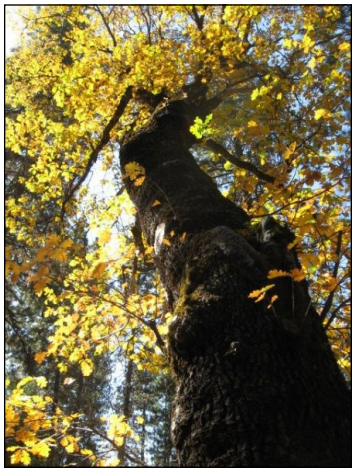
# Pacific Southwest Region
# Ecology Program
# Annual Report
## FY 2023

## REP Organization

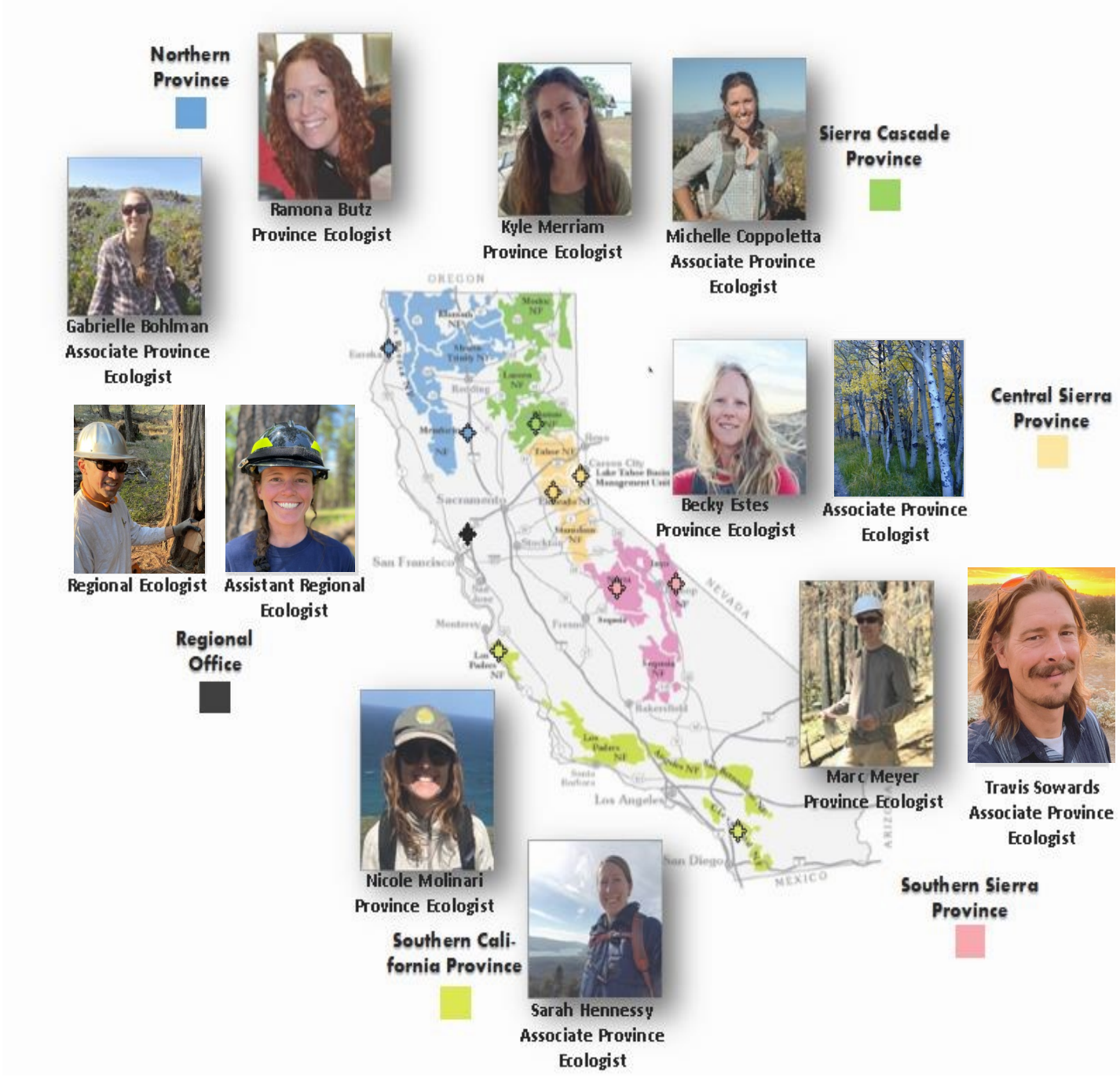
The Region 5 Ecology Program (REP) is a boundary-spanning organization that provides expertise fundamental to sustainable, science-based, multiple-use land management in the Pacific Southwest Region. REP staff work closely with other ecologists, resource specialists, and managers across the region and country. The REP is divided into five Provinces. Each Province has two ecologists, a Province Ecologist and an Associate Province Ecologist. Additionally, the Regional Ecologist and Assistant Regional Ecologist are based out of the Regional Office. Province Ecologists work across Forest Service Zones to help us meet our goals.



## REP Mission Statement

⇒ To provide leadership and program direction that incorporates the best available ecological science to managing natural resources for sustainability and diverse human needs.

⇒ To facilitate understanding, development, and appropriate use of ecological science in Agency activities such as landscape analysis and assessment, land management planning, inventory and monitoring, and project implementation.




## VISIT US ONLINE

Scan the QR code to visit our website at

https://www.fs.usda.gov/detail/r5/plants-animals/?cid=stelprdb5427254

Find resources such as monitoring reports, climate change summaries and contributions from each province across the forests.

# Program Priorities

### *Ecological Restoration*

- The REP supports Forests in the interpretation and implementation of the R5 Ecological Restoration initiative.
- We collaborate with staff on post fire recovery strategies, including providing guidance on reforestation and on the implementation of GTR-270, a postfire restoration framework for National Forests in California.
- Other products include the development of peer-reviewed Natural Range of Variation (NRV) assessments that provide baseline information on ecosystem conditions that can be compared to current conditions to determine the level of departure in altered ecosystems. These assessments have been completed for a range of vegetation types across the Region and have been used for forest planning, development of restoration projects, and as a communication tool.

### *Climate Change Adaptation*

- The REP provides climate change science interpretation support to help forest managers plan for, and where possible, mitigate climate related ecosystem vulnerabilities.
- We regularly update Climate Change Trend Summaries for all of the National Forests in Region 5. These summaries highlight the most current climate science for past, current, and projected future climate change trends by resource area and disturbance type.

### *Inventory and Monitoring*

- The REP works closely with managers to identify, implement, and analyze key inventory and monitoring questions to meet a variety of program goals and address key management concerns. Inventory and monitoring support includes topics such as treatment effectiveness monitoring, status and trend monitoring for key issues across the region (e.g., whitebark pine status and trends, collaborative monitoring, forest health monitoring), and post-disturbance monitoring.
- The REP serves as a repository of monitoring protocols developed through partnerships to address a diverse range of monitoring questions.

# REGIONAL OFFICE

PACIFIC SOUTHWEST REGION

## Regional Office Team

- Becky Estes, Acting Regional Ecologist (*October 2022*)
- Ramona Butz, Acting Regional Ecologist (November *2022 -March 2023*)
- Kyle Merriam, Acting Regional Ecologist (*April-August 2023*)

## Accomplishments

### Ecological Restoration

- Revised California Reforestation Strategy for California Wildfire and Forest Resilience Task Force.
- Developed Whitebark Pine Core Areas for Region 5 as part of the National Whitebark Pine Restoration Plan developed by the Whitebark Pine Foundation.
- Co-led the Regional Reforestation Team. Recruited team members, drafted and finalized team charter, and facilitated team meetings.
- Participated in the regional Reforestation for Resilience working group. Developed reforestation talking points for the Regional Forester, co-developed a reforestation solicitation request, and obtained support from individual Forests to conduct reforestation pilot projects in targeted demonstration areas. Station and other agency partners.
- Continue to serve as members of the regional Research Natural Areas (RNA) committee. Reviewed and approved research permits and Establishment Records for RNAs across the region.
- Coauthored *Interventions to restore wildfire-altered forests in California* (PSW-GTR-278) in collaboration with Pacific Southwest Research.

### Climate Change Adaptation

- Participated in Climate Change Adaptation Workbook Workshops for Wildfire Crisis Priority Landscapes in collaboration with the Washington Office of Sustainability and Climate.
- Drafted a climate change dashboard with the Regional Monitoring Coordinator to address broad-scale monitoring strategy questions across the region.

*Field tour of Sagehen Project, Tahoe NF*

## Inventory & Monitoring

- Served as the R5 technical team lead to the Washington Office for the mature and old growth forest initiative (Executive Order 14072), updated 1990s R5 old growth definitions using best available science, authored inventory methods report, coordinated regional review of revised definitions and estimation of initial acreages based on FIA data, and coordinated regional response of major forested vegetation types for the risk analysis and threat assessment.

## Collaboration and Outreach

- Served on STEM hiring panel to fill 36 positions in Ecosystem Management, Ecosystem Planning and the Pacific Planning Services Group, including Regional Ecologist and Assistant Regional Ecologist.
- Revised and updated Ecology Program website including new pages for three focal areas: climate adaptation, ecological restoration, and inventory and monitoring.
- Organized Regional Ecology Program Meeting at Sagehen Creek Field Station on the Truckee Ranger District on the Tahoe National Forest.

*Region 5 Ecologists at annual meeting on the Tahoe NF*

- Served on technical review panel of Joint Fire Science Program proposals submitted in fiscal year 2023.
- Served on the Science Advisory Panel for the California Wildfire & Forest Resiliency Task Force.

## Welcome to our new Regional Team

- **Regional Ecologist Brandon Collins**

Brandon Collins was formerly a Research Scientist in a partnership between USFS-Pacific Southwest Research Station, and UC Berkeley-Center for Fire Research and Outreach. He was also an Adjunct Professor with UC Berkeley, Department of Environmental Science, Policy, and Management. Brandon has a B.S. in Forestry from UC Berkeley, a M.S. from Colorado State University, and a Ph.D. from UC Berkeley. His previous work has largely been in research, which included investigating: 1) vegetation/fuel development following fuel reduction treatments and wildfires, 2) effects of landscape fuel treatment networks on fire patterns, and 3) fire patterns and vegetation feedbacks in long-term natural fire areas.

- **Assistant Regional Ecologist Lacey Hankin**

Lacey Hankin joins the Forest Service after serving as the fire ecologist at Yosemite National Park, where she supported science-based fire and resource management through fire effects monitoring and cross-disciplinary fire-related research. Lacey holds a PhD in Ecology, Evolution, and Conservation Biology from the University of Nevada, Reno and a MS in Systems Ecology from the University of Montana, where she worked on disturbance and climate impacts to tree regeneration and climate-informed seed selection.

# NORTHERN PROVINCE

KLAMATH, MENDOCINO, SHASTA-TRINITY, AND SIX RIVERS NATIONAL FORESTS

## Province Team

- Ramona Butz, Province Ecologist
- Gabrielle Bohlman, Assoc. Province Ecologist

## Accomplishments

### Ecological Restoration

- Completed a draft of the Mendocino NF Restoration Strategy focused on conifer forests, late seral habitat, and oak woodlands using the GTR-270 Restoration Framework.
- Worked with Firescape Mendocino and the Mendocino NF to organize and lead a public workshop titled *Collaborative Planning Workshop for Wildfire Resilience and Post-fire Restoration* (November 2022).
- Worked with the Scott River Watershed Council and CalPBR to organize and host a meadow restoration workshop – *Making Meadows Matter* (September 2023).
- Helped plan and facilitate a three-part USFS/ Keren Kayemeth LeIsrael-Jewish National Fund (KKL-JNF) Post-Fire Forest Restoration Workshop Series in Israel (July/September 2023).
- Member of the Science Advisory Panel for the California Wildfire & Forest Resiliency Task Force.
- Provided ecological support to a variety of forest-wide NEPA projects and new WCS landscapes.

### Climate Change Adaptation

- Developed a draft climate change monitoring dashboard for R5 at the regional, province, and forest levels with the Regional Monitoring Coordinator.

### Inventory & Monitoring

- Provided support to the Fire Behavior and Assessment Team (FBAT) for several fires.
- Helped develop monitoring protocol to support the Cabin Meadows/Rock Fence Creek meadows restoration project on the Klamath National Forest.
- R5 technical point of contact to the WO for mature and old-growth forest inventory and threat assessment work tied to E.O. 14072.
- Assisted with development and review of the Northern California Regional Resource Kit for the California Wildfire & Resilience Task Force.

*Field tour led by KKL in northern Israel to discuss post-fire conditions and potential restoration strategies.*

## Forest Planning

- Assisted with development of state and transition models for the CA NWFP area to aid in new NWFP amendment and forest plan revisions.
- Reviewed, updated, and refined R5 1990s old growth definitions using the best available science for the national mature and old growth inventory.
- Finalized several ecological integrity white papers for key terrestrial ecosystems across northwestern California.

## Collaboration

- Coordinated with PSW/PNW researchers, the Mendocino NF, Firescape Mendocino, and the CA Climate Hub to develop a series of public engagements related to the Mendocino NF Restoration Strategy.
- Coordinator of the Klamath Meadows Partnership, a diverse network of over 20 agencies, non-profits, and scientists committed to the health and resilience of meadows in northern California.
- Helped with a successful grant proposal put in by the Watershed Research and Training Center on behalf of the Klamath Meadows Partnership for $1,459,757 from the Wildlife Conservation Board (project funding approved in August 2023).

## Other

- Ramona detailed as Regional Ecologist from November 2022-March 2023.
- Gabrielle detailed as the Province Ecologist from January 2023-April 2023.

# Publications

Long, Jonathan W., Dana Walsh, Michelle Coppoletta, Ryan Tompkins, Marc D. Meyer, Clint Isbell, Gabrielle Bohlman, Malcolm P. North. 2023. Interventions to restore wildfire-altered forests in California. Gen. Tech. Rep. PSW-GTR-278. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station.

Meyer, Marc D., Michele R. Slaton, Shana E. Gross, Ramona J. Butz, and Carol Clark. 2023. Ecological integrity of whitebark pine ecosystems in California's national forests. *Canadian Journal of Forest Research*.

## Addressing 2024 Priorities

- Priority Landscapes — Klamath River Basin and Trinity Forest Health and Fire Resilient Rural Communities
- Post Fire Restoration —Mendocino National Forest Restoration Strategy

*Discussing wildfire resilience and post-fire restoration during a Firescape Mendocino Workshop*

# SIERRA CASCADE PROVINCE

PLUMAS, LASSEN AND MODOC NATIONAL FORESTS

## Province Team

- Kyle Merriam, Province Ecologist
- Michelle Coppoletta, Associate Province Ecologist
- Kirsten Bovee, Staff Research Associate, UC

## Accomplishments

### Climate Change Adaptation

- Conducted Climate Change Adaptation Work-book Workshop for the Plumas Community Protection Project (Wildfire Crisis Priority Land-scape) in collaboration with the Washington Office of Sustainability and Climate.
- Evaluated patterns of climate vulnerability within Plumas Community Protection and the Tributaries Projects on the Plumas NF.

*Ishi Tribal Partnership Group meeting in the field to discuss pre-scribed fire and cultural burning objectives.*

### Ecological Restoration

- Completed GTR-270 post-fire restoration strategies for conifer forests and spotted owl habitats impacted by the 2021 Dixie and Sugar fires (Lassen and Plumas NF), as well as five fires that occurred on the Plumas NF between 2017-2020.
- Completed a GTR-270 assessment of restoration opportunities across the entire Plumas NF.
- Conducted range-wide threats assessment for Macnab cypress, including the Lassen and Plumas NF, for the International Union for Conservation of Nature (IUCN). Species was determined to be endangered based on IUCN criteria.
- Developed a $500,000 meadow restoration project across the Plumas NF in collaboration with the Pacific Southwest Research Station through the Bipartisan Infrastructure Law Vegetation and Watershed Management Program (BIL VWMP).
- Continued to lead the Ishi Fire Restoration Project, a proposed 37,000-acre prescribed fire project on the Lassen NF. Completed the Proposed Action and Minimum Requirements Analysis. Established the Ishi Tribal Partnership Working Group, which meets quarterly to share information and co-develop prescribed and cultural burning objectives.

## Ecological Restoration (cont.)

- Worked with staff from the Plumas NF and Mooretown Rancheria to implement hand thin, pile, and raking treatments around large trees in the Valley Creek Special Interest Area. Remeasured field plots to assess treatment effectiveness.
- Secured $150,000 of funding through the (BIL VWMP) to conduct range-wide cone collection and seedling production to reestablish Baker cypress population extirpated by the 2021 Dixie Fire in collaboration with Cal Poly Humboldt and the Placerville Nursery.
- Administered Genetics Resource Conservation Grant to conserve rare conifers threatened by altered fire regimes (Plumas, Lassen and Modoc NF).

## Inventory & Monitoring

- Collaborated with Pacific Northwest Research Station to establish eight 2.2-ha pre-treatment plots in the Plumas Community Protection Project to evaluate the long-term effects of post-fire treatments (i.e., dead tree removal).
- Developed a Survey 123 app for volunteer-based solitude and soundscape monitoring in the Bucks Lake Wilderness on the Plumas NF. Trained forest staff and volunteers, summarized field data, and provided management recommendations for Wilderness Stewardship reporting.
- Collaborated with UC Berkeley researchers to remeasure 85 permanent monitoring plots that reburned in the 2021 Dixie Fire.

## Other

Kyle Merriam served as Regional Ecologist from April-August, 2023.

## Publications and Reports


Bellis, J.; Osazuwa-Peters, O.; Maschinski, J.; Keir, M.; Parsons, E.; Kaye, T.; Kunz, M.; Possley, J.; Menges, E.; Smith, S.; Roth, D.; Brewer, D.; Brumback, W.; Lange, J.; Niederer, C.; Turner-Skoff, J.; Bontrager, M.; Braham, R.; Coppoletta, M. et al. 2023. Identifying predictors of translocation success in rare plant species. Conservation Biology. 37 (5).

Bovee, K., Coppoletta, M., and Merriam K. 2022. Identifying restoration opportunities in recently burned and unburned conifer forest across the Plumas National Forest . Sierra Cascade Ecology Program, USDA Forest Service 11 p . https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd1093468.pdf

Bovee, K. and K. Merriam. 2022. Restoration Opportunities for California Spotted Owl on the Plumas National Forest. Sierra Cascade Ecology Program, USDA Forest Service. 16 p. https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd1093458.pdf

Bovee, K. and M. Coppoletta. 2022. Post-fire Restoration Opportunities for Conifer Forest, Plumas NF Fires 2017-2020. Sierra Cascade Ecology Program, USDA Forest Service. 56 pages. https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd1093654.pdf

Long, J.W.; Walsh, D.; Coppoletta, M.; Tompkins, R.E.; Meyer, M.D.; Isbell, C.; Bohlman, G.N.; North, M.P. 2023. Interventions to restore wildfire-altered forests in California. Gen. Tech. Rep. PSW-GTR-278. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 105 p. https://www.fs.usda.gov/research/treesearch/66673


## Addressing 2024 Priorities

- Monitoring postfire conditions and treatment effectiveness in the 2021 Dixie Fire.
- Climate adaptation support for project planning and implementation.
- Assisting with planning, implementation, and monitoring in the Plumas Community Protection Project (Plumas NF).
- Planning for the Ishi Fire Restoration Project

# CENTRAL SIERRA PROVINCE

TAHOE, ELDORADO AND STANISLAUS NATIONAL FORESTS & LAKE TAHOE BASIN MANAGEMENT UNIT

## Province Team

- Becky Estes, Province Ecologist
- Vacant, Associate Province Ecologist

## Accomplishments

### Climate Change Adaptation

- Collaborated with the Forest Service International Programs Climate Change Seminar to host a field tour in partnership with Mark Egbert and Saba Saberi highlighting aspects of climate change in the 2020 Caldor Fire.
- Acted as GIS Leader to participants at the California Climate Hub Decision Support Tools Workshop in Climate Change Era.
- Contributed to the funded WCB grant Metrics of Wildlife Community Resilience for Sierra Nevada Forests: Development and Application whose main goal is to provide metrics to assess the current and future resilience of forest wildlife communities to stressors associated with climate change that will help inform land managers how different management actions may influence wildlife community resilience into the future.

### Ecological Restoration

- Hosted a two day aspen workshop with over 30 aspen experts at the San Francisco State's Sierra Nevada Field Campus in the North Yuba. This work was done in coordination with the South Yuba River Citizens League, the Western Aspen Alliance and the Forest Service and sponsored by the Yuba Water Agency.
- Participated on Caldor Restoration Team providing project support and implementation of General Technical Report 270 Mixed Conifer and California Spotted Owl analysis.
- Participated on two Aspen Assessment, Prioritization, Restoration and Monitoring efforts on the North Yuba on the Tahoe National Forest and the Upper Mokelumne Watersheds on the Eldorado and Stanislaus National Forests funded through two Wildlife Conservation Board grants and partners with the SYRCL and ACCG on mapping and assessing aspen.

*Aspen resprouting after the 2020 Caldor Fire. The ACCG Monitoring Workgroup held a field day for volunteers to train them on aspen monitoring techniques.*

## Accomplishments (cont.)

### Inventory & Monitoring

- Facilitated post–treatment monitoring addressing questions in the Amador Calaveras Consensus Group Monitoring Workgroup Monitoring Strategy covering a range of projects in red fir, mixed conifer and meadows.
- Hosted two monitoring workdays to accomplish meadow monitoring at Thompson Meadow and aspen monitoring adjacent to Martin Meadows where the 2020 Caldor Fire burned through the aspen stands.
- Contributed to efforts to develop monitoring strategies to track treatment effectiveness on pillars of resilience and the implementation of the California Spotted Owl Strategy.
- Coordinated Caldor Fire monitoring with UC Davis to assess fuel treatment effectiveness, postfire vegetation trends and patterns of natural regeneration.
- Developed Whitebark Pine Inventory and Monitoring Protocol for the Lake Tahoe Basin Management Unit. This protocol was developed collaboratively by the USDA FS Region 5 Ecology Program and the LTBMU, in accordance with the 2018 Heavenly Mountain Resort Partnership Action Plan, to provide inventory and monitoring data in stands dominated or co-dominated by whitebark pine within the Heavenly Special Use Permit Area.

### Collaboration

- North Yuba Partnership Monitoring Workgroup
- South Fork of the American River Cohesive Strategy Landscape Design Team
- Amador Calaveras Consensus Group, Monitoring Workgroup, facilitator
- Phase One & Phase Two Technical Advisory Panel
- Tahoe Central Sierra Initiative Science Advisory Team
- California Wildfire & Forest Resilience Task Force Science Advisory Panel

## Publications and Reports

Young, D., B. Estes, S. Gross, A. Wuenschel, C. Restaino and M. Meyer. 2023. Effectiveness of forest density reduction treatments for increasing drought resistance of ponderosa pine growth. https://doi.org/10.1002/eap.2854.

## Addressing 2024 Priorities

- Assisting with planning and monitoring for the Collaborative Forest Landscape Restoration Projects and Wildfire Crisis Strategy Priority Landscapes;
- Post Fire Restoration Monitoring in coordination with the CALM Initiative in the 2022 Mosquito Fires.

*Red fir stands following treatment in the Hemlock Project on the Stanislaus National Forest. The monitoring crew along with our Forest Health and Protection pathologist and entomologist completed monitoring on red fir forest health.*

# SOUTHERN SIERRA PROVINCE

INYO, SEQUOIA AND SIERRA NATIONAL FORESTS

## Province Team

- Marc Meyer, Province Ecologist
- Travis Sowards, Associate Province Ecologist

## Accomplishments

### Ecological Restoration

- Completed a GTR-270 post-fire restoration strategy for the Western Glass Mountain Range of the Inyo National Forest.
- Provided technical support to the Eastern Sierra Climate and Communities Resilience Project, Inyo National Forest.
- Awarded $500,000 in CalFire funding to evaluate and facilitate post-fire forest restoration success in eastside Sierra Nevada Jeffrey pine forests in collaboration with the USFS Rocky Mountain Research Station, Inyo National Forest, Humboldt-Toiyabe National Forest, and University of Nevada Reno.

### Climate Change Adaptation

- Developed variable spacing planting design for climate-smart reforestation efforts in the Southern Sierra Nevada in collaboration with the Pacific Southwest Research Station.
- Co-chaired session on *Conifers in the face of climate change* at the California Native Plant Society Conference (Oct. 2022).

### Inventory & Monitoring

- Published inventory assessment of the ecological integrity of whitebark pine ecosystems in California's national forests in partnership with R5 Mapping and Remote Sensing team.
- Conducted effectiveness monitoring of whitebark pine treatments at June Mountain, sagebrush steppe fuel reduction treatments in Mammoth Lakes, and post-fire regeneration of Jeffrey pine forests at the Indiana Summit Research Natural Area, Inyo National Forest.
- Conducted effectiveness monitoring of emergency response fuel reduction treatments in giant sequoia groves on the Sierra National Forest and Giant Sequoia National Monument.

*Post-fire monitoring of conifer regeneration and vegetation in giant sequoia groves burned in the 2021 KNP Complex in the Redwood Mountain Grove, Giant Sequoia National Monument and Sequoia & Kings Canyon National Parks.*

## Forest Planning

- Assisted with completion of Forest Plan Revision for the Sequoia and Sierra National Forests and assisted with Objections review.
- Served as lead author for the terrestrial ecosystems and agents of change sections for Sierra and Sequoia Forest Plans, Final Environmental Impact Statement, and Record Of Decision.

## Collaboration

- Coordinated ecological monitoring for the Dinkey Collaborative Forest Landscape Restoration Project, Sierra National Forest.
- Conducted monitoring of post-fire regeneration in sequoia groves in Sequoia & Kings Canyon National Parks and Sequoia National Forest in the 2021 KNP Complex in partnership with the US Geological Survey, National Park Service, and UC Davis.
- Worked with Whitebark Institute and Inyo National Forest to develop for the Eastern Sierra Climate and Communities Resilience Project Proposed Action and Environmental Assessment.
- Served on Southern Sierra science panel during the Sierra Nevada Conservancy quarterly meeting in Kernville, CA in collaboration with the US Geological Survey and National Park Service.

## Addressing 2024 Priorities

- Monitoring of emergency response fuel reduction treatments in giant sequoia groves.
- Post-fire ecological monitoring reports for the Windy Fire and KNP Complex.
- Technical assistance to Collaborative Landscape Restoration Projects.

## Publications and Reports

Long, J.W., D. Walsh, M. Coppoletta, R. Tompkins, M.D. Meyer, C. Isbell, G. Bohlman, and M.P. North. 2023. Interventions to restore wildfire-altered forests in California. Gen. Tech. Rep. PSW-GTR-278. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station.

Meyer, M.D. 2022. June Mountain whitebark pine preliminary monitoring report. USDA Forest Service unpublished report.

Meyer, M.D. 2022. Post-fire restoration strategy for the western Glass Mountain Range, Inyo National Forest. USDA Forest Service unpublished report.

Meyer, M.D., M. Slaton, S. Gross, R. Butz, and C. Clark. 2023. Ecological integrity of whitebark pine ecosystems in California's national forests. Canadian Journal of Forest Research 53: 328–342.

Young, D.J.N., B. Estes, S. Gross, A. Wuenschel, C. Restaino, and M.D. Meyer. 2023. The effectiveness of forest thinning for increasing tree growth resistance to drought depends on environmental context. Ecological Applications 33:e2854.

*Treatment effectiveness monitoring of sagebrush steppe vegetation with UC Davis field crew on the Inyo National Forest.*

# SOUTHERN CALIFORNIA PROVINCE

ANGELES, CLEVELAND, LOS PADRES, AND SAN BERNARDINO NATIONAL FORESTS

## Province Team

- Nicole Molinari, Province Ecologist
- Sarah Hennessy, Associate Province Ecologist

## Accomplishments

### Ecological Restoration

- Developed the draft Montane Forest Conservation Strategy, including a new adaptation menu to assist managers with selecting appropriate and effective climate adapted management tactics.
- Developed a Prioritization Framework for planning and implementation in montane forests. Framework was piloted on the San Bernardino NF through a series of workshops.
- Co-led effort to produce a Natural Range of Variation assessment for Yellow Pine and Mixed Conifer Forests in southern CA.
- Contributed to the WCS ignition reduction strategy through science support of demo and pilot projects, as well as conceptualization of an Invasive Species Toolbox.
- Developed a GTR-270 post-fire restoration strategy for montane forest and chaparral areas affected by the Bobcat Fire.
- Co-developed a nurse plant study evaluating the benefits of chaparral shrubs for oak seedling survival.

### Inventory & Monitoring

- Conducted monitoring and developed a briefing paper for the effects of seasonal burning on black oak and Jeffrey pine. Initial findings led to adaptive management actions focused on reducing fire effects to legacy oaks.
- Collected stand and fuels data for forest health projects (e.g Frazier Mtn, North Big Bear, Bluff Mesa) at various stages of implementation (e.g. baseline, post-mechanical and post-Rx) to evaluate whether management is meeting proposed objectives.
- Collected seedling regeneration data across two fire scars (Cranston and Lake fires) to expand the POSCRPT Tool to southern CA forests.

*Montane forest prioritization workshop held on the San Bernardino National Forest. Forest staff worked collaboratively to identify the key priority assets and vulnerabilities for montane forests.*

## Forest Planning

- Provided science support for major forest health (e.g. North Big Bear, Ecological Restoration Project) and water extraction (Blue Triton) projects within the Zone.
- Supported the production of Research Natural Area establishment records, specifically focused on fire management recommendations.
- Supported the development of carbon whitepapers for each forest to enable integration of carbon retention and storage as key ecosystem services.

## Collaboration

- Served on the Science Advisory Panel for the California Fire and Forest Resilience Task Force, led field trips and presented at the southern California convenings in Calabasas and Riverside.
- Served on the advisory panel for the Southern CA region of the California Fire Science Consortium, UC Santa Barbara Wildfire Resilience Initiative, Region 5 RNA Committee, Santa Barbara Botanic Garden Conservation Committee, National Fish and Wildlife Post-fire Restoration Granting Committee and multiple graduate student committees.

## Addressing 2024 Priorities

- Outreach and application of the Montane Forest Conservation Strategy with an emphasis on integrating the prioritization framework and climate adaptation actions into planning and implementation
- Support monitoring needs for the Wildfire Crisis Strategy and other key projects throughout the Zone, including the development of objective driven monitoring protocols, data collection and summarization

## Publications and Reports


- Underwood, E.C., Sorenson, Q.M., Schrader-Patton, C.C., Molinari, N.A. and Safford, H.D., 2023. Assessing spatial and temporal variation in obligate resprouting, obligate seeding, and facultative seeding shrub species in California's Mediterranean-type climate region. *Frontiers in Ecology and Evolution*, *11*.
- Runte, G.C., Oono, R., Molinari, N.A., Proulx, S.R. and D'Antonio, C.M., 2022. Restoring bigcone Douglas-fir post-fire in drought-stricken Southern California: Assessing the effects of site choice and outplanting strategies. *Frontiers in Forests and Global Change*, *5.*
- Dewees, S.L., D'Antonio, C.M. and Molinari, N., 2022. Determining potential drivers of vegetation change in a Mediterranean environment. *Ecosphere*, *13*.
- Jennings, M.K. Hennessy, S., Enquist, C., Molinari, N., Pairis, A., Safford, H., 2023. Building a collaborative, climate-informed strategy to conserve southern California's montane forests. In Proceedings of the Volcan Mountain Symposium: Importance and Conservation Status of the Eastern Peninsular Ranges. April 2023. Julian, California: Volcan Mountain Foundation.


*Field monitoring of a large burned forest patch along the Pacific Crest Trail within the Bobcat Fire, ANF.*