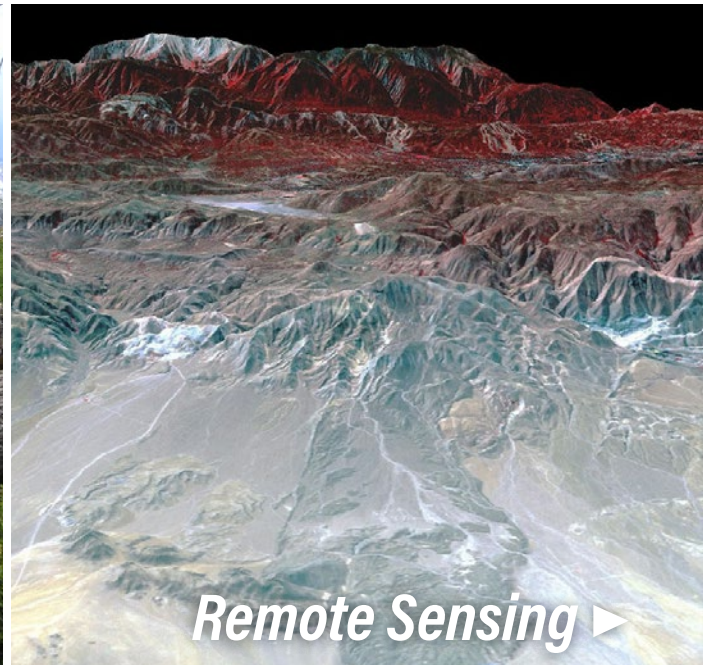


Climate Change Adaptation and Natural Areas Management: *Turning Words to **Action*** ►

Collaboration ►



Post-Fire Inventory ►



Remote Sensing ►

FORTY THIRD

natural
areas
conference

Climate-Smart Management Adaptation Strategies
October 18–21, 2016 Genomic Technologies Genomics
Davis, California Diversity Collaboration Reforestation
Strategies Fire Management Strategies Sea Level Rise
Anthropogenic Effects Plan and Plant for Pollination



UCDAVIS

Presented by the Natural Areas Association with our co-hosts
U.S. Forest Service and University of California, Davis



Southwest Climate
Science Center



Cleveland Museum of
NATURAL HISTORY



Center for
Natural Lands
Management



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Hello, and welcome to the 2016 Natural Areas Conference.

This year's event is remarkable in so many ways. It is one of the longest conferences in recent years, with one of the largest programs ever. And, thanks to the underwriting of our generous sponsors, we've been able to keep this event inclusive by offering significantly discounted registration rates—making this year's conference one of the best values ever.

Additionally, this year marks the conference's return to the West for the first time in seven years. The prime location of University of California-Davis puts us close to centers of activity for two of our most active partners and conference sponsors, the U.S. Forest Service and Bureau of Land Management.

I want to extend a special welcome to the students in attendance. As the next generation to face the challenges of our profession, they are a crucial part of our conversations.

This year's conference continues the Natural Areas Association's commitment to addressing climate change and its challenges for natural areas management. This issue is an urgent one, and as an organization we are increasingly focused on getting actionable information out to our members. The need to respond is outpacing the advance of science in some cases, which makes it all the more important for us to come together and share ideas as a community.

The professional diversity of the NAA makes that community stronger. Climate change is quickening the pace at which we need to make good, science-based decisions about managing natural areas, and it's invaluable to have a group of practitioners like ours to consult when tough decisions need to be made quickly.

The *Natural Areas Journal* is another way to share our experience and expertise. We're pleased to introduce a special issue devoted to the theme "Managing for Pollinators on Natural Areas," sponsored by the U.S. Forest Service and Bureau of Land Management. It's filled with peer-reviewed papers devoted to various aspects of managing for pollinators. The *Journal* has also debuted a new feature, called "Stewardship in Action," where those working in land management can get new and exploratory methods and tactics out to readers quickly.

Our new webinar series is yet another venue for sharing ideas. We've completed two very successful webinars this year, with more to come. Check www.naturalareas.org for more information.

I'd like to thank our conference planning committee members for all of their hard work assembling this event over the course of the past year. Additional thanks go to the USFS, BLM, UC Davis, and all of our other conference sponsors. I hope you enjoy your time in Davis, and I'm confident you will benefit professionally and personally from your attendance at our conference.

Sincerely,

Lisa L. Smith
Executive Director, Natural Areas Association

Welcome to Davis,

The conference planning team welcomes you to the 43rd Natural Areas Conference. We're excited to host this event in California for the first time since 1990.

You've come to one of the most appropriate places in which to address this year's theme, *Climate Change Adaptation and Natural Areas Management: Turning Words to Action*. California has taken the lead on many aspects of mitigating and adapting to climate change, including supporting the only carbon cap-and-trade market in the nation. The city of Davis is a national leader in progressive planning and urban sustainability and recently won acclaim for its efforts to reduce its carbon footprint. Aside from being one of the top universities in the world in the fields of agriculture, ecology, and the environment, the University of California-Davis is a trailblazer in university sustainability.

The conference planning team has assembled one of the largest program schedules in Natural Areas Conference history. We've tapped leading experts in fields relating to climate change, ecological restoration, and resource management to share their knowledge and firsthand experiences. We hope you'll take full advantage of the workshops, oral sessions and symposia, panels, poster sessions, networking opportunities, and field trips that are on offer.

Outside the conference, the city of Davis offers many options for your free time. A vibrant, walkable downtown features dozens of restaurants, theaters, and easy foot and bike access to the UCD campus and arboretum trail system. Davis is one of the most bike-friendly cities in the country. Special bicycle rental arrangements have been made for conference attendees, and we encourage you to explore the more than 100 miles of trails, paths, and bike lanes. Davis is also a great jumping-off point for excursions to the coast, San Francisco and the Bay Area, Sacramento, Napa Valley, and the Sierra Nevada.

We would like to thank our conference sponsors for their support. In particular, we'd like to spotlight the U.S. Forest Service, not only for its financial support, but for the help that its staff provided planning and organizing the conference. Additionally, our thanks go to the University of California-Davis, which donated the indoor and outdoor venues for the conference.

It's our goal to send you home from this year's Natural Areas Conference with new ideas and new professional contacts to enhance your career, as well as new memories and friends who will enrich your personal life.

Natural Areas Conference Planning Committee 2016

Exhibitors
<div>Lobby Conference Center</div> <div>The NAA thanks this year's exhibitors. Be sure to stop by the exhibits area and meet them.</div> <div>Bureau of Land Management California Landscape Conservation Cooperative Comstock Seed Conservation Biology Institute Hedgerow Farms Kamprath Seed Natural Areas Association Pacific Coast Seed Pacific Gas and Electric Company S&S Seeds Southwest Climate Science Center The Nature Conservancy-California U.S. Forest Service — Region 5 USDA Southwest Climate Hub Wilburforce Foundation</div>

Questions and Conference Updates

The staff at the conference registration desk will be happy to help answer any questions you might have. This is also where the lost and found is located. Check for last-minute updates to the conference schedule and other important information on the message board stationed near the registration desk.

Name Badges

Please wear your name badge to all conference events. It is your ticket to sessions, workshops, breaks, and socials. Look within the sleeve of your name-badge for tickets to the events you chose to attend during registration.

Cell Phones

Please silence cell phones during sessions as a courtesy to presenters and participants.

Stay Current

Please use #NACDavis2016 on social media related to the conference. Also, search #NACDavis2016 to stay up to date with conference events. Follow the NAA on Twitter @naturalareas.

Exhibitors

The lobby of the conference center will be open from Tuesday morning through Thursday at 5 pm to provide participants time to meet exhibitors and browse their displays.

Field Trips

If you preregistered for a field trip, you will find a ticket indicating your field trip choice behind your name badge. Should you have questions regarding a scheduled trip, please visit the conference registration desk. We ask that you not change your field trip selection, but if you feel you must, the deadline for doing so is Wednesday at 2 pm (on a space-available basis).

Student Competition

We thank those who entered the student awards presentation. A team of judges will evaluate student posters and oral presentations. The top student presenters will receive their monetary awards and certificates on Thursday night at the awards dinner.

Wireless

UC Davis Guest Wireless (ucd-guest) is available in the Conference Center and Buehler Alumni & Visitors Center. Follow these steps to connect:

1. On your mobile device, choose ucd-guest from the available wireless networks.
2. Click connect to open a browser window and the Guest Registration page.
3. Select create a ucd-guest account (or login with an existing ucd-guest account if you have already set one up).
4. Enter the information requested and click register. You will receive an email and/or text message confirming your account.
5. Login to ucd-guest using the username and password included in your confirmation message.

Note: Connectivity will be lost if you leave the conference location. If you experience connection issues within this area, please contact IT Express at (530) 754-HELP.

Schedule at a Glance

Monday, Oct. 17

5 – 7 pm Register/Check-in (UC Davis Conference Center)

Tuesday, Oct. 18

7 am – 5:30 pm Register/Check-in (UC Davis Conference Center)

8 am – noon Concurrent Sessions & Symposia [p. 6](#)

9 – 11 am State Natural Areas Roundtable (Wickson Hall: Room 1017)

9 – 11 am *Natural Areas Journal* Editors Meeting (Plant and Environmental Sciences (PES): Room 2004)

10 – 10:20 am Break

noon – 1:20 pm Lunch (on your own)

noon – 1:20 pm Student-Mentor Networking: Passing the Drip Torch (Alumni Center: Moss Patio) [p. 8](#)

1:20 – 5:30 pm Conference Welcome & Plenary Session 1 (Conference Center Ballroom) [p. 10](#)

3:50 – 4:10 pm Break (Conference Center Lobby)

6 – 8 pm Poster Session & Reception (Alumni Center: AGR Room) [p. 14](#)

Wednesday, Oct. 19

7 am – 5:30 pm Register/Check-in (UC Davis Conference Center)

8 am – noon Concurrent Sessions & Symposia [p. 16](#)

10 – 10:20 am Break (Conference Center Lobby)

Wednesday continued

noon – 1:30 pm NAA Membership Meeting & Luncheon preregistration required (Alumni Center: AGR Room) [p. 18](#)

1:30 – 5:30 pm Plenary Session 2 (Conference Center Ballroom) [p. 19](#)

3:20 – 3:40 pm Break (Conference Center Lobby)

Thursday, Oct. 20

7 am – 5:30 pm Register/Check-in (UC Davis Conference Center)

8 am – noon Concurrent Sessions & Symposia [p. 24](#)

10 – 10:20 am Break (Conference Center Lobby)

noon – 1:30 pm Lunch (on your own)

1:30 – 5:30 pm Concurrent Sessions & Symposia [p. 28](#)

3:30 – 3:50 pm Break (Conference Center Lobby)

5:45 – 9 pm Awards Dinner (Alumni Center) [p. 31](#)

Friday, Oct. 21

6:30 – 8:30 am Field Trip Departures (Front doors of the Conference Center) [p. 32](#)

Venue Map





About this Program

The conference program spans three days, with a fourth day for field trips. Each day there are symposia and programs that run in parallel, but with slightly different time schedules.

The program grids for each day detail when, where, and what is taking place in each time slot. Please note that some days' programs span several pages. Look carefully at the start and end times for the events you wish to attend, as they may overlap.

See the conference check-in table with any questions you may have about the schedule.

Oral Sessions (8 am – noon)

(1) Restoration 1

Hyatt: Conference Room

(2) Wildlife and Climate Change Adaptation

Conference Center: Conference Room B

(3) Finding Forest Management Momentum: Adapting to Change in Mid- and Late Seral Fire-Dependent Forests at Significant Ecological Scales

Conference Center: Ballroom B

With loss in forest cover in California due to fires and drought projected to continue increasing in the future, management efforts need to produce and maintain

landscapes that are more resilient where providing forest cover is an important management objective for the future.

(4) Science-Driven Climate Change Adaptation: Tools and Resources to Manage Natural Areas

Alumni Center: Alpha Gamma Rho Hall

This two-part symposium presents research and tools to help resource managers assess western landscapes' climate vulnerability and employ "climate smart" management strategies in their work.

Tuesday, Oct. 18

Room	Hyatt: Conference Room	Conference Center: Conference Room B	Conference Center: Ballroom B	Alumni Center: Alpha Gamma Rho Hall
Topic	GENERAL ORAL SESSION Restoration 1 (1)	GENERAL ORAL SESSION Wildlife and Climate Change Adaptation (2)	ORGANIZED ORAL SESSION Finding Forest Management Momentum: Adapting to Change in Mid- and Late Seral Fire-Dependent Forests at Significant Ecological Scales (3)	ORGANIZED ORAL SESSION Science-Driven Climate Change Adaptation: Tools and Resources to Manage Natural Areas (4)
Moderator	Michelle Stevens	Genny Wilson	Joe Sherlock	Pat Comer
8:00 am	Restoration Effects On Riparian Ecosystem Carbon Pools: A Global Meta-Analysis. Kristin Dybala	Swap 2015 On the Go – Integrating California Wildlife Action Plan Into State Operations and Climate Change Adaptation. Junko Hoshi	Managing for Resilience in Mature Forests: Fire Severity Goals and Lessons From the Past. Scott Stephens	Bringing Climate Change Science to Public Land Managers. Peggy Olwell
8:20 am	A Framework for Making Restoration Climate-Smart. Tom Gardali	Evaluating Connectivity Plans to Conserve Vulnerable California Species Under Global Change. Erin Conlisk	Prescribed Fire in Plantations – Shifting the Paradigm. Eric Knapp	Ecological Forecasting: Understanding Climate Change Exposure and Vegetation Transitions. Stephanie Auer
8:40 am	Restoration as a Pathway for Plant Pathogen Invasion: How Do We Protect California's Sensitive Habitats? Susan Frankel	Snag Islands Can Permit Population Persistence of Black-Backed Woodpeckers Following Salvage Logging: A Case Study of the Angora Fire. Gina Tarbill	Effects of Prescribed Fire in Jeffery Pine-Dominated Forests Before and During Drought Conditions. Kyle Jacobson	Measuring Climate Change Vulnerability for Vegetation: Sagebrush and Pinyon-Juniper Ecosystems. Regan Smyth
9:00 am	Managing Plant Pathogen Introductions in Restoration Sites: The San Francisco Public Utilities Commission's Fight to Contain Phytophthora in Large Scale Restoration Sites. Mia Ingolia	Landscape Heterogeneity Compensates for Fuel Reduction Treatment Effects on Northern Flying Squirrel Populations. Angela White	Working With Partnerships to Increase the Pace and Scale of Prescribed Fire: Getting Good Fire Back on the Landscape. Clint Isbell	Applying Climate Change Vulnerability Assessments to Adaptive Vegetation Management. Patrick Comer
9:20 am	Restoring Riparian Ecosystem Function and Diversity Through Cost-Efficient Hazardous Fuel Removal. Sarah Godfrey	Wild Horse and Burro Management in the Black Rock-High Rock National Emigrant Trails Conservation Area (NCA). Angela Arbonies, Mark Hall	Incorporating Traditional Ecological Knowledge Into Fire and Fuels Management. Danny Manning	Socializing Data: Leveraging Web-Mapping Technology to Increase Data Access, Visualization, and Stakeholder Engagement. Tosha Comendant
9:40 am	How Temporal Variation in Rhizome Removal Affects Giant Cane (<i>Arundinaria gigantea</i>) Transplanting Success. Richard Nessler	Contemporary Drought and Future Effects of Climate Change on the Endangered Blunt-Nosed Leopard Lizard (<i>Gambelia sila</i>). Michael Wesphal	Prescribed Fire in Young Mixed Conifer Stands. Robert York	Climate Vulnerability and Adaptation Planning for National Forests in Southern California. Sarah Sawyer
10:00 am	MID-MORNING BREAK	MID-MORNING BREAK	MID-MORNING BREAK	MID-MORNING BREAK
10:20 am	Restoration of Mojave Marshes in Support of Amargosa Voles: Lessons Learned and Future Directions for Ensuring Survival of an Important Desert Mammal Amidst Long-Term Drought and Climate Change. Stephanie Castle	Cooler Streams in Illinois: Assessing Their Vulnerability to Land Cover and Climate Change. Jodi Vandermyde	Post-Treatment Results of Restorative Variable Thinning With Regeneration Gaps in Sierran Mixed Conifer Forests. Ramiro Rojas	Climate-Smart Adaptation for the North-Central California Coast and Ocean. Sara Hutto
10:40 am	Rice Straw Mulch for Erosion Control Introduces Non-native Species and Affects Native Plant Communities. Kristen Shive	Managing Threatened Fish Habitat in the Driest State in the Nation. Kathy Cadigan	Managing Stand Density for Reducing Bark Beetle Caused Mortality in Ponderosa Pine Plantations. Jianwei Zhang	The Central Valley Landscape Conservation Project. Debra Schlafmann
11:00 am	Factors Driving Patterns of Seedling Survival in Coniferous Forests of the Sierra Nevada. Emily Moran	Loggerhead Shrikes (<i>Lanius ludovicianus</i>): Successes and Failures of a Troubled Species in Human-Dominated Environments. Jerome Jackson	Integrated Indicators for Socioecological Restoration and Adaptation. Jonathan Long	Integrating Climate Change Into Washington's State Wildlife Action Plan. Lynn Helbrecht
11:20 am	Using Birds as Indicators to Guide Post-Fire Management of Chaparral in the Sierra Nevada, California. Alisa Fogg	Endangered Species Recovery When Your Subject Was Always Rare: Adaptive Management of the Amargosa Vole. Janet Foley	Scaling Up Collaborative Approaches to Forest Project Design and Creative Funding Vehicles for Implementation Using Lessons Learned From the Sagehen Forest Project on the Tahoe National Forest. Jeff Brown	Decision Support Tools for Integrating Climate Adaptation Information Into Management Plans, Programs, and Projects. Jessi Kershner
11:40 am	Building Climate Resilience in the Sierra Nevada: The Sierra Climate Adaptation and Mitigation Partnership's Policy Recommendations for California's 2017 Update of "Safeguarding California: Reducing Climate Risk." Diana Madson	The Vole in the Climatic Coal Mine. Rob Klinger	Long-Term Ecological Recovery of California State Park Lands in the Sierra Nevada. Daniel Shaw	Alternative Futures for the Great Basin and Eastern Sierras – A Spatially Explicit Scenario Planning Approach – Communicating Across the Landscape. Tamara Wall
noon	LUNCH	LUNCH	LUNCH	LUNCH

Tuesday, Oct. 18

Symposia (8 am – noon)

Room	Alumni Center: Allewelt	Alumni Center: Founders	Conference Center: Conference Room A	Alumni Center: West
Topic	SYMPOSIUM The Role of NGO Research in Ecosystem Management and Conservation in a Climate-Changed World (5)	SYMPOSIUM Communicating the Science of Climate Change (6)	SYMPOSIUM Conserving Rare and Imperiled Species in the Context of Climate Change: Case Studies From Research, Management, and Policy Perspectives (7)	SYMPOSIUM Application of Genomics Technologies to Understand and Manage Forest Trees and Associated Organisms in Changing Environments (8)
Moderator	Edward Smith	Deanne DiPietro	Deborah L. Rogers	Amanda De La Torre
8:00 am	Habitat Connectivity Assessment Under Future Land Use and Climate Change Scenarios: A California Case Study. Dick Cameron	Toward Optimizing the Delivery of Climate Science for Natural Resource Management: Lessons Learned From Recent Adaptation Efforts in Southern California. Carolyn Enquist	Managing an Endangered Southern California Herb in the Context of Climate Change: The Contribution of Genetic Information to Management Strategy. Jennifer Dewoody	Genomics of Adaptation and Disease Resistance in Sugar Pine. Amanda De La Torre
8:30 am	Conservation Values Assessment of the Sierra-Cascade Mountains of California for Prioritization, Management, and Adaptation. Edward Smith	Engaging the Public Through a Community of Climate Stewards. Adina Merenlender	Climate Change, Invasive Species, and Phenological Shifts: Anticipating Changes to Native Plants' Reproductive Potential. Susan Waters	Landscape and Population Genomics in Serotinous Pines. Thomas Parchman
9:00 am	Climate Action Through Conservation: A County Scale Approach to Climate Solutions. Michelle Passero	Engaging Tribes in Climate Adaptation. Susan Rose	Strange Bedfellows? Using Non-natives in the Recovery of Rare Species. Peter Dunwiddie	Drought Tolerance in Ponderosa Pine: Can Association Genetics Help Us Select Seed Sources That Will Thrive Under Changing Conditions? Emily Moran
9:30 am	Building an Information Base and Decision Support Tool for Determining Whether and Where to Translocate Rare Plants. John Randall	Drought Early Warning Systems – Making Drought Science Available, Understandable, and Usable for Decision Making. Amanda Sheffield	How Now Brown Cow? Shifting Grazing Protocols for Management of Rare Grassland Species. Catherine Little	The Landscape Genomics of Adaptive Traits in Douglas-Fir (<i>Pseudotsuga menziesii</i> var. <i>Menziesii</i>). Anita To
10:00 am	MID-MORNING BREAK	MID-MORNING BREAK	MID-MORNING BREAK	MID-MORNING BREAK
10:20 am	Enhancing Conservation Outcomes & Improving Rangeland Monitoring Efficiency With RDMapper. Scott Butterfield	Scenario Planning and Incorporating Uncertainty into Management Decisions. Sam Veloz	How Shifting to Utility-Scale Renewable Energy Sources is Impacting Imperiled Species: Unanticipated and Unmitigated Impacts of Utility-Scale Solar and Wind Projects Remain a Concern. Lisa Belenky	Local Adaptation of White Pines Across Fine Spatial Scales of the Lake Tahoe Basin, USA: Implications to Sustainable Management and Conservation of Conifer Species. Brandon Lind
10:50 am	Multifunctional Climate-Smart Restoration of a Riparian Corridor Along the Upper Pajaro River, California. Jennifer Benson	Using Narrative Stories to Understand Traditional Ecological Knowledge in the Great Basin. Tamara Wall	New Federal Policy on "Mitigating Impacts on Natural Resources From Development and Encouraging Related Private Investment." Ken Sanchez	Sustaining Southwestern White Pine by Combining Experimental Work and Genomic Tools. Antonio Castilla
11:20 am	Discussion: Edward Smith	Discussion: Miriam Morrill	Discussion: Deborah Rogers	Discussion: Jessica Wright
noon	LUNCH	LUNCH	LUNCH	LUNCH



Student-Mentor Networking: Passing the Drip Torch

Noon – 1:20 pm Alumni Center: Moss Patio

Students and recent grads, take advantage of this unique opportunity to make connections with professionals in your desired field! Talk with those working in a range of careers and meet potential employers. Lunch will be provided to participants. Must be preregistered to participate.

Tuesday, Oct. 18

2016 NATURAL AREAS CONFERENCE



The Nature Conservancy of California invites attendees of the Natural Areas Association Conference to read our new report, “**Climate Action Through Conservation Project: Conserving Landscapes, Protecting the Climate.**”

Focused on Sonoma County, the project presents new methods and analytical tools for quantifying landscape carbon sequestration, assessing the conservation and other benefits that landscapes provide, and evaluating how various future land management and land use changes may affect these benefits.

Download the report at <http://bit.ly/1RMNnmc>



(5) The Role of NGO Research in Ecosystem Management and Conservation in a Climate-Changed World

Alumni Center: Allewelt

This symposium highlights contemporary analytical tools and management strategies that the NGO sector uses to improve land management and conservation on its own lands, as well as to influence and inform climate-smart planning and adaptation management across all lands at scales ranging from statewide to project level.

(6) Communicating the Science of Climate Change

Alumni Center: Founders

We can break down barriers to the application of climate science through effective communication methods, such as developing science guided by management needs, partnering across typical boundaries, and learning to plan in an uncertain future.

(7) Conserving Rare and Imperiled Species in the Context of Climate Change: Case Studies From Research, Management, and Policy Perspectives

Conference Center: Conference Room A

Case studies from research, management, and policy perspectives provide information on climate change impacts on rare and endangered species and implications for management and policy.

(8) Application of Genomics Technologies to Understand and Manage Forest Trees and Associated Organisms in Changing Environments

Alumni Center: West

Genomic technologies are now ready to be applied to better understand adaptation to the environment in forest communities, which will greatly facilitate resource management under changing climates.

Tuesday, Oct. 18

2016 NATURAL AREAS CONFERENCE

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Plenary Session 1 (1:20 – 5:30 pm)

This plenary session addresses climate change adaptation. The session begins with a talk from Forest Service leadership on agency climate change response and continues with climate adaptation case studies from four California ecosystems. Speakers will focus on adaptation practices in forest management and new tools and analyses that can incorporate assessments of climate change exposure and sensitivity into more resilient management in natural areas.

- 1:20 pm **Introduction**, Hugh Safford, U.S. Forest Service and Conference Chair
- 1:30 pm **Welcome**, Helene Dillard, Dean, College of Agricultural and Environmental Sciences, UC Davis
- 1:35 pm **Welcome**, Jennifer Eberlien, Deputy Regional Forester, U.S. Forest Service Pacific Southwest Region
- 1:40 pm **Opening Remarks**, Lisa Smith, Executive Director, NAA

KEYNOTE ADDRESS

1:50 pm **Forest Service Natural Areas and Climate Change**
Allen Rowley, U.S. Forest Service

This talk outlines U.S. Forest Service efforts to respond to climate change trends, with a focus on climate change adaptation strategies and practices. The Forest Service's Research Natural Area (RNA) Program is highlighted. This program includes hundreds of important ecological sites nationwide that are protected generally for their contributions to regional biodiversity and to provide educational, monitoring, and research opportunities. Forest Service RNAs are an important part of the agency's response to global change, as they may serve as gene conservation locations, sites to monitor long-term ecological processes, and baseline locations for studies of management activities and effectiveness.

CALIFORNIA CASE STUDIES

2:10 pm **Adaptation Case Study 1: Seal Beach National Wildlife Refuge Thin-layer Salt Marsh Sediment**
Presenter: Kirk Gilligan, U.S. Fish and Wildlife Service
Alternate Presenter: Andy Yuen

In January 2016, the U.S. Fish & Wildlife Service began efforts to prepare for sea-level rise on the Seal Beach National Wildlife Refuge by implementing the first-ever thin-layer salt marsh sediment augmentation project on the West Coast of the U.S. Salt marsh habitat within the project site has been degraded by a combination of subsidence, gradual sea-level rise, and a lack of natural sediment input. Raising the elevation of the site by applying 10 inches of clean sediment over the 8-acre low salt marsh project site is intended to enhance the quality of the cordgrass-dominated salt marsh habitat and improve nesting opportunities for the federally endangered Light-footed Ridgway's Rail. Improving the quality of the cordgrass vegetation is also expected to maintain the carbon sequestration capacity of the marsh over time. This presentation focuses on project planning and implementation as well as associated scientific research and lessons learned.

2:35 pm **Adaptation Case Study 2: Climate Ready North Bay: Local Natural Resource Agencies Applying Pepperwood's TBC3 Applied Science Tools to Watershed and Protected Lands Management**
Presenter: Dr. Lisa Micheli, Pepperwood Foundation and Terrestrial Biodiversity Climate Change Collaborative (TBC3)

To create a framework for adapting to climate change, decision-makers working in Northern California's Coast Range watersheds need to define climate vulnerabilities in the context of site-specific opportunities and constraints relative to water supply, land use suitability, wildfire risks, ecosystem services, and biodiversity. Pepperwood's Terrestrial Biodiversity Climate Change Collaborative (TBC3) has crafted customized climate vulnerability assessments in concert with select natural resource agencies of California's Sonoma, Marin, Napa and Mendocino counties via Climate Ready North Bay, a public-private partnership funded by the California Coastal Conservancy's Climate Ready program. Working directly with managers from the very start of the process

to define resource-specific information needs, we have developed spatially explicit data products to help local agencies implement informed and effective climate adaptation strategies. Climate Ready products include customized maps, time series, and summary technical reports tailored to site-specific resource management challenges, which vary throughout the region. This presentation showcases a subset of climate science tools developed for managers. We also summarize lessons learned about how to successfully collaborate across the research-management divide.

3 pm **Adaptation Case Study 3: Reintroducing Fire and Traditional Ecologic Knowledge to Land Management, Lower Klamath River Basin**
Presenters: Merv George, Six Rivers National Forest, U.S. Forest Service and Jill Beckmann, Karuk Tribe Department of Natural Resources

The success of fire suppression efforts over the past 100-plus years has led to overstocked forest conditions, a longer than natural fire-return interval, and conditions less conducive to the use of managed fire. Traditional ecologic knowledge, including the routine use of managed fire on the landscape, has been superseded by land management focused on mechanistic treatments. These practices, coupled with a longer fire season, several years of drought, legal challenges, and an over-allocated water supply, provide more fuel for catastrophic fire. The Western Klamath Restoration Partnership is bringing all communities together to prepare the land for the use of beneficial fire as one tool to restore an ecosystem more resilient to climate change and other disturbances.

3:25 pm **Adaptation Case Study 4: Managing for Climate Change in the Sierra Nevada**
Moderator: Elizabeth Berger, U.S. Forest Service
Presenters: Ken Pimlott, California Department of Forestry and Fire Protection (CAL FIRE)
Jennifer Montgomery, Placer County, District 5; Sierra Nevada Conservancy

Air and land managers face major challenges in the Sierra Nevada region of California. Forests are overstocked from more than 100 years of fire suppression and stressed from five years of historic drought. These conditions have resulted in unprecedented tree mortality, particularly in the southern Sierras, but noticeable throughout the region and the state, where an estimated 40 million trees died last year and 66 million trees have died during the

drought period. Wood-products infrastructure, including mills and bioenergy plants, are insufficient to respond to current need. The Sierra Nevada Conservancy and the Pacific Southwest Region of the U.S. Forest Service have established the Sierra Nevada Watershed Improvement Program (March 2015) to focus attention on the Sierra Nevada region, much of which was also included as a flagship landscape under President Obama's Resilient Lands and Waters Initiative, and formally designated as the California Headwaters Partnership in June 2015. To address the effects of climate change and maintain the ecological and economic importance of the area, local, state, and federal managers must focus even more effort on collaborative work across all land ownerships. Representatives from the California Department of Forestry and Fire Protection (CAL FIRE) and Placer County will discuss the lessons learned and the work still to be done in a conversational format moderated by the U.S. Forest Service lead for the California Headwaters Partnership.

3:50 pm **Break**

PLENARY ADDRESSES

4:10 pm **Forest Management and Climate Change Adaptation**
Dr. Chris Swanston, Northern Institute of Applied Climate Science

The Climate Change Response Framework (CCRF; www.forestadaptation.org) spans 19 states in the Upper Midwest and Northeast and was launched by the Forest Service in 2009 to help people meet their land stewardship goals while minimizing climate risk. The emphasis of the CCRF on stewardship goals represents a subtle but important shift in focus from climate change and its effects to people and their values. It has involved thousands of people and over 100 organizations, published six ecoregional vulnerability assessments with more than 130 authors, and created an adaptation menu of strategies and an adaptation workbook (www.adaptationworkbook.org). This approach has generated more than 185 intentional adaptation demonstrations in real-world land management projects. This presentation considers lessons learned in moving from information to implementation with diverse stakeholders across a diverse landscape.

USDA California Climate Hub



United States Department of Agriculture
California Climate Hub

The USDA Climate Hubs, formed in 2014, aim to **connect land users with actionable information on climate adaptation and mitigation**. The California Hub (one of 10 Hubs nationwide) focuses on specialty crops, rangelands, and the state's diverse forest types. **Based at UC Davis**, we partner with land-grant universities, Cooperative Extension, and state and federal government agencies.

Our **recent projects** are aimed at land users, their advisors, and policymakers:

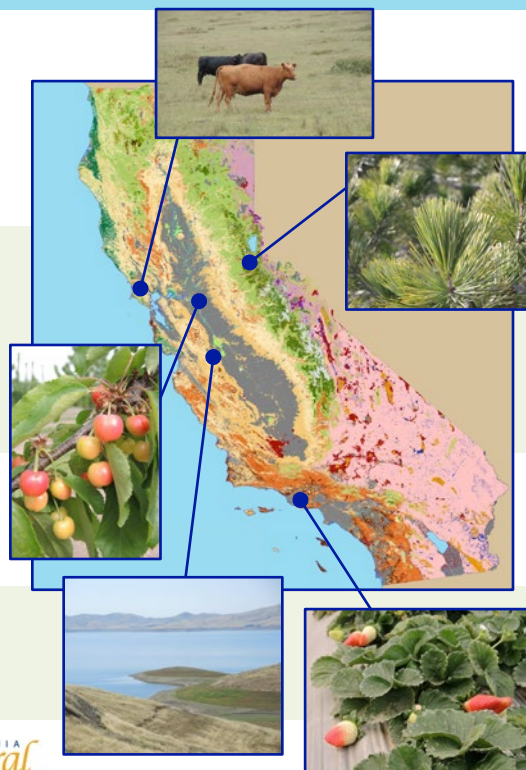
- Climate vulnerability assessment of **California rangelands**
- Fact sheet series on the **current drought** in California
- Fact sheet series on California **specialty crops**
- Technical brief on **chill-hour trends** and almond production
- Southwest regional vulnerability assessment (co-authored with SW Hub)

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UCDAVIS

University of California
Agriculture and Natural Resources



4:50 pm **Current Climate Trends and Climate Adaptation Planning in Major Western Vegetation Assemblages**

Dr. Healy Hamilton, NatureServe

Global change increasingly demands an understanding of where and how the climate is changing, and how ecosystems might respond. Spatial patterns of climate exposure, describing the rate, magnitude, and nature of change, are becoming fundamental to adaptation planning for natural resource management. Sufficient climate change has already occurred over the last 65 years that observed patterns of climate exposure can be mapped and used to identify where vegetation is the most climatically stable and the most exposed. Distinct patterns of recent climate exposure across the western U.S. are evident, and they have implications for management of major vegetation assemblages occurring widely on public lands. From climate to biodiversity to ecosystem resilience, intuitive and accessible visualization tools for this and related analyses are essential assets. Spatial data and analysis play a critical role in guiding and communicating

resource management decisions, improving their transparency, monitoring their effectiveness, and supporting opportunities for stakeholder participation.

5:30 pm **Plenary Adjourns**

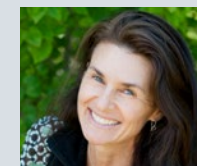
ABOUT THE SPEAKERS

Elizabeth Berger serves as the regional forester's liaison for the Pacific Southwest Region of the Forest Service in Sacramento, California. She focuses on large-scale initiatives and partnerships that help move forward the region's Leadership Intent for Ecological Restoration. She also represents the region in its coordination and collaboration with state and federal agencies and NGOs headquartered in Sacramento. Previously, Berger worked at the Forest Service headquarters in Washington, D.C., as the Assistant Water Program Leader and served in acting roles as the National Groundwater Program Leader and National Ecosystem Planner. Before her national and regional positions, Berger spent 15 years working in field offices for the Forest Service and Bureau of Land Management in multiple locations in Oregon. Berger has a B.S. in environmental biology

and management from UC Davis and a Professional Certificate in River Restoration from Portland State University.

Merv George is forest supervisor for the U.S. Forest Service's Six Rivers National Forest. George joined the USFS in 2008 as the regional tribal relations program manager for the Pacific Southwest Region. In this position, he worked with all 18 national forests and Indian tribes in California. He became acting deputy forest supervisor of Six Rivers National Forest in June 2011 and was hired permanently in January 2012. Prior to joining the USFS, he spent four years on the Hoopa Valley Tribal Council and a term as the Hoopa Valley Tribal Chairman. He was also the executive director for California Indian Forest & Fire Management Council and Klamath River Inter-Tribal Fish & Water Commission. He has a B.A. in Native American studies from Humboldt State University.

Kirk Gilligan has been the refuge manager at Seal Beach National Wildlife Refuge since 2006. He is in charge of all aspects of managing a refuge—endangered species management, habitat restoration, facilities planning and construction, environmental education, community outreach, and actively working with the Friends of Seal Beach as well as many federal, state, and local partners. Gilligan graduated from the University of North Carolina at Chapel Hill in 1997. He has worked as a seasonal biologist with the U.S. Fish and Wildlife Service, U.S. Forest Service, the Nature Conservancy, and the South Florida Water Management District. He began his permanent career as a recreation assistant at Parker River National Wildlife Refuge in Massachusetts. He came to Southern California in 2002 to work as a forestry technician on the fire crew at the San Diego National Wildlife Refuge Complex.



Dr. Healy Hamilton serves as chief scientist and vice president for conservation science for NatureServe. She is a biodiversity scientist with broad interests in the evolution and conservation of the diversity of life. Her current research focus is global change

biology, with an emphasis on forecasting the impacts of climate change on species and ecosystems for natural resource management and conservation. In her spare time, she studies the taxonomy, evolution, and conservation genetics of seahorses and their relatives. She obtained her master's degree at Yale University and Ph.D. at UC Berkeley and for both degrees conducted extensive fieldwork in tropical South America. Hamilton is president of the Society for Conservation GIS, serves on the Science Committee of the National Park Service Advisory Board, and is a former U.S. Fulbright Scholar.

Dr. Lisa Micheli is president and CEO of Pepperwood Foundation and co-chair of the Terrestrial Biodiversity Climate Change Collaborative (TBC3). She has over 25 years' experience applying her technical, policy, and fundraising expertise to the design and implementation of ecological restoration, research, and education programs. Micheli completed her

graduate studies at UC Berkeley as a NASA Earth Systems Research Fellow in 2000 and now focuses her research on relationships between watershed health and biodiversity.

Jennifer Montgomery is a native Californian who has lived in Placer County for almost 30 years. A former small-business owner who also worked at the Sierra Business Council and Sugar Bowl Ski Resort, she has represented the 5th District in Placer County for the past seven years. As well as serving on the Sierra Nevada Conservancy Board, she serves on the Local Government Commission, the Placer County Air Pollution Control District, the Sierra Climate Adaptation & Mitigation Partnership, and many others.

Ken Pimlott was appointed director of California Department of Forestry and Fire Protection (CAL FIRE) in 2011 after serving as the acting director since November 2010. He is also California's State Forester. Prior to being appointed, Pimlott was the deputy director of fire protection. He has risen through the ranks within CAL FIRE, holding a variety of resource and fire protection positions after starting as a seasonal firefighter 29 years ago. Currently, he also serves as chair of the Council of Western State Foresters. He holds an associate of arts degree in fire technology from American River College, a bachelor's degree in forest resource management from Humboldt State University and is a registered professional forester.



Allen Rowley is national director for rangeland management and vegetation ecology for the U.S. Forest Service. His experience in natural resource management spans over 30 years. He worked at the district, forest, and regional levels before coming to his current position at the Forest Service headquarters in Washington, D.C., in 2015. His experience includes work on six national forests in range management, fire management, wilderness, and forest management in Idaho, Montana, and Utah.



Dr. Chris Swanston helps organizations reach their land stewardship goals while considering and planning for climate change. He is the director of the Northern Institute of Applied Climate Science (NIACS), a partnership led by the Forest Service and designed as a boundary-spanning organization providing climate adaptation services to land managers. He also is the director of the USDA Northern Forests Climate Hub, co-chair of the Climate Change Resource Center, and member of the science steering groups of the International Soil Carbon Network and the North American Carbon Program.

Tuesday, Oct. 18

2016 NATURAL AREAS CONFERENCE

2016 NATURAL AREAS CONFERENCE

Tuesday, Oct. 18

Poster Session (6 – 8 pm)

Alumni Center: AGR Room

Join us for a reception with complimentary hors d'oeuvres and bar.



Photo by Glenn Juday

- *Tribal-Federal Collaborations in Forest Restoration: Social Processes and Ecological Outcomes.* **Christopher Adlam**
 - *The California Climate Console: An Information Portal to Help Guide Decisions for the Future.* **Dominique Bachelet**
 - *Cliff Flora of the Big South Fork National River and Recreation Area.* **Laura Boggess**
 - *Abundance Patterns of Landbirds in Montane Meadows Restored with the Pond and Plug Method.* **Brent Campos**
- *Orange is the New Green: Accelerating Tropical Forest Regeneration in Costa Rica Using Citrus Waste.* **Jonathan Choi**
 - *Integrity Species, the Concise Route to Restoring a Natural Area.* **Cecil Frost**
 - *Reproductive Biology of Aplectrum hyemale in Hougham Woods Biological Field Station in Central Indiana.* **Wanda Gaines**
 - *Seeding Functional Redundancy for Multiple Ecosystem Service Goals.* **Elise Gornish**
 - *Badoura Jack Pine Woodland Scientific and Natural Area Climate Response Planning.* **Shelley Hedtke**

Tuesday, Oct. 18

2016 NATURAL AREAS CONFERENCE

- *Summary of Northern Sierra Nevada Foothills Comparative Veg Mapping.* **Todd Keeler-Wolf**
 - *Bioblitz Reveals the Benefits of Small-Scale Organic Farming to the Local Flora and Fauna.* **Heather Kostick**
 - *The Direct and Indirect Effects of Climate Change on Native Forb Persistence.* **Marina LaForgia**
 - *Youth Solving Ecological Issues in Desert Climates.* **Afton McKusick**
 - *Livestock Grazing for Landscape Diversity in California Vernal Pools.* **Julia Michaels**
 - *Canopy Distribution and Survey Methods for an Old-Growth Forest Lichen Growing at Its Range Limit.* **Jesse Miller**
 - *Using Collections to Document the Occurrence Through Space and Time of Non-native Species: The Great Lakes Invasives Network.* **Brenda Molano-Flores**
 - *Forest Health Aerial Detection Survey Highlights for California 2016, Status of Insect, Disease and Abiotic (Drought) Forest Disturbance Activity by USFS R5 S&PF Aerial Survey Program.* **Jeffrey Moore**
 - *Relationships Between Ground-Dwelling Arthropod Communities and Forest Fragment Environmental and Spatial Characteristics.* **Andrea Myers**
 - *A Window Into the Future: Mojave Desert Disjunct Flora on South Slopes of Monocline Ridge in the San Joaquin Valley Desert.* **Ryan O'Dell**
 - *Survey of Invasive Plants and Their Relationship to Environmental Variables Along the Mid-Atlantic Corridor of the Appalachian National Scenic Trail.* **Kevin Popowich**
 - *The Future of Agriculture in California: Supporting Diversity, Resiliency and Adaptive Capacity Through the Implementation of the 2014 Sustainable Groundwater Management Act.* **Jessica Rudnick**
 - *Hydrologic Drought, Soil Moisture Storage, Root Depth, and Livestock Management During "Drought."* **Brad Schultz**
- *Limitations of the Drought Monitoring Index for Predicting Forage Production and Adjusting Livestock Numbers.* **Brad Schultz**
 - *Metapopulation Monitoring of Howellia Aquatilis, A Threatened Aquatic Plant Species in Northwestern Montana: Trends in Relation to Land Management Activities, Disturbance and Climate Change.* **Steve Shelly**
 - *Water Velocity and Flow in a Managed River Influence Spread of an Invasive Aquatic Emergent Plant.* **Meghan Skaer Thomason**
 - *Assessing Climate Change Vulnerability Using Measures of Exposure and Terrestrial Resilience: A Case Study from the National Park Service National Capital Region.* **Regan Smyth**
 - *The Invasion Risk in the Pacific Northwest of Two Closely Related Grass Species in the Genus Cortaderia.* **Daniel Sorensen**
 - *Using Monitoring to Inform Adaptive Wetland Habitat Management in Drought Conditions.* **Khara Strum**
 - *Introduced Phytophthora Root Diseases Decrease Resilience of California Habitats and Restoration Sites to Climate Change.* **Tedmund Swiecki**
 - *Engaging Citizen Scientists to Research Best Management Practices for Increasing the Abundance of Spiranthes romanzoffiana, a Locally Rare Orchid, in Hoyt Arboretum, Portland, Oregon, U.S.A.* **Mandy Tu**
 - *Municipal Compost as a Boreal Forest Reclamation Medium in Canada: Managing for Resilience After Industrial Disturbance.* **Erika Valek**
 - *Wet Meadow Restoration and Grazing in the Sierra Nevada: Significant Impacts on Non-target Pollinator and Forb Communities.* **Jennifer van Wyk**
 - *Acorn Harvesting and Propagation: A Community Supported Model.* **Zarah Wyly**

Tuesday, Oct. 18

2016 NATURAL AREAS CONFERENCE

Room	Alumni Center: Allewelt	Hyatt: Conference Room	Conference Center: Conference Room B	Alumni Center: West	Alumni Center: Alpha Gamma Rho Hall	Alumni Center: Founders	Conference Center: Ballroom B	Conference Center: Conference Room A
Topic	GENERAL SESSION Land Stewardship and Planning: Case Studies, Programs, and Citizen Science ⁽⁹⁾	GENERAL SESSION Using the Past and Present to Inform the Future: Baselines, Trends, and Historical Reconstructions ⁽¹⁰⁾	ORGANIZED ORAL SESSION The National Native Seed Strategy and Managing Genetic Diversity on Public Lands ⁽¹¹⁾	ORGANIZED ORAL SESSION Science and Collaborative Action: Addressing Climate Change, Disturbance, and Restoration in California's Northern Coast Range and Beyond ⁽¹²⁾	ORGANIZED ORAL SESSION Post-Fire Conifer Regeneration: Drivers and Patterns ⁽¹³⁾	ORGANIZED ORAL SESSION Fire Use as a Climate Adaptation Tool ⁽¹⁴⁾	ORGANIZED ORAL SESSION Climate Vulnerability and Implications for Management of Native Vegetation ⁽¹⁵⁾	ORGANIZED ORAL SESSION Climate Change Impacts on Ecosystem Services and Climate Adaptation in Southern California ⁽¹⁶⁾
Moderator	Michelle Stevens	Rick Bottoms	Fred Edwards	Chad Roberts	Kristen Shive	Marc Meyer	Greg Suba	Amber Pairis & Emma Underwood
8:00 am	History of the Public Domain in the United States. Jerry Magee	Climate and Management as Drivers of Change in the Composition and Structure of California Forests: Perspectives From a Historical Dataset. Kelly Easterday	Serendipity Versus Strategy: The Need for a Coordinated Approach to Native Seed in the United States. Peggy Olwell	Incorporating Science-Based Collaboration Into Climate Change Adaptation for Northwestern California Federal Agency Planning and Land Management. Jessi Kershner	Post-Fire Tree Regeneration in Ponderosa Pine Forests of the Southern Rocky Mountains. Paula Fornwalt	Fire Regime Restoration in the 21st Century Using Managed Wildfires. Kent van Wagtendonk	Challenges and Applications of Species Distribution Models: Forecasting Climate Change Impacts on Rare Plants in the University of California Natural Reserve System. Erin Riordan	Climate Resilient Connectivity for Wildlife Adaptation in Southern California. Megan Jennings
8:20 am	The Bureau of Land Management's National Conservation Lands: A Growing System of Federal Natural Areas Connecting Working Landscapes. Bob Wick	Reconstructing the Historical Forests of California. Carrie Levine	Stepping Down the National Seed Strategy Into Action. Fred Edwards	Collaborative Action for Restoring the Role of Fire in Northwestern California Landscapes: Firescape Mendocino and the Western Klamath Restoration Partnership. Mary Huffman	Post-Fire Climate as a Driver of Forest Community Regeneration. Chhaya Werner	Managed Wildfire Effects on the Drought Resilience of the Illilouette Creek Basin in Yosemite National Park. Gabrielle Boismrame	Incorporating Species Distribution Models, Climate Change, and Species' Traits Into Seed Sourcing Decisions for Southern California Scrub Restoration. Arlee Montalvo	Using Forecasting and Scenarios to Set Conservation Priorities in Southwestern California. Zachary Principe
8:40 am	Green Infrastructure to the Rescue: Park District Combats Climate Change. Brian Holt	Historical High-Severity Fire and Forest Density in the Sierra Nevada: The Discrepancy Between Sources and Forest Plan Revisions. Chad Hanson	Seed Transfer Guideline Development in the Great Basin and Insights for Seed Transfer at a National Scale. Francis Kilkenny	Climate Change, Ecosystem Alteration, and Adaptation Options for Northwestern California Forestlands: Addressing the Science. Ramona Butz	Repeated Wildfires: For Better or for Worse? Camille Stevens-Rumann	Strategies and Tactics for Mitigating and Managing Increased Smoke Production in California Forests. Leland Tarnay	Assessing Climate Vulnerability for Rare Plants, and Translating Results Into Actions. Melanie Gogul-Prokurat	Lessons Learned From Incorporating Climate Smart Conservation Into Natural Resource Management Plans. Kim Roeland
9:00 am	The 'Art' of Conservation: Evaluating Motivations and Incentives to Conserve Land in Northern Michigan. Kathryn Braddock	The Changing Landscape of California Fire: Trends in Burn Patterns and Post-Fire Forest Heterogeneity. Zachary Steel	Mojave Desert Native Plant Program: Developing Genetically and Ecologically Appropriate Native Plant Materials for Desert Habitat Restoration. Judy Perkins	Connectivity Underpins Climate Change Adaptation Strategies in Northwestern California Landscapes. Steve Greco	Early Forest Dynamics in Stand-Replacing Fire Patches in the Northern Sierra Nevada, California, USA. Brandon Collins	Restoring Fire and Stabilizing Carbon in a Warmer, Drier Future. Matthew Hurteau	Considerations in Plant and Vegetation Predictive Modeling: Conservation Implications From Contemporary and Historic Data. Patrick McIntyre	Climate Change Adaptation and California Tribes: Building Capacity Through Partnerships. Kurt Broz
9:20 am	The UF/FAS Assessment of Non-Native Plants in Florida's Natural Areas: A Comprehensive Screening Program for Introduced Plants and Their Cultivars. Deah Lieurance	Reconstructing a Cultural Fire Regime: Implications For Ridgetop Barrens Management In The Pennsylvania Anthracite Region. Tom Saladyga	Mojave Desert Restoration: A Science-Based Strategy for Repairing Degraded Shrubland Habitats. Lesley Defalco	Using Silvicultural Approaches to Increase Climate Resilience, Reduce Fire Risk, and Maintain Habitat in Northwestern California Forestlands: Collaborative Processes Facilitate Stand-Level Planning. Tony Saba	Facultative Serotiny. David Greene	Wildland Fire as a Necessary Catalyst for Facilitating Adaptation to Climate Change. Sean Parks	The California Conservation Genomics Consortium. Rachel Meyer	Building a Regional Network for Climate Adaptation. Amber Pairis
9:40 am	Early Detection Rapid Response Citizen Science Program Provides Immediate Management Data and Tracks Changes in Distribution, Abundance, and Phenology of Invasive Plants Over Time. Julie Combs	Historical Air Photos as a Source of Information on Landscape Heterogeneity for Forest Restoration. Jamie Lydersen	Spatial Genetic Methods to Guide Native Plant Restoration: A Mojave Desert Case Study. Daniel Shryock	Collaborative Engagement in Land Use Management to Meet Recreational Needs and Other Nontraditional Objectives. Don Amador	Predicting Conifer Establishment Post-Wildfire in Mixed Conifer Forests of the North American Mediterranean-Climate Zone. Kevin Welch	Southwestern Fire Use as a Climate Adaptation Tool. Peter Fulé	Regional Conservation Investment Strategies. Graham Chisholm	Understanding the Impacts of Climate Change on Ecosystem Services in Southern California. Emma Underwood
10:00 am	MID-MORNING BREAK	MID-MORNING BREAK	MID-MORNING BREAK	MID-MORNING BREAK	MID-MORNING BREAK	MID-MORNING BREAK	MID-MORNING BREAK	MID-MORNING BREAK
10:20 am	Monitoring the Impacts of Climate Change Across Ecological Transitions in Joshua Tree National Park. Lynn Sweet	Phenology Information Can Support Adaptation in Species and Natural Areas. Theresa Crimmins	Using Field Experiments to Identify the Best Seed Sources for Establishing Native Grass Seedlings in Our Driest Sites. Beth Leger	Ensuring Effective Participation of Non-Governmental Conservation Organizations in Forest Collaboratives. Tom Wheeler	A Modern-Era Response to Post-Fire Reforestation. Joe Sherlock	Relearning and Applying Indigenous Knowledge to Manage Grasslands and Meadows for Biodiversity. Valentin Lopez	Microclimatic Effects on Germination and Survival of a Sand Dune Endemic: Implications for Adaptation to Climate Change. Noel Pavlovic	The Influence of Climate Change and Fire on Hydrology as an Ecosystem Service in Southern California. Lorraine Flint
10:40 am	Perpetuity in a Changing Climate: Working Lands Conservation From the Land Trust Perspective. Steve Kohlmann	Using Herbarium Records to Assess Shifts in Phenology in Alpine Plants and Select Indicator Species for Climate Change. Michelle Deprenger-Levin	Getting the Right Seed in the Warehouse: Increasing the Availability of Native Seed in the Great Basin. Sarah Kulpa	Changing the Map: Mobilizing Regional and National Support for the Berryessa Snow Mountain National Monument. Bob Schneider	Field Examples of Post-Fire Regeneration Patterns, Management Challenges, and Reforestation Treatments. Ryan Thompson	Wildfire and an Emerging Disease Interact in California's Coastal Forests: Impacts and Management of Sudden Oak Death in a Fire-Prone System. Allison Simler	Climate Change Vulnerability Assessment for Illinois Rare Flora: The Good, the Bad, and the Ugly. Brenda Molano-Flores	Identifying and Managing Biodiversity Hotspots for an Uncertain Future. Patrick Huber
11:00 am	Little Rock Island: Ecological Restoration and Wildlife Habitat Enhancement in the Heart of the Willamette River, Oregon. Adam Stellmacher	The Extent and Stand Characteristics of Eastern Red Cedar on Private Forest Land Across Arkansas, Kansas, Louisiana, Missouri, Oklahoma, and Texas. Jim Rosson	Presidential Memorandum on Pollinators – What It Means for Restoration and Reclamation Projects on Forest System Lands. Dirk Netz	Linking the Northern Sierra Nevada to the Cascades Establishing Dispersal Corridors Through Conservation Easements and Improving Forest Management on Private Lands. Connie Best	Release Treatment Effects Following Wildfire in an Eastside Pine Plantation. Martin Ritchie	Drivers of Plant Communities in Arid Forests With Long-Restored Fire Regimes. Kate Wilkin	Evaluating Climate Exposure of Each Land Cover Type in Temperate Broadleaf and Mixed Forests of East Asia. Hyeyeong Choe	Assessing the Response of Vegetation and Carbon Storage in Southern California to Climate Change. John Kim
11:20 am	Private Lands Conservation and Management in the Face of Changing Climates: A Case Study From Tejon Ranch. Michael White	The Importance of Annual and Multi-Year Drought in Tree Growth. Stella Cousins	Increasing Forb Diversity for Pollinators and Greater Sage Grouse in the Great Basin Under the National Seed Strategy. Mark Mousseaux	Discussion: Chad Roberts	The Effect of Post-Fire Reforestation on the Understory Plant Community. Gabrielle Bohlman	Growth Response of Three Southwest Conifer Species to Prescribed Fire. Emma Williams	A Clearer Vision From Fuzzy Logic: Metrics for Climate Change Sensitivity, Exposure, and Potential Impacts in Utah and the Colorado Plateau. Tim Sheehan	The Economic Value of Ecosystem Services in Chaparral-Dominated Landscapes With Mediterranean Climates: The Case of National Forests in Southern California. Lorie Srivastava
11:40 am	The Landscape of Implementation-Ready Adaptation Projects in the U.S. Conservation Sector. Sarah Skikne	Increased Water Deficit Decreases Douglas-Fir Growth Throughout Western U.S. Forests. Christina Restaino	The Seed Industry Challenge: Improving Regional Seed Inventories, Logistical and Contractual Issues, Examples. Ed Kleiner		Ecological Restoration Following the King Fire: A Potential Learning Opportunity. Christina Liang	Structure, Diversity, and Health of Red Fir Forests Within Active Fire Regime Landscapes of the Sierra Nevada. Marc Meyer	Assessing Climate Change Vulnerability for Rare Plants in the Western United States. Shannon Still	Developing Ecological Units and Management Tools for Assessing Ecosystem Services Under Climate Change. Allan Hollander
noon	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH

Organized Sessions (8 am – noon)

(9) Land Stewardship and Planning: Case Studies, Programs, and Citizen Science

Alumni Center: Allewelt

(10) Using the Past and Present to Inform the Future: Baselines, Trends, and Historical Reconstructions

Hyatt: Conference Room

(11) The National Native Seed Strategy and Managing Genetic Diversity on Public Lands

Conference Center: Conference Room B

This session expands the dialogue between land managers and researchers regarding applied population genetics and vegetation management in the context of the National Seed Strategy for Rehabilitation and Restoration and describes current efforts and projects in the American West.

(12) Science and Collaborative Action: Addressing Climate Change, Disturbance, and Restoration in California's Northern Coast Range and Beyond

Alumni Center: West

This session focuses on collaborative processes for climate change adaptation, with presentations from ecologists and stakeholders concerned with recreation, regional economies, environmental restoration, abandoned mine abatement, the role of climate-change information in agency planning, and uses of large-scale advocacy to accomplish regional objectives.

(13) Post-Fire Conifer Regeneration: Drivers and Patterns

Alumni Center: Alpha Gamma Rho Hall

This session responds to the rising concern that the interaction of climate and wildfire will have profound

implications on the future of forested ecosystems. It focuses on our current understanding of post-fire conifer regeneration patterns, with emphasis on management-relevant concerns.

(14) Fire Use as a Climate Adaptation Tool

Alumni Center: Founders

This session identifies current and future climate adaptation strategies for managed fire use, with a focus on fire management in the western United States.

(15) Climate Vulnerability and Implications for Management of Native Vegetation

Conference Center: Ballroom B

This session explores appropriate applications of Species Distribution Models (SDMs) and Vulnerability Analyses (VAs) and the development of new tools for use in native vegetation conservation, with a specific focus on the applicability of these to land managers and land-use planners.

(16) Integrating Climate Adaptation Into Resource Management and Assessing the Impacts of Future Climates on Ecosystem Services in Southern California

Conference Center: Conference Room A

This session focuses on the collaborative efforts in Southern California that form the foundation for building resilience to the effects of climate change and highlights the projected impacts on natural resources and ecosystem services.



NAA Annual Membership Meeting & Luncheon

Noon – 1:30 pm UC Davis Buehler Alumni Center: AGR Room

All current NAA members are invited and encouraged to attend. Meet your fellow members and reunite with old friends! The meeting will also include: an update on the NAA, election of NAA board members, and the opportunity to network with other NAA members. Those who preregistered for the luncheon will have tickets in the sleeve of their name badge.

Plenary Session 2 (1:30 – 5:30 pm)

Reconciling Restoration with Environmental Change

This plenary session focuses on restoration and the complications brought on by global change. Seven of the world's top restoration scientists address a series of major challenges in modern restoration. After introductory presentations, the panel and audience will engage in a moderated discussion about these important topics.

1:30 pm Introduction to the Issue, Hugh Safford, USFS and UC Davis; and Nicole Heller, Director of Conservation Science, Peninsula Open Space Trust

PLENARY ADDRESSES

1:40 pm The Case for Traditional Restoration

Dr. Truman Young, UC Davis

Ecological restoration has long encompassed a variety of project goals and concomitant variety of philosophical approaches. Recently, however, there has been a tendency to be dismissive of traditional restoration goals (caricaturized as a return to a "natural" state) in favor of models that explicitly acknowledge potentially irreversible changes in the world's biomes (climate change, invasive species, cultural landscapes). I argue that such abandonment of traditional restoration is premature, and that it still serves as a useful touchstone for both past and future restoration.

2:05 pm Novel Ecosystems: Concepts and Practice

Dr. Richard J. Hobbs, University of Western Australia

Novel ecosystems arise because of changes in abiotic characteristics and in species compositions. Many novel systems have considerable value to local communities and, on the other hand, the ability to restore original "native" systems may be limited. Given that management resources are virtually always limited, deciding what to do where is a key ongoing challenge. Some natural areas are not changing rapidly or irreversibly, and in these cases traditional approaches remain relevant. Where change is pervasive, new thinking and approaches may be required. Practitioners have to make sense of the

situations they face on a daily basis. While science can help with this, many of the decisions to be made are value-based. Developing an effective and expanded portfolio of restoration options can help maintain high value natural areas and better manage altered landscapes.

2:30 pm Making Decisions About Where and How to Restore in a Changing World

Dr. Katharine Suding, with Lauren Hallett and Lorelee Larios

Natural systems are experiencing unprecedented rates of change and, faced with this uncertain future, managers increasingly need to anticipate and better understand resilience in time (as environments change) and in space (across heterogeneous landscapes that are differentially exposed to change). Looking forward to future conditions of atmospheric nitrogen pollution, we suggest ways to best meet two management challenges—conservation of native grasslands and restoration in exotic grasslands—in California. Our work combines impact assessment, species interactions, and demographic modelling to determine when systems need little management intervention, when they are highly vulnerable or best respond to restoration, and when shifting baselines might mandate a change from more traditional management goals.

2:55 pm Dealing with Dynamics: Restoration and Conservation in the California Delta

Dr. John Wiens

Natural areas are centerpieces of conservation. Their effectiveness, however, is challenged by a history of habitat loss and degradation and by future land use and climate change.

Restoration is an important tool in addressing these past and future changes and enhancing the value of natural areas. In order to use this tool effectively, however, several issues must be addressed, including: What are the goals of restoration, and of natural-area management? What are the targets? What is the appropriate spatial scale? What is the appropriate temporal scale?

All of these issues are confounded by dynamics and uncertainties, which affect how restoration and management set goals and how management is planned and conducted. Wiens illustrates these issues with an example of habitat restoration in the California Delta.

In a dynamic world, the concept of natural areas as islands of stability, divorced from the landscape context, won't hold water. Natural areas are spatially fixed, but the world about them is a flux of moving species and changing landscapes. There are tools to deal with such dynamics—spatial analysis, scenario modeling, risk assessment, adaptive management, decision support. These tools can help bracket the possible outcomes of restoration actions, which can then be assessed in relation to the multiple goals for natural areas.

3:20 pm Break

3:40 pm Ecosystem Services as a Guide to Developing Restoration Goals and Approaches that are Feasible and Beneficial

Valerie T. Eviner, UC Davis

Restoration projects can encompass a diverse set of goals, ranging from the re-establishment of historical communities to the development of novel systems that are resilient to changing environmental conditions. Determining the feasibility of different goals and the most effective management approaches relies on a strong understanding of the fundamental processes that maintain communities and ecosystems (e.g., erosion control, soil fertility, water infiltration and storage). These processes, in turn, determine the delivery of ecosystem services that are critical for human well-being (e.g., food production, pest control, provision of clean water).

This talk will use examples from California grasslands, oak woodlands, and riparian areas to show how an understanding of ecosystem functions and services can guide many steps of the restoration process. 1) What is feasible? Site degradation due to management or changing environmental conditions can constrain which goals are achievable by compromising key ecosystem functions. What types or magnitude of changes necessitate a “novel systems” approach, versus what can be reversed by using historic communities to restore ecosystem functions? 2) What is desirable? While there is often the assumption that historic native communities will improve ecosystem services, in reality, native communities usually enhance some ecosystem services, while decreasing others. This is especially important to consider under changing environmental conditions. For example, with increasing frequency and intensity of droughts, maintenance of any type of plant production and erosion control may be a primary goal. 3) Which areas should be prioritized for different restoration goals? Areas across the landscape can

differ in which biotic communities they support, which ecosystem services they deliver, and which ecosystem services are most needed. For example, California's invaded grasslands provide better erosion control than native grasslands, suggesting that restoration of native communities should focus on areas where erosion isn't a problem. 4) Which restoration approaches will be most promising? Understanding site-specific changes in soil nutrients, water, and herbivory can be critical to selecting the restoration approaches that will be most effective.

Ecosystem services shouldn't be the only guide for restoration, but given limitations in the scope and extent of where we can do restoration, they can be an important guide in prioritizing restoration sites and goals.

4:05 pm Resilience Ecology, the Dilemma of Change, and the Importance of Experiments, Modeling, and Monitoring

Dr. Donald A. Falk, University of Arizona

Novel combinations of climate, land use, ecosystem disturbance, and species redistributions constitute profound challenges to sustainable land management in the Anthropocene. Change arises as a central conundrum for land management: Should we embrace or resist ecological change if the drivers are anthropogenic? Ecosystems have powerful legacies, including long-lived species and basic biogeochemical and regional determinants of biome distributions, which can buffer external stressors and support resilient and adaptive responses. Eventually, however, these stabilizing factors will readjust to new conditions, as they have many times in Earth's history. Ecological responses in coming centuries are thus largely uncharted territory for ecosystem science, and extrapolations of past dynamics into future conditions may be inaccurate and inadequate to guide land management. Experimental approaches will be critical during this period, including controlled and natural experiments and iterative modeling of ecological complexity. Long-term monitoring of change will be especially important as we seek to understand how ecosystems will respond and adapt.

4:30 pm Spreading Conservation Risk with a Portfolio of Strategies

Dr. Gregory Aplet, The Wilderness Society

As this symposium has shown, various opinions exist about how to conserve natural areas. Generally, these

strategies span the range from trying to conserve historical ecosystems to accepting and managing for novel ecosystems unlike those of the past. Strategies may further be said to span the range from intensive engagement to a more hands-off approach. Thinking of these two ranges as axes defining a two-dimensional space, we may describe management alternatives as combinations of each. Historically, natural area managers have actively managed ecosystems to maintain or re-create historical ecosystems through the process of traditional restoration. In other places, such as urban parks and botanical gardens, managers have invested energy to create novel ecosystems. In still other places, like old fields and wilderness, we have refrained from management, allowing natural ecosystems to recover historical conditions. Increasingly, we are facing the fact that, as a result of various pressures collectively called “global change,” ecosystems will drift into novel conditions in the absence of management. In fact, so strong are many of these pressures, notably climate change, that a hands-off approach is no longer likely to maintain historical ecosystems, and we are left with three options: accept change (including some recovery on degraded sites), resist change through the process of restoration, or guide change into historically novel conditions that nevertheless sustain valued ecosystem elements in the face of anticipated global change. Which of these is most likely to succeed in the preservation of nature? Obviously, different opinions exist, stemming from uncertainties in future conditions and management response, and these uncertainties create risk. Fortunately, this risk can be managed by spreading it among all three strategies. In the future, nature conservation will increasingly be viewed as managing the risk of loss to objects of conservation concern by allocating natural areas to a portfolio of observation, restoration, and innovation strategies, much as one would allocate investments among a portfolio of investment vehicles of different risk. Some areas will concentrate on the observation of change, some on traditional restoration, and some on high risk-high yield efforts in novel ecosystems.

4:55 pm Discussion: Charting a Way Forward, Hugh Safford & Nicole Heller, moderators

5:30 pm Plenary Adjourns

ABOUT THE SPEAKERS



Dr. Gregory H. Aplet is senior science director in The Wilderness Society's Denver office, where he oversees the organization's scientific research program. He holds a B.S. in forestry and an M.S. in wildland resource science from UC Berkeley and a Ph.D. in forest ecology from Colorado State University. Since arriving at TWS in 1991, Aplet's research has focused on a variety of Wilderness Society priorities, including the conservation of

Pacific Northwest forest ecosystems, biodiversity conservation in the Southern Appalachians, planning for the Grand Staircase-Escalante National Monument, restoration of ecosystem health in fire-prone western forests, and climate change adaptation. He is the author of numerous publications on the effects of disturbances on Rocky Mountain and Hawaiian forests, the ecology of biological invasions, the conservation of biological diversity, and wildland fire and wilderness management.



Dr. Valerie Eviner received her B.A. from Rutgers University and Ph.D. from UC Berkeley. Her research focuses on a mechanistic understanding of interactions between plants, animals, and soil to increase our understanding and effective management of: ecosystem services, plant invasions, restoration, plant community composition,

biogeochemical cycling, global change, grazing systems, and resilience of ecosystem structure and function. She is particularly interested in understanding controls over plant community interactions and ecosystem services, and how these patterns and controls vary across the landscape, over time, in response to environmental changes, and due to management actions. Most of her work occurs in California grasslands on working landscapes.



Dr. Donald A. Falk is an associate professor in the School of Natural Resources and the Environment, with joint appointments in the Laboratory of Tree-Ring Research and the Institute of the Environment at the University of Arizona. Falk's research focuses on fire history, fire ecology, and the adaptation of restoration ecology to resilience in a changing world. He is a Fellow of the American Association for the Advancement of Science and has received a Fulbright

Short-Term Scholar award, the Ecological Society of America's Deevey Award, and a Udall Faculty Fellowship in Public Policy. Falk was

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co-founder and executive director of the Center for Plant Conservation, originally at Harvard University's Arnold Arboretum and now at San Diego Zoo Global. He subsequently served as the first executive director of the Society for Ecological Restoration. His books include *Genetics and Conservation of Rare Plants*, *Foundations of Restoration Ecology*, and *The Landscape Ecology of Fire*. Falk was a delegate to the 2015 UN climate summit in Paris.



Dr. Nicole Heller is the director of conservation science at Peninsula Open Space Trust. Trained as a field ecologist, she has been working for the past 10 years at the boundary of scientific research and applied ecology to help pioneer climate change adaptation in California. She is an affiliated researcher with the Terrestrial Biodiversity and Climate Change Collaborative, Resilient Silicon Valley, Switzer Foundation and the

Amah Mutsun Land Trust. Nicole received her B.A. in ecology and evolution from Princeton University and her Ph.D. in biological sciences from Stanford University. She conducted postdoctoral research at UC Santa Cruz. Her research has been published widely in academic and popular presses. She has held teaching positions at UC Santa Cruz, Franklin and Marshall College, and Duke University.



Dr. Richard J. Hobbs is a professor and IAS Distinguished Fellow in the School of Plant Biology at the University of Western Australia and leads the Ecosystem Restoration and Intervention Ecology Research Group. Originally from Scotland, where he completed his undergraduate and doctoral degrees, he worked as a postdoc at Stanford University before moving to Western

Australia in 1984. There, he has worked at CSIRO and Murdoch University before moving to UWA in 2009. His work has contributed to and advanced conservation biology, landscape ecology, and restoration ecology. He is a Highly Cited Researcher in Ecology and Environment. He focuses on sound empirical field ecology, conceptual, and synthetic development and practical, on-ground application to ecosystem management and restoration. He maintains long-term studies in California and Western Australia. His work on restoration ecology, intervention ecology, and novel ecosystems aims to provide a framework to guide management and policy and has also promoted much-needed scientific and public debate in this area.



Dr. Hugh Safford is the regional ecologist for the U.S. Forest Service's Pacific Southwest Region (California, Hawaii, Pacific territories), and also holds a research position in the Department of Environmental Science and Policy at UC Davis. Safford manages a staff of ecologists who provide expertise in areas from vegetation, fire, and restoration

ecology, climate change, inventory, and monitoring to land management and planning efforts on the national forests in the Pacific Southwest Region. His areas of professional expertise are restoration ecology, community ecology, biogeography, and disturbance ecology. Safford is the manager of the Regional Research Natural Area program, the Sierra Nevada region leader for the California Fire Science Delivery Consortium, and a member of the science advisory boards for a number of environmental collaboratives and NGOs. He also works internationally, and provides technical assistance on fire, forest management, and climate change issues to the U.S. Agency for International Development and the International Program of the Forest Service. Safford holds a Ph.D. in ecology from the University of California, an M.A. in secondary education from San Francisco State University, and a B.S. in geology from Montana State University.



Natural Areas Conference Chair
Dr. Hugh Safford with graduate students and post-doctoral scholars at work in Sierra San Pedro Mártir National Park in Baja California, Mexico.

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Dr. Katharine Suding is a professor of ecology at the University of Colorado in Boulder. Her research is aimed at understanding the spatial and temporal dynamics of systems, why some systems change rapidly and others are surprisingly stable, and how this information can help us better meet conservation and restoration goals. She leads the Niwot Ridge LTER program and is a Fellow of the Ecological

Society of America. She received her Ph.D. from the University of Michigan and was on the faculty at UC Berkeley before moving to Boulder.



Dr. John Wiens grew up in Oklahoma as an avid birdwatcher. Following degrees from the University of Oklahoma and the University of Wisconsin-Madison (M.S., Ph.D.), he joined the faculty of Oregon State University and, subsequently, the University of New Mexico and Colorado State University, where he was a professor of ecology and University

Distinguished Professor. His work has emphasized landscape ecology, conservation, and the ecology of birds, leading to over 260 scientific papers and 11 books. Wiens left academia in 2002 to join The Nature Conservancy as lead scientist and then, in 2008, PRBO Conservation Science as chief scientist. He retired in 2014. He now splits his time between his home in Corvallis, Ore., and the University of Western Australia, where he is an adjunct professor. He currently serves on the Delta Independent Science Board in California.



Dr. Truman Young is a professor of ecology and restoration ecology in the Department of Plant Sciences at UC Davis. He was born and raised in Colorado, and attended the University of Chicago and the University of Pennsylvania. He has done research in Africa since 1977. He began teaching at UC Davis in 1996. With his students, he has studied basic and applied aspects of ecological restoration in California

and beyond. His current research projects are related to the ecology, management, restoration, and conservation of human-dominated landscapes.

Organized Sessions (8 am – noon)

Room	Conference Center: Ballroom A	Conference Center: Conference Room B	Conference Center: Conference Room A	Hyatt: Conference Room	Alumni Center: Alpha Gamma Rho Hall	Alumni Center: West	Alumni Center: Founders	Conference Center: Ballroom B
Topic	GENERAL SESSION Restoration 2: Genetics, Seed Sourcing, and Local Adaptation (17)	ORGANIZED ORAL SESSION Managing Meadows With Consideration for Changes in Climate (18)	ORGANIZED ORAL SESSION Coastal Adaptation to Sea Level Rise in North-Central California (19)	ORGANIZED ORAL SESSION Contemporary Remote Sensing and a Changing Climate: Identify, Assess; Act (20)	ORGANIZED ORAL SESSION Forests in the Oven: Implications of Hotter Drought for Forests and Their Management in California and Across the U.S. (21)	ORGANIZED ORAL SESSION Adapting and Mitigating Grassland Response to a Changing and Variable Climate (22)	ORGANIZED ORAL SESSION Status and Trends in Chaparral Shrublands: Management Considerations for the Future (23)	ORGANIZED ORAL SESSION Pollinators, Plants, and People (24)
Moderator	Danielle Hughes	Shana Gross	Fraser Shilling	Carlos Ramirez	Carolyn A.F. Enquist	Andrew Fulks	Nicole Molinari	Peggy Olwell
8:00 am	Progress Over the First Ten Years of the American Chestnut Foundation Blight Resistance Breeding Program in Georgia. Martin Cipollini	Natural Range of Variation for Meadows in the Sierra Nevada and Southern Cascades. Shana Gross	Sea Level Rise: Effects of Shoreline Modification on Tidal Dynamics. Rusty Holleman	California Forest Responses to Drought and Other Factors From Advanced Airborne Mapping Techniques. Greg Asner	Recent Insights on Tree Die-off From Hotter Drought. David Breshears	Predicting and Managing California Grassland Response to Multiple Environmental Changes. Valerie Eviner	Diversity and Dynamics of the Chaparral Ecosystem. Tom Parker	Landscape-Scale Management of Pollinators and Other Beneficial Invertebrates. Casey Burns
8:20 am	Challenges in the Selection of Best-Suited Genotypes of Long-Lived Desert Shrubs for Restoration. Nathan Custer	Understanding Climate Sensitivities of Sierra Nevada Meadows as a Foundation for Prioritizing Adaptation Actions. Christine Albano	Harnessing Innovation and Natural Processes for Large-Scale Tidal Wetland Restoration, San Francisco Bay. Julian Meisler	JPL and NASA Remote Sensing Technologies for Land Resource Management. Natasha Stavros	Do Forest Treatments Improve Tree Vitality Under Drought? James Thorne	Climatic Drying and Its Effects on Grassland Diversity. Susan Harrison	Tracking Biomass Accumulation in Southern California Chaparral With Remote Sensing and Ground-Based Measurements. Kellie Uyeda	Wildfire and Post-Fire Restoration Seeding Alter Insect Pollinator Communities in Sagebrush Habitats. Ashley Rohde
8:40 am	Native Seed Use for Post-Fire Reclamation and Stabilization in McInnis Canyons National Conservation Area and Grand Junction Field Office: Positive Restoration Trajectories. Madeline (Nikki) Grant-Hoffman	Importance of Late-Season Groundwater in a Montane Peatland. Wesley Kitlsten	Shoreline Protection With "Living Levees." Jeremy Lowe	Rapid Assessment of Forest Disturbance and Mortality in California Using eDaRT. Alexander Koltunov	Processes for Translating Drought Effects Into Resource Management in High Value Forests. Koren Nydick	Insights From Long-Term Plots on Grassland Responses to Rainfall in a Transitional Coast/ Interior Grassland Setting in Santa Barbara County, California. Carla D'Antonio	Chaparral Landscape Conversion After a Century of Global Change. Alexandra Syphard	Islands of Native Shrub and Forb Plantings Attract a Diversity of Insect Pollinators. David Pilliod
9:00 am	Assisted Gene Flow to Maintain Healthy Forests Under Climate Change: Insight From Post-Wildfire Tree Seedling Plantings in California. Derek Young	Plant Species Composition and Abundance in Relation to Soil Chemistry, Thickness of Peat, and Livestock Use in Fens in the Sierra Nevada, CA, USA. Dave Weixelman	Shoreline Transportation Planning in the Face of Sea-Level Rise. Reza Navai	Utilizing LiDAR to Inform and Monitor Multi-Scale Forest Restoration. Sean Jeronimo	Does Prescribed Fire Promote Forest Resistance to Drought? Phillip van Mantgem	Latitudinal Trait Variation in Two Native and Exotic California Grass Species. Joseph Waterton	Southern California Shrubland Recovery Following Short-Interval Wildfire: Monitoring Past Community Changes and Predicting Future Threats. Stephanie Ma	Do Native Bees Respond to Landscape Position in Sagebrush Ecosystems of Wyoming? Lusha Tronstad
9:20 am	Climatic and Biotic Limitations to High-Andean <i>Polylepis</i> Forest Migration in Huascanan Biosphere Reserve (Ancash, Peru). Laura Morales	Rehabilitation of an Agricultural Wetland: Utilizing Seed Bank and Response to Biomass Management to Inform Restoration Management. Annie Overlin	Conflict Resolution During Adaptation of Shoreline Infrastructure Embedded in Natural Systems. Fraser Shilling	It's Not Just for Landscapes Anymore: Applying High Spatial and Temporal Resolution Remotely Sensed Datasets to Project Level Planning and Implementation. Scott Conway	Managing for Climate Change Adaptation in Forests: A Case Study From the U.S. Southwest. Lucy Kerhoulas	Climate Change and Grasslands of the Central Plains. Alan Knapp	Fuel Management Effects on Wild Bird Communities in California Chaparral: How Mastication Is Changing Community Structure and may be Increasing Lyme Disease Incidence. Erica Newman	Pollinator-Friendly Forbs to Seed for Sagebrush-Steppe. James Cane
9:40 am	Digging Into Mechanisms: Plant-Soil Biota Interactions Mediate Shrub Expansion in Declining Forests. Alix Pfennigwerth	Assessing Willow Flycatcher Population Size and Distribution to Inform Meadow Restoration Priorities in the Sierra Nevada and Southern Cascades. Helen Loffland	Forecasting Tidal Marsh Elevation and Habitat Change Through Fusion of Earth Observations and a Process Model. Kristin Byrd	Using Airborne LiDAR to Identify Characteristics of Forest Structure Selected for by California Spotted Owls Across Multiple Scales. Van Kane	How Drought Characteristics Interact With Tree Physiology to Kill Trees (Or Not): A Case Study From Colorado. Leander Anderegg	Planning and Implementing Landscape Changes at a Campus-Wide Scale to Adapt to Climate Change and Resource Scarcity. Andrew Fulks	Faunal Responses to Fire in California Shrubland. Jon Keeley	Rare Plants and Native Pollinators at the Pine Hill Preserve. Landon Eldredge
10:00 am	MID-MORNING BREAK	MID-MORNING BREAK	MID-MORNING BREAK	MID-MORNING BREAK	MID-MORNING BREAK	MID-MORNING BREAK	MID-MORNING BREAK	MID-MORNING BREAK
10:20 am	Is Species Identity or Source Climate a Better Predictor of Seed Germination Requirements for Native Forb Species in the Colorado Plateau? Alexandra Segias	Conifer Encroachment as a Consequence of Stream Restoration in Montane Meadows of the Lake Tahoe Area, California. Sarah Hall	Addressing Sea Level Rise in the San Francisco South Bay, California. Steve Kohlmann	The Drones are Coming: Mapping Our Changing Landscape Using Unmanned Aircraft Systems. Jarlath O'Neil-Dunne	Widespread Drought-Induced Changes in Southeastern Forest Ecosystems: Implications for Conservation and Management. James Vose	Incorporating Soil Water Dynamics to Improve Understanding of Climate Response in Arid and Semi-Arid Grasslands. Jennifer Gremer	Impact of Climate Change on Southern California's Fire Regimes: Implications for Fire Management. Yufang Jin	The Importance of <i>Cirsium pitcheri</i> , a Rare Plant Species, as a Pollinator Resource. Kayri Havens
10:40 am	Impacts of Climate Change on Early Life Stages of Milkweed: Implications for Forecasting Species Responses and Seed Sourcing. Jessamine Finch	Greenhouse Gas Dynamics in Degraded Montane Meadows: Contributions to Climate Change and Opportunities for Mitigation. Cody Reed	Will a Rising Tide Float All Lagoons? Sea Level Rise, Mouth Closure, and Habitat Changes in California's Coastal Wetlands. John Largier	Leaf and Canopy Biophysical Traits are Correlated With Spectral Traits Derived From AVIRIS Data. Susan Ustin	After the Extended Pluvial: Implications of Hotter Drought for Northeastern U.S. Forests. Neil Pederson	Point Blue Conservation Science's Rangeland Watershed Initiative: Rewatering California, One Ranch at a Time. Wendell Gilgert	Mortality of Chaparral Shrubs During Recent Climate Change-Type Droughts in Southern California. Brandon Pratt	Cross-Pollination Over Prison Walls: Working With Incarcerated People to Produce Plants for Pollinators and Habitat Restoration. Thomas Kaye
11:00 am	Testing a Predictive Provenancing Approach for Five Tallgrass Prairie Species Used in Midwest Restoration Efforts. Christopher Woolridge	Evaluating Climate Change Adaptation Strategies for Wet Meadows and Fens in Sequoia and Kings Canyon National Parks. Erik Frenzel	Nature-Based Coastal Adaptation Strategies in the Humboldt Bay Region. Joel Gerwein	New Eyes in the Sky: The Utility of Second Generation Satellite Imagery for Environmental Monitoring in the Black Rock-High Rock Emigrant Trails National Conservation Area. Mark Hall	Pine Susceptibility to Bark Beetle: What is the Role of Stand Density vs. Physiological Drought Stress? Nancy Grulke	Grazing in the Black Rock-High Rock National Emigrant Trails Conservation Area (NCA). Angela Arbonies	Examining Distribution of Herbaceous Cover Throughout Southern California Chaparral: Insights From a Novel Remote Sensing Method. Isaac Park	Plant Pollinator Networks of Prairies and Barrens in the Southeastern United States. Melissa Caspary
11:20 am	Using Strip-Seeding to Restore Multiple Ecosystem Services. Elise Gornish	Using and Updating the UC Sierra Nevada Meadows Data Clearinghouse: Leveraging Remote Sensing and Field Data to Assess Resiliency. Ryan Peek	Building Resiliency in a Dynamic System: Restoration of the Mattole River Estuary. Cassie Pinnell	LiDAR and PhoDAR: How Existing Federal Programs will be able to Provide a Continuous Vegetation Monitoring System. Andrew Brenner	Woodland Recovery Following Drought-Induced Tree Mortality: Abiotic and Biotic Controls on Tree Regeneration. Peter Weisberg	Re-watering Rangelands to Increase Resilience to Drought: Improving Habitat, Grazing Viability, and Management Opportunities by Augmenting Water Resources on Grazed Uplands. Ian Howell	Modeling Climate Change Impacts on Habitat Suitability to Inform Restoration of Southern CA Shrublands. Erin Riordan	Utility Right-of-Way Management That Supports Pollinators and Safe Energy Transmission. Peter Beesley
11:40 am	Madrean Archipelago Plant Propagation Initiative: A Strategy in Regional Plant Material Resiliency. Francesca Claverie	Sierra Meadow Strategy and Prioritization Framework: A Process and Outcome Centered on Increasing Pace and Scale of Meadow Restoration. Mark Drew	Discussion: Fraser Shilling	Discussion: Scott Conway	Discussion: Carolyn Enquist	Regeneration of Soil Hydraulic Function on Compacted Stock-Pond Edges for Revegetation With Native Plant Cover. Vic Claassen	Nitrogen Cycling and Export in California Chaparral: The Role of Climate in Shaping Ecosystem Responses to Fire. Erin Hanan	Discussion: Peggy Olwell
noon	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH

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(17) Restoration 2: Genetics, Seed Sourcing, and Local Adaptation
Conference Center: Ballroom A

(18) Managing Meadows with Consideration for Changes in Climate
Conference Center: Conference Room B

This session focuses on understanding the complex feedback loops in meadow ecosystems influenced by climate change, management, and restoration. It provides valuable information and tools that practitioners can employ to develop robust strategies for adaptation.

(19) Coastal Adaptation to Sea-level Rise in North-Central California
Conference Center: Conference Room A

This session explores ways in which society can adapt to potential impacts from sea-level rise and stochastic events to natural and built systems. We focus on North-Central California and primarily the San Francisco Bay area.

(20) Contemporary Remote Sensing and a Changing Climate: Identify, Assess, Act
Hyatt Hotel: Conference Room

Learn about contemporary remote sensing technologies that help identify, assess, and drive management



(24) Pollinators, Plants, and People
Conference Center: Ballroom B

This session focuses on planning and planting for pollinators. It discusses current research and management practices and what is necessary to make the full spectrum of pollinator plants available for management purposes.

Though the Killdeer (*Charadrius vociferous*) is a globally secure species, its population will still be affected by climate change as precipitation patterns change the habitat available in its resident and breeding ranges. Photo by Judy Semroc.

decisions to help adapt ecosystems to climate-driven change.

(21) Forests in the Oven: Implications of Hotter Drought for Forests and Their Management in California and Across the U.S.
Alumni Center: Alpha Gamma Rho Hall

This session addresses what hotter drought means for forests and their management in California, the Southwest, and elsewhere.

(22) Adapting and Mitigating Grassland Response to a Changing and Variable Climate
Alumni Center: West

This session features a diverse range of speakers highlighting cutting-edge research and projects related to climate change adaptation in grassland ecosystems, including direct links to on-the-ground management.

(23) Status and Trends in Chaparral Shrublands: Management Considerations for the Future
Alumni Center: Founders

This session explores effects of climate and non-climate stressors on chaparral shrublands, a dominant feature across Southern California, and provides insight into best management practices for the future.



Keys to Conservation Careers (25)

8 am - noon Alumni Allewelt

This session is designed for students interested in pursuing careers in conservation and natural areas management. Each presenter will talk for 15 minutes. We'll then open the floor for a 20-minute panel discussion.

SESSION SCHEDULE

8 - 8:10 am	Welcome and session introduction
8:10 - 8:25 am	Federal careers representative: Eli Ilano, US Forest Service, Tahoe National Forest
8:25 - 8:40 am	State careers representative: Whitney Albright, climate coordinator, CA Department of Fish and Wildlife
8:40 - 8:55 am	Academic careers representative: Dr. Truman Young, professor, Dept. of Plant Sciences, UC Davis
8:55 - 9:10 am	Land trust careers representative: Nicole Heller, director, conservation science, Peninsula Open Space Trust
9:10 - 9:25 am	NGO careers representative: Greg Aplet, senior science director, Wilderness Society
9:25 - 9:40 am	Environmental consulting careers representative: Linda Leeman, senior biologist, Ascent Environmental Consultants, Sacramento
9:40 - 10 am	Panel discussion & questions
10 - 10:20 am	Scheduled break

CAREER WORKSHOPS

10:20 - 10:50 am	USA Jobs: Tom Nichols & Jesse Ruvalcaba, BLM
10:50 - 11:20 am	Pathways program: Juana Rosas, U.S. Forest Service
11:20 - 11:50 am	BLM internships and employment opportunities: Zoe Davidson, BLM
11:50 - noon	Open for extra discussion



Interns of the Illinois Department of Natural Resources at Maramec Spring Park, Missouri (2010). Photo by Jodi Vandermyde.

Symposia (1:30 – 5:30 pm)

Room	Conference Center: Conference Room B	Conference Center: Conference Room A	Alumni Center: Allewelt	Alumni Center: Alpha Gamma Rho Hall	Alumni Center: West	Alumni Center: Founders	Hyatt: Conference Room
Topic	SYMPOSIUM Co-Production of Knowledge: Managers and Scientists Working Together for Effective Conservation in the Face of Climate Change (26)	SYMPOSIUM Applying Living Shorelines Techniques to Mitigate Sea Level Rise Impacts in Southern California (27)	SYMPOSIUM Mountain Meadow Restoration in California (28)	SYMPOSIUM Reconciling Habitat Quality and Resiliency Goals in Fire-Suppressed Forests of the American West (29)	SYMPOSIUM TBC3 Applied Climate Adaptation Tools for the CA Coast Ranges and Beyond (30)	SYMPOSIUM Understanding and Overcoming Management Challenges in Shrubland Habitats (31)	SYMPOSIUM Reversing Pollinator Losses on Wildlands in the Face of Climate Change (32)
Moderator	Toni Lyn Morelli	Amber Pairis	Stephanie Heller	Sarah Sawyer	Lisa Micheli	Nicole Molinari	Alix Cleveland
1:30 pm	Using Translational Ecology to Accomplish Effective Resource Conservation. Steve Jackson	Climate Resilient Communities: Living Shoreline Approaches in Southern California. Niko Kaplanis	Restoration of Meadow Floodplain Function Using the Rosgen "Priority One" Approach. Joseph Hoffman	Fisher Habitat Characteristics and the Effects of Forest Restoration on Fishers and Fisher Habitat. Craig Thompson	Conservation Strategies for a Changing World. David Ackerly	Challenges in Chaparral Management. Paul Zedler	Climate Change and Bumble Bees: An Overview of What We Have Observed and the Challenges Ahead. William Carromero
2:00 pm	How to Prioritize Management Action in a Changing Climate: A Look at Climate Change Refugia. Toni Lyn Morelli	Overcoming Uncertainty: Using Scenario Planning to Prepare for Climate Change in a Binational Watershed. Dani Boudreau	Benefits of Restoring Ecosystem Stability in Mountain Wetlands. Evan Wolf	New Insights on Characteristics of California Spotted Owl Territories and Effects of Forest Restoration, Wildfire, and Climate Change on Owls and Habitat Resilience. John Keane	Regional Water Balance Modeling: A Platform for Natural Resource Adaptation in California. Lorraine Flint	Global Warming Impacts on Future Fire Regimes: What California Fire History Can Teach Us. Jon Keeley	The Influence of Climate Change and Other Stressors on the Status of Native North American Pollinators. Bruce Young
2:30 pm	Spatial Patterns in Water Temperature in Pacific Northwest Rivers: Substantial Diversity at Multiple Scales and Potential Influence of Climate Change. Christian Torgersen	Dunes, Oysters, and Salt Marshes: Implementing Natural Resilience Strategies in Southern California. Megan Cooper	How Reconnecting a Floodplain in Indian Valley Altered Streamflow. Luke Hunt	Using LiDAR and Historical Data to Identify Topographic and Vegetation Characteristics Associated with Forest Resilience. Malcolm North	Downscaling TBC3 Applied Science Tools to the Preserve Scale: Pepperwood Preserve's Adaptive Management Plan. Lisa Micheli	Establishing Long-Term Public Support for Chaparral Management Within the Context of Climate Change and Population Growth. Richard Halsey	Creating Pollinator Habitat in the Context of Climate Change: Approaches, Tools, and Resources for Revegetation Practitioners. Mathew Horning
3:00 pm	Forest Climate Change Refugia Fire Ecology and Management. Kate Wilkin	Achieving Natural and Community Resilience in the City of Carlsbad. Mike Grim	Shifting Streams: Geomorphic Context of Pond and Plug Restoration in Montane Meadows of California. Jennifer Natali	Wildfire Impacts on California Spotted Owl Nesting Habitat in the Sierra Nevada. Scott Stephens	The Climate Smart Watershed Analyst. Stuart Weiss	The Effectiveness and Ecological Effects of Mechanical Fuel Treatments in Chaparral. Teresa Brennan	Unexpected Ways That Bees Experience and Accommodate Variable Climate: Let's Undertake Tasks to Benefit Native Bees Now. James Cane
3:30 pm	MID-AFTERNOON BREAK	MID-AFTERNOON BREAK	MID-AFTERNOON BREAK	MID-AFTERNOON BREAK	MID-AFTERNOON BREAK	MID-AFTERNOON BREAK	MID-AFTERNOON BREAK
3:50 pm	Mapping Vulnerability of Giant Sequoia to Climate Change and Other Stressors. Koren Nydick	A Federal Perspective: Living Shorelines, Ecosystem Services, and Coastal Resilience. John Rozum	Lake Tahoe Basin Management Unit Ecosystem Restoration Program: Preparing for Climate Change: A Management Perspective. Stephanie Heller	Effects of Forest Structure and Composition on Tree Mortality From Bark Beetles and Other Insects and Diseases in Western Coniferous Forests. Chris Fettig	Fostering Flexibility for Adaptation: Climate Diversity and "Natural" Practice as Guides to Conservation and Stewardship Planning. Nicole Heller	Considerations Surrounding WUI Management: How to Meet the Goldilocks Challenge. Carol Rice	Bringing Back the Pollinators: Best Management Practices in the Age of Climate Change. Scott Hoffman Black
4:20 pm	California Terrestrial Vegetation Vulnerability Assessment and Application to Management of Fish and Wildlife. Whitney Albright	Incorporating Climate-Smart Adaptive Strategies Into Wetlands Recovery in Coastal Southern California.	Using Ecologically Functional Dams and Other Instream Obstructions to Restore Complex Fluvial Ecosystems. Michael Pollock	The Holy Grail of Fisher and Spotted Owl Habitat Management: Reconciling Habitat Quality and Habitat Resilience Goals. Wayne Spencer	Landscape Connectivity for Climate Adaptation. Adina Merenlender	Strategic Placement and Prioritization of Fuel Breaks in Southern California Landscapes. Tim Metzger	Using Science and the Gardening Capabilities of Industry to Restore Pollinator Populations and Communities and Resilient Habitats. Casey Sclar
4:50 pm	Discussion: Toni Lyn Morelli	Discussion: Amber Pairis	Discussion: Stephanie Heller	Discussion: Wayne Spencer	Discussion: Lisa Micheli	Discussion: Nicole Molinari	Discussion: Alix Cleveland
5:30 pm	ADJOURN	ADJOURN	ADJOURN	ADJOURN	ADJOURN	ADJOURN	ADJOURN

(26) Co-Production of Knowledge: Managers and Scientists Working Together for Effective Conservation in the Face of Climate Change

Conference Center: Conference Room B

Natural resource managers, conservation practitioners, and scientists convene to share examples of translational ecology and co-production of knowledge to accomplish effective climate adaptation, including estimating vulnerability and managing climate change refugia.

(27) Applying Living Shorelines Techniques to Mitigate Sea Level Rise Impacts in Southern California

Conference Center: Conference Room A

Sea level rise is forcing local governments to develop new methods for protecting coastal developments. This symposium explores how scientists, natural resource managers, and local governments can utilize natural habitat elements to create living shoreline habitats that mitigate sea-level-rise-associated coastal impacts.

(28) Mountain Meadow Restoration in California

Alumni Center: Allewelt

This symposium provides a balanced discussion on the current state of montane meadow restoration by including the state's leading meadow restoration practitioners and scientists who have evaluated meadow restoration in California. The goal is to provide land managers with a better understanding of range restoration techniques and outcomes to expect in the context of climate change.

(29) Reconciling Habitat Quality and Resiliency Goals in Fire-Suppressed Forests of the American West

Alumni Center: Alpha Gamma Rho Hall

This symposium synthesizes the science on a critical issue in forest management: Whether and how management can achieve forest resilience goals in the face of climate change and other stressors while striving to achieve habitat management goals for rare species associated with forest conditions often considered not resilient.

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Western Wildland Environmental Threat Assessment Center

www.fs.fed.us/wwetac

WWETAC synthesizes information and knowledge, develops and applies models to integrate information, and develops application tools to help manage natural resources with scientifically based practices. Our center is located in Prineville, Oregon. A part of the USDA Forest Service, WWETAC has a small staff working closely with partners and collaborators within the agency as well as universities throughout the western US.

Our products are developed for resource managers and planners, and include:

- Satellite and airborne multispectral remote sensing tools for detecting and attributing disturbance in natural systems.
- Dynamic global vegetation modeling to predict current and future (2100) vegetation assemblages, above- and below-ground carbon and hydrologic dynamics.
- Socio-economic climate change vulnerability assessments for large landscapes.
- Recommendations on effective spatial patterns and type of fuel treatments.
- Geospatial tools and analysis designed to examine wildland threats, high value resources, native plant restoration, phenology and climate.

(30) TBC3 Applied Climate Adaptation Tools for the California Coast Ranges and Beyond

Alumni Center: West

This symposium offers an opportunity to learn about the mission and results of the Terrestrial Biodiversity and Climate Change Collaborative (TBC3), an effort to coordinate informed climate adaptation strategies for natural resources in California's Coast Ranges.

(31) Understanding and Overcoming Management Challenges in Shrubland Habitats

Alumni Center: Founders

This symposium explores the issues surrounding the management of shrubland habitats in the context of a coupled natural-human system in Southern California.

(32) Reversing Pollinator Losses on Wildlands in the Face of Climate Change

Hyatt Hotel: Conference Room

This session presents the current status of pollinators in relation to climate change and opportunities for education, outreach, and conservation.

Natural Areas Association Awards Dinner

The awards dinner kicks off at 5:45 pm with a social featuring a complimentary bar. Mingle with friends and colleagues. Dinner will be served at 6:45 pm. Full-conference attendees and those who preregistered for the awards dinner will have dinner tickets in the sleeve of their name badge. The NAA will honor recipients of the Carl N. Becker Stewardship Award and the George B. Fell Award. Please join us in acknowledging these deserving individuals.

THE GEORGE B. FELL AWARD

The George B. Fell Award, the NAA's highest award, recognizes exceptional achievements in the natural areas profession.

The late **John O. Sawyer, Ph.D.**, was a recognized authority on plant ecology, conifers and the vegetation and flora of California, especially of the Klamath Region. He was a professor in the biology/botany department at Humboldt State University from 1966 until his retirement from academic work in 2008. He continued his professional career until his death in 2012. Among his many achievements, he developed a vegetation classification system that became the basis for describing and evaluating natural areas throughout the country. Sawyer was a brilliant, creative, and enthusiastic force in California botany who inspired countless students to carry on in his footsteps.



Photo by Michael Kauffman

THE CARL N. BECKER STEWARDSHIP AWARD

The Carl N. Becker Stewardship Award recognizes individuals or groups for excellence and achievement in managing the natural resources of reserves, parks, wilderness, and other protected areas.



Photo by Duke Rankin

Jenny Cruse-Sanders, Ph.D., vice president for science and conservation at the Atlanta Botanical Garden, has been leading efforts to restore high-elevation mountain bogs within Georgia's Chattahoochee-Oconee National Forest for over two decades. When she began, there was no plan or oversight for the work. Through commitment, persistence, and persuasion, she aligned resources across organizations that had not previously cooperated. Cruse-Sanders has championed a comprehensive approach to restoration. She developed a restoration model that incorporated research, safeguarding, monitoring, and on-the-ground experience. This model has proven so successful that the U.S. Forest Service is applying it to other habitats and species in the southern region.

Thursday, Oct. 20

2016 NATURAL AREAS CONFERENCE

Thursday, Oct. 20

2016 NATURAL AREAS CONFERENCE

Conference Field Trips

Your field trip selection is indicated on a ticket in the sleeve of your name badge. If you have questions regarding your scheduled trip or if you'd like to change your trip, visit the registration table before Wednesday at 2 pm (changes can only be made on a space available basis). No changes can be made after Wednesday at 2 pm.

Field trips will depart from the front doors of the Conference Center. **Please arrive 20 minutes before your scheduled departure time to pick up your lunch in the foyer and assemble with your group.** Bring appropriate outdoor gear and your water bottle. Transportation will depart promptly at the scheduled departure time.

FT-1	Pepperwood Preserve – Sonoma County (8:30 am – 5 pm)
FT-2	Salmon Tour on the Yuba River (7:30 am – 5 pm)
FT-3	Tour of Russell Ranch, Putah Creek Riparian Reserve and Hedgerow Farms, Inc. (8 am – 4 pm)
FT-4	Tour of Lake Tahoe Basin Forest Service Meadow Restoration Projects (7 am – 5:30 pm)
FT-5	Quail Ridge Reserve – Managing for Research in the California Coast Range (8:30 am – 5 pm)
FT-6	Planning for Climate Change in California Forests: Creating Resilience Before and After a Fire (7 am – 6 pm)
FT-7	Yolo Bypass Wildlife Area: Multiple Benefits for Birds and People (8:30 am – 1 pm)
FT-8	Rafting the South Fork of the American River (7 am – 5:30 pm)



Photo by Zack Steel

Friday, Oct. 21

2016 NATURAL AREAS CONFERENCE

NATIONAL SEED STRATEGY FOR REHABILITATION AND RESTORATION

Restoring Natural Areas with “The Right Seed in the Right Place at the Right Time”

RESTORING NATURAL AREAS

The National Seed Strategy provides a coordinated approach to ensure that genetically appropriate seed reserves are available when and where they are needed to restore healthy plant communities.

Organizations and individuals at all levels are contributing to common goals, pooling resources, sharing information, and achieving results for advancing plant conservation on a broad scale.

Implementation will help guide ecological restoration across large landscapes, especially lands damaged by rangeland fires, invasive species, severe storms, and drought.

WORKING TOGETHER TO:

- (1) Identify seed needs.
- (2) Undertake research and improve technologies.
- (3) Develop tools for land managers.
- (4) Ensure good communications.

WHO?

A coalition of 12 federal agencies and other members of the Plant Conservation Alliance (PCA) developed the strategy to address widespread shortages of native seed. The PCA is a network of more than 300 public and private partners dedicated to native plant conservation.

LEARN MORE AND JOIN US!

The Bureau of Land Management and the Plant Conservation Alliance invite all Natural Areas Association members to join us in implementing the National Seed Strategy (www.blm.gov/seedstrategy). To get involved, send an email to seedstrategy@blm.gov.





California Landscape Conservation Cooperative

a proud sponsor of
The 43rd Annual Natural Areas Conference



Supporting diverse and thriving ecosystems through lasting conservation partnerships

Colophon

On The Cover: (Collaboration) Sacramento–San Joaquin River Delta by Amber Kerr; (Remote Sensing) Blackhawk landslide, Lucerne Valley, CA, Credit: NASA/METI/AIST/Japan Space Systems, and U.S./Japan ASTER Science Team; (Post-Fire Inventory) Post-Fire Regeneration Inventory at Lake Tahoe Basin Management Unit by Hugh Safford **Editorial Services:** Sarah K. Riehl **Graphic Design:** Juliano Boronka **Icons:** Mortar Board by Catia Marsh Mallow from the Noun Project; Ticket Star by Viktor Vorobyev from the Noun Project



United States Department of Agriculture

Climate Change, Restoration, and Collaboration

Climate Change, Restoration, and Collaboration

Like climate change, ecological restoration is not bound by borders. The US Forest Service (USFS) works collaboratively with partners across shared landscapes to ensure ecosystems are more sustainable, resilient, and healthier for the benefit of current and future generations.

Working together in California

USFS is involved in several large-scale restoration and watershed collaborations including: Collaborative Forest Landscape Restoration Projects (CFLRP) such as the Amador-Calaveras Consensus Group Cornerstone, Burney-Hat Creek Basins, and the Dinkey Landscape Restoration; the South Fork American River project; The Sierra Nevada Watershed Improvement Program (WIP); and the Western Klamath Restoration Partnership.

Collaborative Partnership with the State of California to tackle tree mortality. USFS is developing a Regional post-fire restoration strategy and is a member of the Governor's Tree Mortality Task Force to foster long-term healthy forests and communities.



Forest Service, Dave Weixelman



Forest Service, Steve Dunsky



Forest Service

Pacific Southwest Region



Scan with smart device to visit www.fs.usda.gov/r5

USDA is an equal opportunity provider, employer, and lender.

Conference Planning Team

Lead Organizers

Hugh Safford*, U.S. Forest Service
Kate Angell, Natural Areas Association
Gabrielle Bohlman, UC Davis
Renee Boronka, The Cleveland Museum of Natural History
Deb Kraus, Natural Areas Association
Christina Restaino, UC Davis
Lisa Smith, Natural Areas Association
Becky Wayman, UC Davis

A/V and Promotion

Kate Angell, Natural Areas Association
Gabrielle Bohlman, UC Davis
Steve Dunsky, U.S. Forest Service
Stacey Frederick, California Fire Science Consortium
Christina Restaino, UC Davis

Entertainment/Catering

Christina Restaino*, UC Davis
Gabrielle Bohlman, UC Davis
Renee Boronka, The Cleveland Museum of Natural History

Exhibits

Elise Gornish*, UC Davis
Amber Kerr, UC Davis
Lisa Smith, Natural Areas Association

Field Trips

Christina Restaino*, UC Davis
Becky Wayman, UC Davis

Fundraising

Lisa Smith*, Natural Areas Association
Cliff Chapman, Natural Areas Association

Program

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Christina Lund, U.S. Bureau of Land Management
Miriam Morrill, U.S. Bureau of Land Management
Jan Ng, UC Davis
Koren Nydick, National Park Service

Kat Powelson, U.S. Geological Survey
Sarah Sawyer, U.S. Forest Service
Ed Smith, The Nature Conservancy
Lisa Smith, Natural Areas Association
Tara Ursell, California State Parks
Dana Walsh, U.S. Forest Service
Becky Wayman, UC Davis

Transportation

Brian Smithers*, UC Davis
Gabrielle Bohlman, UC Davis
Jens Stevens, UC Davis

Students and Volunteers

Chhaya Werner*, UC Davis
Hugh Safford, U.S. Forest Service
Jody Shimp, Illinois Department of Natural Resources
Kim Smith, University of Arkansas
Jodi Vandermyde, Illinois Natural History Survey

Scholarships

Terri Hogan, National Park Service
Peggy Olwell, U.S. Bureau of Land Management (*Provided the BLM scholarship donation*)
Jody Shimp, Illinois Department of Natural Resources
Kim Smith, University of Arkansas
Jodi Vandermyde, Illinois Natural History Survey

* Chair



Together, we can continue to rise to our challenges.

Natural areas professionals need the best, most up-to-date information and resources, and a strong community to respond to a changing world.

Your support ensures the Natural Areas Association can build on this work, and plan for the future of our profession.

We couldn't do it without you.

Natural Areas Association members are behind everything we do.

We want to thank you for your support. of us and of each other - and for the dedication you show in your work for natural areas every day.

Your support has allowed us to:

- ✓ Debut a new, successful webinar series for members
- ✓ Publish a special *Journal* issue, "Managing for Pollinators on Natural Areas"
- ✓ Expand our capacity by adding a staff member in Communications
- ✓ Create a fully updated NAA website, to debut in October



44th NATURAL AREAS CONFERENCE

October 10-12, 2017

Hilton Fort Collins - Fort Collins, CO



Join us for the 2017 Natural Areas Conference, where the Great Plains meet the Rocky Mountains in Colorado's Front Range. The 44th annual Conference will be held at the Hilton Fort Collins, on the edge of the Colorado State University Campus, and will be hosted by the Natural Areas Association (NAA). Our theme:

Working beyond boundaries:

Collaboration as a key to natural areas management

The Natural Areas Conference returns to Colorado for the first time since 1991.

The event will include sessions on:

- Managing in light of climate change
- Ecological restoration in the Anthropocene
- Use of native plant materials
- Managing for pollinators
- Wildland fire use



Photo credit: Michael Menefee