardized method that nondestructively test arrays of plants for the presence of *Phytophthora* and does not produce false positive results. It has been extensively tested and shown to be highly sensitive at detecting infestation rates as low as 2.5% in test arrays. The test uses simple equipment and has been successfully used by multiple nurseries. Sensitive testing protocols like the bench leachate method are an important component of effective nursery best management practices (BMPs) designed to exclude *Phytophthora* because they allow early detection of inadvertent lapses that result in contamination. Because plants infected with root-rotting *Phytophthora* species often show no obvious shoot symptoms in the nursery until root decay is extensive, accidental contamination can become widespread before it can be detected by visual inspections. Predelivery testing of stock using this method serves as a final check on the successful implementation of BMPs by the nursery. Extensive testing using a validated standardized method also provides a way to assess the overall effectiveness of the BMPs. Through 2021, nursery plants grown in full compliance with the BMPs used by the Accreditation to Improve Restoration (AIR) program had no *Phytophthora* detections in 669 bench leachate tests including 24,588 plants, providing strong evidence that the BMPs are effective. The bench leachate test can also be used to detect *Phytophthora* in nurseries that do not follow effective BMPs. However, it is not practical or advisable to use testing as a way to select noninfected plants from a generally infested non-BMP nursery.

California Grown... Updating Nursery Practices *Listed in order of presentation*

Best Management Practices to Prevent Plant Pathogen Introductions on Restoration Nursery Stock: Searching for the Best Recipes (Discovery Thu 11:20a)

Kristina Weber*, California Department of Food and Agriculture, Sacramento, CA, kristina.weber@cdfa.ca.gov

Diana Benner*, The Watershed Nursery, Richmond, CA, diana@thewatershednursery.com

Susan Frankel, USDA Forest Service, Pacific Southwest Research Station, Albany, CA, susan.frankel@usda.gov

Surveys of native plant nurseries and restoration sites indicate root-rotting *Phytophthora* species are commonly, inadvertently, outplanted on native plant nursery stock used for habitat restoration

or landscaping. Restoration plantings aim to enhance the environment, but these soil and waterborne pathogens may reduce plant vigor, decrease survival, degrade the site, and harm adjacent vegetation. Once established, soil and waterborne pathogens are very difficult to control. Prevention is key to sustain plant health and achieve restoration goals. Nursery Best Management Practices can be applied to reduce the likelihood of *Phytophthora* introduction and spread in container plant production. A systematic approach which focuses on practices at all stages of production is the most effective method to produce healthy, robust plant material. Monitoring nursery stock health through pest scouting or periodic diagnostic testing is also recommended. The California Department of Food and Agriculture (CDFA), Nursery Services and

the Phytophthoras in Native Habitats Work Group have each developed nursery best management practices-based programs aimed at limiting soil and waterborne plant pathogen spread. The programs are exploring how they can work together to assist nurseries with the goal of growing healthy plants in a means that is practical, effective, and affordable. Case studies will be shared to provide tips and guidance regarding production of clean plant material, examples of low-cost solutions for soil heat treatment, raised bench designs and other critical control points to focus on.



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Poster Chair: Cassie Pinnell, Vollmar Natural Lands Consulting

Open Mic Chair: Lindsay Teunis, SWCA

Meeting the Moment: Developing Ecological Worker & Compliance Training for the On-the-Ground Restoration Workforce

Sally Bolger, Director, Ecological Workforce Initiative,
sallyb@ecologicalworkforce.org,
415.218.9818

The Ecological Workforce Initiative is bringing together a coalition of restoration industry leaders, employers, workforce development partners, training providers, and education professionals to develop an Ecological Worker + Compliance Training Program and industry-recognized qualifications certificate. The Program is a combination of specially developed curriculum supplemented by worksite training.

The Program delivers restoration-focused curriculum to on-the-ground laborers and equipment operators, giving them the skills and knowledge they need to work appropriately in ecologically sensitive habitats, including an understanding of the permitting requirements and restrictions, basic ecological principles, habitat types, and species of concern.

It is on the ground where the labor force interfaces with the resources, yet there currently is no publicly available training for those workers. The extent to which workers are trained in this specialty is primarily based on on-the-job training, which varies dramatically between employers. Lack of industry standards can lead to damage to resources and unsatisfactory project outcomes.

The Environmental Restoration Industry is growing exponentially and is already unable to meet its workforce needs. In order to accomplish restoration at pace and scale, we need a workforce trained to implement it. This initiative is a powerful means of addressing the long-standing barriers to employment in restoration

work faced by many in our under-served communities. The Program will expeditiously train/retrain laborers of all levels into highly paid and fulfilling jobs with excellent wages and benefits, while supporting more successful restoration project outcomes.

Restoring Coastal Lagoons and Wetlands on California's Scenic Highway 1

Katherine Brown-Caltrans District 5, Landscape Architect,
katherine.brown@dot.ca.gov

Between 2015 and 2018, the California Department of Transportation (Caltrans) constructed the Piedras Blancas Road Realignment, along California's Scenic Highway 1, to realign the three-mile stretch of highway away from coastal bluff erosion. This section of California's coastline is home to at least six federally protected species, an equal number of plants and wildlife considered rare or species of special concern by the state of California, and over 90 acres of wetlands; all located within the unique setting of a pristine coastal prairie grassland. Working with over 12 permitting agencies, Caltrans developed innovative measures to avoid and minimize impacts to natural resources. In addition, the project also implemented compensatory mitigation for impacts that occurred including restoring wetlands and waters on-site along the old roadbed, enhancing wetlands at another on-site location, and the removal and restoration of old roadbed — replanting using native plants and seed using topsoil saved from the excavation of the new alignment.

Efforts were made to protect natural resources, including using permeable road base in wetland locations, steepened slopes, building the bridges from trestles, a full-time biological monitor, collection and placement of topsoil, extensive ESA

fencing, landform grading, native vegetation transplanting, and invasive plant management.

Importance of Local Adaptation In California Poppies for Ecological Restoration

Leisha Devisetti*,
leishadevisetti@gmail.com

Ecological restoration is the process of assisting the recovery of an ecosystem by reintroducing native species to an area. Climate change and human activity have led to ecosystems' degradation, providing opportunities for more restoration efforts. Local adaptations occur when populations adapt to match their environment. These adaptations can be useful in ecological restoration because the locally adapted genotypes perform better in the site. We tested to see if climate conditions at the source population or seed source locality impacted leaf traits, flower traits, or seed production in California poppies (*Eschscholzia californica*). We gathered poppies from eight sites along the west coast (from Humboldt, California, to Ensenada, Mexico) along a gradient of climatic conditions. The experiment was conducted at a common garden in Santa Cruz, where plants sourced from the different locations were exposed to common growing conditions. We collected leaves to quantify specific leaf area, specific major vein length, leaf lobedness, specific flower area, and assessed fitness with seed counts. We found that there were significant differences between seed locality and the poppies' morphology and leaf traits. But, the Santa Cruz poppies did not have a significantly greater reproductive output compared to the other sites, suggesting that these differences did not translate into local adaptations. Since we found local adaptations were not present, it could be



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more efficient to purchase cheaper seeds when using California Poppies in restoration even if they are not local, helping redirect the money to other restoration activities.

Does Seeding and Planting Revegetation Techniques or Nitrogen Deposition Affect Seed Bank Composition in Restored California Coastal Grasslands?

Nicholas Mazzotti*, nmazzott@ucsc.edu

Alyssa Anzalone*, aaanzalo@ucsc.edu

Karen D. Holl, kholl@ucsc.edu

Justin Luong, jluong4@ucsc.edu

California's coastal grasslands have a high species richness, providing habitat for many of state-designated rare and endangered species. Seed banks allow species to persist over decades and can prevent regional genetic homogeneity, conserve rare species, and aid the recovery of disturbed plant communities. Whereas seed banks are important for native species preservation, they can also make it more difficult to achieve restoration objectives as they may retain non-native seeds for many growing seasons. We compared the species richness of sites restored through direct seeding and outplanting methods and the effect of nitrogen addition on species composition. We hypothesized that sites restored through direct-seeding methods would result in a more diverse seed bank composition. We also anticipated higher non-native species density in N-treatment flats when compared to the control. We germinated the soil seed bank and identified the resulting seedlings from four sites for each technique. We used a water-soluble N-fertilizer applied weekly while the control received no fertilizer. We compared relative species richness and abundance of both native and non-native species between planted and seeded flats to the standing vegetation as observed by vegetation surveys. While the seed banks

from most sites were dominated by non-native species, preliminary results suggest that there were more non-native species present in N-treated flats. Early results suggest that there may be a higher native species richness in the sites restored through direct-seeding methods. We will present updated results at the poster session.

Restoration of Seasonal Wetland and Perennial Grassland to Sequester Greenhouse Gasses at the Newman Community Conservation Area in San Joaquin Valley

Rachel Miller*, Vollmar Natural Lands Consulting,
rmiller@vollmarconsulting.com

The City of Newman Seasonal Inland Wetland Project will restore a mosaic of seasonal wetland, riparian woodland, and perennial grassland habitat at a historically disturbed site located in northwestern Merced County, just outside the City of Newman. The site has been disturbed by interruptions to its former hydrologic connections to the San Joaquin River, terracing and leveling for agriculture, the addition of unseasonable irrigation water, and overgrazing by cattle. Prior to these disturbances, the site likely supported a mix of vernal pools, seasonal wetlands, riparian marsh, and native perennial bunchgrasses. These habitats were once widespread in the Central Valley, but all provided valuable arable land, and were therefore largely converted to agriculture during the last two centuries.

This project provides a unique opportunity to restore and preserve rare habitat types for the benefit of plants and wildlife, with a focus on the sequestration of greenhouse gasses. Located within the Newman Community Conservation Area — a public amenity in development by the City of Newman, which will house three other restoration and community development projects on various portions of the site — this project also provides an

opportunity to provide a natural public amenity for community education and wildlife viewing to the City of Newman, which lacks natural open spaces.

Planning for the project has recently completed and the project will begin construction in summer 2022. Here we discuss the restoration design features, constraints, and unique opportunities to sequester greenhouse gasses, restore native habitats, and provide a natural public amenity.

The Effects of Drought and Warming on *Lupinus nipomensis* Survival and Reproduction

Peter Nguyen*, UC Santa Cruz Environmental Studies Department, Evolution and Ecology Biology Department, pnguye53@ucsc.edu

Michael Loik, Justin Luong

California is forecasted to have more droughts and heatwaves, which can negatively affect plant growth and hinder rare plant reintroduction efforts. *Lupinus nipomensis* is a plant endemic to the Guadalupe-Nipomo Dunes, located in southern San Luis Obispo County. *L. nipomensis* is a California state and federally endangered species that has a variable interannual population because of environmental factors. To help inform conservation efforts, we are interested in the role water and temperature stress have in growth and reproduction. We grew 80 *L. nipomensis* individuals in separate containers and exposed them to four treatments: drought, warming, drought and warming, and a control. We hypothesize that *L. nipomensis* will have reduced seed production and photosynthesis when experiencing drought and warming, and an interactive effect between the two variables will further impact *L. nipomensis*. Drought was implemented with an episodic drought, where plants were not watered until stressed (indicated via stomatal

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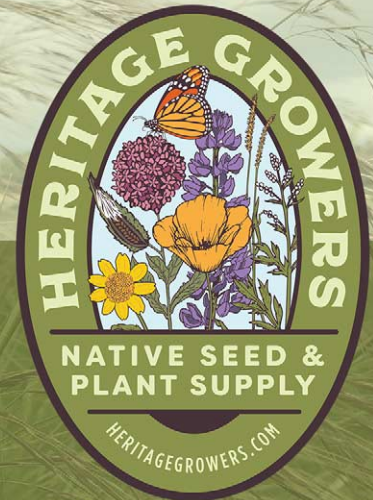
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conductance). Warming was applied using a polycarbonate cube and heat lamp, which increased the average temperatures by 4°C. We will measure growth, seed production, photosynthetic rates, water use efficiency, and specific leaf area to assess the role of increased drought and elevated temperatures on *L. nipomensis* growth geared for conservation efforts.

Sod vs Sprigs: Methods and Preliminary Observations from Restoration of the Ravenswood R4 Transition Zone

Kenneth Rangel*,
krangel@savesfbay.org

Jessie Olson, jolson@savesfbay.org

Peter Baye, botanybaye@gmail.com

Around San Francisco Bay, wetland and tidal marsh restoration projects are increasingly including large transition zone/ecotone habitats within their project designs. These habitat types are fundamental in protecting against sea level rise, providing wildlife refugia, and increasing biodiversity. Building upon novel propagation methods successfully undertaken at the Oro Loma Horizontal Levee Demonstration project in 2015, Save The Bay is seeking to scale-up and apply these techniques to larger acreage transition zone project by using rhizomatous native species in revegetation, and a native, annual seed mix as a temporary cover crop. We discuss the implementation of rhizomatous plant material grown in raised beds using two propagule types (sod and rhizome sprigs), discuss the potential for mechanized dispersal and installation of plant material on site, and share initial observations of plant establishment and growth at the Ravenswood R4 levee restoration project six months post-project implementation.

An Overview of the Watershed Stewards Program

Shelby Crawford*,
Shelby.Crawford@ccc.ca.gov

Jay Ryan*, Jay.Ryan@sjsu.edu

California Conservation Corps Watershed Stewards program is dedicated to improving watershed health by actively engaging in restoration science, civic service, and community education while empowering the next generation of environmental stewards. This service program, available for individuals aged 18 to 28, is one of the most productive programs for future employment in the environmental field.

Assessment of Seacliff Buckwheat (*Eriogonum parvifolium*) in Garrapata State Park

Michelle Tarian*,
michelletarian@gmail.com

Dr. Fred Watson, fwatson@csumb.edu

Amy Palkovic

The Smith's Blue Butterfly (SBB) (*Euphilotes enoptes smithi*) is a federally endangered species that is endemic to the central coast of California within Monterey and northern San Luis Obispo counties. Garrapata State Park, located at the northern end of the Big Sur coastline, lies within the SBB critical habitat and is a popular outdoor recreation spot for millions of visitors each year. To balance the recreational needs of the park and protect the critical habitat for the SBB, California State Parks seeks to improve access while also restoring and conserving SBB habitat. To help accomplish this goal, dense regions of seacliff buckwheat were identified and 41.5 acres were objectively surveyed to further delineate seacliff buckwheat abundance, phenology, life stages, canopy cover, habitat threats, and site disturbances. The resulting data was used to identify areas of potential conflict between SBB habitat and risk of habitat

disturbance, such as unofficial trail use, erosion, and non-native species encroachment. These findings can be used to explore management strategies — such as re-routing trails, erosion controls, and removing non-native species — that can improve habitat quality for the benefit of the Smith's Blue Butterfly.

Inoculant-Supported Restoration of *Quercus agrifolia* and *Q. lobata* Increases Survival and Restoration Success

Isaiah Thalmayer*,
ithalmayer@ucdavis.edu

Kristen Dybala, kdybala@pointblue.org

Thomas Gardali, tom.gardali@egret.org

Chelsea Carey, ccarey@pointblue.org

Over the past century, up to 98% of riparian habitat in California has been lost or degraded, making riparian restoration critical. Oaks constitute an important part of natural and restored plant communities along riparian areas, but unlike many of the other co-occurring woody species, oaks form relationships with a particular kind of mycorrhizal fungi (ectomycorrhizal fungi or EMF) that may be absent from degraded sites, or areas far from mature donor forests. Mycorrhizal fungi confer many benefits to plants, and the absence of EMF may reduce establishment and vigor, and increase mortality of oak species as the climate warms and droughts become more extreme and frequent. In the fall of 2019, we established a field experiment to assess the effects of EMF inoculation on the establishment and near-term success of *Quercus agrifolia* and *Q. lobata* individuals across three sites in Sonoma County. We compared two different inoculum sources to a control: whole-soil inoculum sourced from beneath mature *Q. agrifolia* and *Q. lobata* trees in: 1) Reference riparian areas currently experiencing a similar climate to the restoration sites ("local" inoculum),

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and 2) Reference riparian areas currently experiencing warmer and drier conditions compared to the restoration sites (“heat-adapted” inoculum; n = 8 per treatment per site). We hypothesized that seedlings supplied with inoculum adapted to warm and dry conditions would show increased establishment in the face of near-term stressors and would withstand future climate conditions better in the long term. Results from two years of growth and monitoring indicate that, when grown with the heat-adapted inoculum, *Q. agrifolia* had higher rates of germination, survival, and EMF colonization compared to uninoculated controls. This response was less apparent from *Q. agrifolia* individuals grown with local inoculum. In contrast, *Q. lobata* showed a mixed response to inoculum source, with strong support for higher germination rates, but only weak support for higher EMF colonization, and no support for higher survival associated with the heat-adapted inoculum. There was also weak support for higher rates of germination, survival, and EMF colonization associated with the local inoculum for *Q. lobata* but not *Q. agrifolia*. We continue to explore the relationship between plant-mycorrhizal dynamics with inoculation, including assessing mycorrhizal community composition via DNA amplicon sequencing and determining whether genotypic specificity plays a role in EMF

colonization. Implementation of this approach at three restoration sites in Sonoma County suggests that whole soil reference site inocula from warmer, drier climates can increase oak restoration success.

A New Tool for Comparing Vernal Pool Restoration/Creation Success

Misaki Yonashiro*, Vollmar Natural Lands Consulting,
misaki@vollmarconsulting.com

Cassie Pinnell, Vollmar Natural Lands Consulting,
cpinnell@vollmarconsulting.com

Sarah Pearce, Aquatic Sciences Center and San Francisco Estuary Institute,
sarahp@sfei.org

Sarah Lowe, Aquatic Sciences Center and San Francisco Estuary Institute,
sarahl@sfei.org

More than 90% of California’s vernal pool habitats have been lost or severely degraded, resulting in a large number of vernal pool species becoming threatened or rare. The loss of these unique systems and the threats against their flora and fauna continue, and may even be accelerating in some areas due to ongoing land-use pressure and climate change. The net effects of voluntary restoration and mitigation on the status and trends in

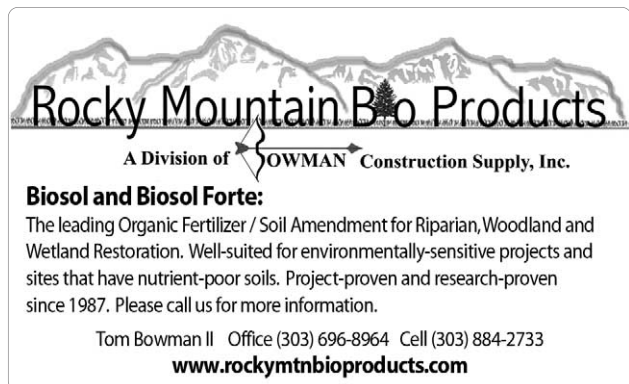
vernal pool condition are unknown at any scale, because standardized methods to assess and track permitted impacts and projects have not existed.


A team from the Aquatic Science Center (ASC) and VNLC have partnered through an EPA Wetland Program Development Grant to create the first Habitat Development Curve (HDC) for vernal pools in the Central Valley to standardize performance assessments of vernal pool creation and restoration projects based upon California Rapid Assessment Method (CRAM) condition scores. HDCs are used to forecast expected and evaluate present project performance relative to desired or reference conditions. An HDC plots project age against vernal pool condition, with the curve indicating the expected rate of improvement in condition through time. Projects having scores that plot on or above the HDC curve are on a trajectory toward reaching reference condition, whereas projects that plot below the HDC may need additional management actions to put them on a trajectory towards reaching reference conditions. This new tool will provide a standardized metric to assist with determining performance success trajectories of vernal pool creation/restoration projects.



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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.

***Thank you and we hope
to see you next year!***

SERCAL 2022 Leadership Team

Allegra Bukojemsky, President
Cassie Pinnell, President-Elect
Geoff Smick, Treasurer
Cindy Thompson, Secretary
Thor Anderson
Greg Andrew
Brian Bartell
Kari Dupler
Mauricio Gomez
Meg Kargul
James Mizoguchi
Nina Omomo
Chelsea Palisoc
Jeannine Ross
Jamie Silva
Will Spangler
Lindsay Teunis
Isaiah Thalmayer
Sonya Vargas
Ashley Zavagno

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