Pacific Southwest Region
Ecology Program
Annual Report

FY 2021

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

Contents

2021 California Fire Science Retreat, Inyo National Forest

Region 5 Ecology Program

Ecology Program Mission Statement

"To provide leadership and program direction that incorporates the best available ecological science in the Agency's multiple-scale approach 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."

R5 Ecology Program Overview

The Region 5 Ecology Program (REP) is a boundary-spanning organization that provides products and expertise fundamental to sustainable, science-based, multiple-use land management in the Pacific Southwest. The REP is a national model for science-management boundary spanning and has been featured in a number of national publications (e.g., *Frontiers in Ecology & Environment* 2017: Vol. 15). The REP's principal purpose is to ensure and enable the application of current ecological science to land and resource management on the National Forests in California. The Regional Program is headed by a GS-13 Ecologist and a GS-12 Assistant Regional Ecologist in the Regional Office. A GS-12 Province Ecologist is stationed on each of five Provinces (zones of three to four National Forests), in most cases with a GS-11 Associate Ecologist. Two cost-share ecologists at the Regional level are co-managed with the University of California-Davis and the California Fire Science Consortium.

Primary functions at the Regional level include:

- providing expert ecological input and advice to the Regional Forester, Regional Office staff, and Region 5 Forests and Districts
- assisting in development of Regional ecological priorities as they pertain to the USDA and USFS Strategic Plan goals and R5 Strategic Priorities
- acting as the principal ecological liaison between USFS Region 5 and other federal and state agencies, research institutions, NGOs, public and media
- providing assistance to the Province Ecologists in the form of funding, technical expertise, and logistical support
- providing assistance and ecological input to bioregional and forest assessments for Forest Plan processes
- developing and stewarding applicable Regional and National standards

- reviewing Ecology Program work plans and products
- aiding in the recruitment of qualified candidates for ecology positions Regionwide
- representing Region 5 and the Regional Ecology Program at local, Regional, and National functions and events
- supporting Region 5 Forests in their interpretation and implementation of the R5 Ecological Restoration initiative
- supporting Region 5 efforts to manage for climate change mitigation and adaptation
- coordinating Fire Return Interval Departure mapping in Region 5
- serving on the executive committee for the California Fire Science Consortium
- managing the Research Natural Area (RNA) Program
- serving as a technical advisor to bodies such as the Regional Forest Planning core team, Regional Climate Change Integration Team, and the Sierra Nevada Forest Carnivore Conservation Assessment

Primary functions at the Province-and Forest-level include:

- provision of expert vegetation & fire ecology input to ecosystem management and planning (e.g., pre-NEPA consultation, monitoring, ID-Teams, Forest planning)
- training and technology transfer
- ecological support to restoration planning and implementation
- inventory and monitoring design, implementation and analysis
- climate change interpretation
- support to fuels treatment planning
- fire/fire regime modeling and mapping
- determination of site potentials and ecosystem suitability
- development of desired future conditions
- vegetation classification and mapping
- development of management interpretations
- development of state & transition and other stand-dynamics models
- habitat modeling, mapping, and prediction
- active engagement with the California Fire Science Consortium
- interaction and collaboration with Forest and District resource staff
- RNA program coordination for the host Forest

The Regional Ecology Program (REP) was historically supported by a Regional earmark combined with negotiated funds from the served field units. This changed in 2020/2021 when salaries and travel and training costs were shifted completely to a Regional account. In FY 2021 most of the REP's base cost was covered by the Region, excepting the southern California associate ecologist, who was supported 85% by USGS funding and 15% by the Cleveland NF. Province Ecologists supplement their Regional allocation with Forest-level

funding and funding derived elsewhere, mostly to support seasonal field data collection (examples include USFS State and Private Forestry, the Tahoe Science Program, the Joint Fire Sciences Program, and various California state agencies such as CALFIRE and Fish and Wildlife). Until 2010, Regional funding for the Ecology Program had fallen continuously since the early 1990's, when funding reached or exceeded $1.2 million per year in 2019 dollars (Fig. 1). Staffing has also dropped significantly, from a high of 16 in the mid 1990's, to six in late 2011, rising to 11 in 2021. The Regional Ecology Program is a national leader in developing partnerships (see p. 75) and attracting funding from external sources (Fig. 2). Over the last ten years, the REP has more than doubled its effective budget by way of partner funding, grants, and various types of financial support from sources outside the NFS annual budget.

REP staff (and affiliated Forest and District staff) meet at least once annually to discuss programs of work, funding, standards and guidelines, future planning, and topics of current interest. Trainings are held periodically. Annual program reviews and annual program of work meetings are also held on each Province. Province Ecologists operate under a shared services agreement between the Region and the Province Forests. Province Ecologists prepare, with assistance of the Regional Ecologist and forest Resource staff, an annual Program of Work describing objectives, activities, and assistance needed to complete the planned work; the annual POW is tied to National, Regional, and Forest goals and priorities. An annual meeting (1) to review the previous fiscal year's accomplishments, and (2) to negotiate the upcoming fiscal year's POW, is held with the attendance of the Province Ecologist, the Regional Ecologist, Resource Staff officers, and any other interested parties. The final program of work is agreed to by the Forest Supervisors and RO Director of Ecosystem Management.

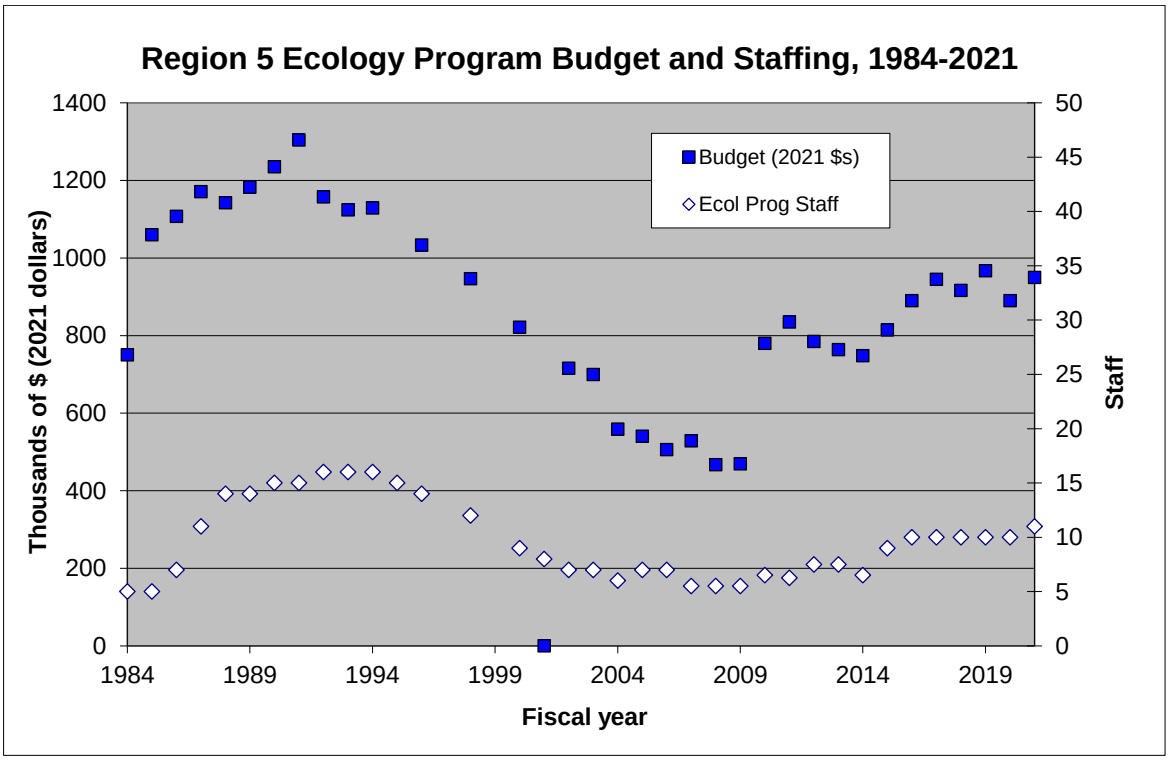

Figure 1. Ecology Program (REP) funding (does not include Regional and Assistant Regional ecologists, who are funded from RO internal budget), and number of REP staff (including RO staff), 1984-2021.

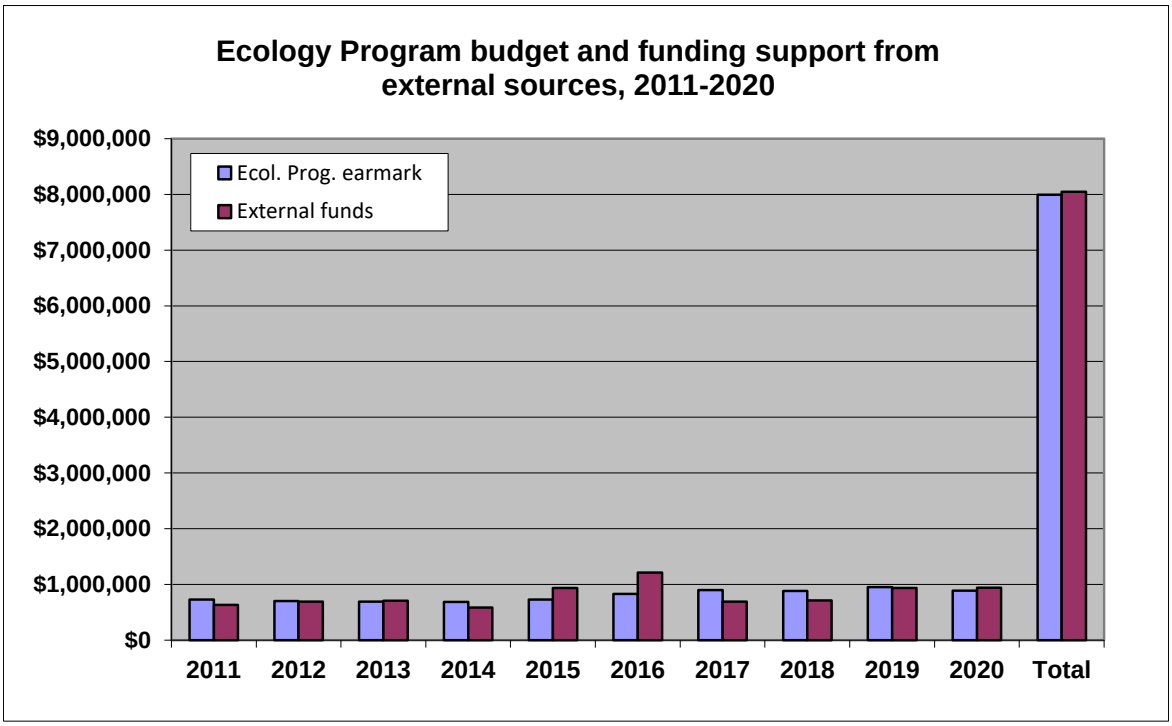

Figure 2. REP earmark funding and funding secured from external sources by the REP, 2011-2020. "External" = funding from outside the Region 5 National Forest System annual budget.

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Links to Strategic Goals and Priorities

USDA STRATEGIC PLAN 2018-2022

(*https://www.usda.gov/sites/default/files/documents/usda-strategic-plan-2018-2022.pdf*)

Strategic Goal 1. Ensure USDA Programs are delivered efficiently, effectively, with integrity and a focus on customer service.

Strategic Goal 6. Ensure productive and sustainable use of our National Forest System lands.

6.2 Ensure lands and watersheds are sustainable, healthy, and productive.

6.3 Mitigate wildfire risk.

USFS STRATEGIC GOALS 2015-2020

(https://www.fs.usda.gov/sites/default/files/strategic-plan%5B2%5D-6_17_15_revised.pdf)

Strategic Goal (1): Sustain Our Nation's Forests and Grasslands

Strategic Objective A. Foster resilient, adaptive ecosystems to mitigate climate change
Strategic Objective B. Mitigate wildfire risk
Strategic Objective C. Conserve open space

Strategic Goal (2): Deliver Benefits to the Public

Strategic Objective D. Provide abundant clean water
Strategic Objective E. Strengthen communities
Strategic Objective F. Connect people to the outdoors

Strategic Goal (3): Apply Knowledge Globally

Strategic Objective G. Advance knowledge
Strategic Objective H. Transfer technology and applications
Strategic Objective I. Exchange natural resource expertise

Strategic Goal (4): Excel as a High-Performing Agency

Objective A. Recruit a diverse workforce
Objective B. Promote an inclusive culture
Objective C. Attract and retain top employees

USFS Pacific Southwest Region (R5) Strategic Priorities

(https://www.fs.usda.gov/detail/r5/about-region/?cid=STELPRDB5150117)

Ecological Restoration: The need for ecological restoration in our national forests is widely recognized due to myriad threats to our landscapes including catastrophic wildfire, climate change, and increasing human population pressures. The Forest Service recognizes the need for a more focused approach that clearly identifies ecological restoration as the primary goal for all land management actions.

Major Accomplishments

Ecology Program accomplishments are organized under a series of major headings, each of which is linked to various USDA, USFS, and Region 5 goals and priorities. These include:

- **Ecological Restoration**: USDA Strategic Goal 6. USFS Strategic Goal Objectives A, B, D. R5 Priority 1
- **Vegetation, Fire and Fuels**: USDA Strategic Goal 6. USFS Strategic Goal Objectives A, B. R5 Priority 1
- **Forest Planning/NEPA**: USDA Strategic Goal 6. USFS Strategic Goal Objectives A-F. R5 Priority 1
- **Inventory and Monitoring**: USDA Strategic Goal 6. USFS Strategic Goal Objectives G, H, I. R5 Priority 1
- **Climate Change**: USFS Strategic Goal Objectives A, D. R5 Priority 1
- **Collaboration:** USDA Strategic Goal 1. USFS Strategic Goal Objectives A-I. R5 Priority 1
- **Other**: Other major headings for accomplishments are also used below. Their links to the USDA, USDA, and Region 5 goals and priorities are identified in the text.

REGIONAL OFFICE

Ecological Restoration and Conservation

- Published Region 5 postfire restoration framework with collaborators in NFS and PSW
- Published Natural Range of Variation assessment for yellow pine and mixed conifer forests in NW California
- Worked with R5 Range Monitoring program to sample Golden Trout Wilderness meadow monitoring sites

- Updated and revised Fire Return Interval Departure (FRID) mapping for California
- Wrote proposal to develop montane forest conservation strategy for southern California. Proposal was funded by USGS SW Climate Adaptation Science Center for two-years, covers costs of GS-11 ecologist on Cleveland NF
- Member, science advisory committee, Natural Areas Association
- Reviewed USGS-CASC Pinyon-Juniper Woodland Resource Management climate brief

Vegetation, Fire and Fuels

- Acted as director for Sierra Nevada region of the California Fire Science Consortium (CFSC)
- Planned and implemented 2020 California Fire Science Retreat with collaborators on Inyo NF and California Fire Science Consortium
- Received $310,000 grant from CALFIRE for expansion of FRID dataset, improvement of POSCRPT model, and new emissions baseline estimates
- Provided input to R5 communications plan for fire and forest management
- Led California chapter for 2021 book on US fire ecology and management
- Co-author, United Nations Environmental Program report on world fire trends
- Collaborated with UC-Davis, San Diego State University, and PNW Research Station on chaparral carbon cycle analysis
- Received funding from USGS SWCASC to support tribal graduate student to develop study of potential for scaling up of cultural burning
- Gave ten newspaper/online interviews on fire and fuels subjects
- Supervised rx burn monitoring team that monitored prescribed burn effects at sites on the Modoc NF, Eldorado NF, Stanislaus NF, and Humboldt-Toiyabe NF
- Planned and implemented 2021 California Fire Science Retreat with collaborators on Inyo NF and California Fire Science Consortium (event cancelled due to Covid-19 outbreak)

Forest Planning/NEPA

- Participated in vegetation data decision making for NWFP plan revisions
- Provided support to Six Rivers NF programmatic NEPA for prescribed fire
- Coordinated with Region 6 staff on data and mapping projects relating to NWFP forest planning

Inventory and Monitoring

- Began data cleaning and analysis of postfire forest succession study in Gondola and Showers Fires, Lake Tahoe Basin

- Completed data entry for inventory of pre-treatment forest conditions at UC-Valentine Reserve
- Carried out second year of California prescribed monitoring program, collaboration with Cal Fire and UC-Davis

Climate Change

- Member, steering committee, USDA Climate Hub, SW Region
- Participated in Fire and Climate symposium at 2021 Association for Fire Ecology conference
- Gave lecture on climate change adaptation to the international Beyond Carbon Network
- Gave presentation to Eastern Europe US Embassy staffs on Forest Service support to climate change response
- Developed plan with WO-IP to conduct a detail with IP to help the staff develop climate change adaptation-related programs and projects
- Project leader for SoCal ecosystem services assessment, project includes evaluation of potential effects of climate change on services; joint project with University of California, US Geological Survey, PSW, Michigan State University
- Participated in planning for climate change adaptation session at 2020 MEDECOS meetings

Research Natural Areas – USDA Strategic Goals 2.1, 2.4. USFS Strategic Goals 1, 3, 7. R5 Priority 1.

- NFS chairperson, Regional Research Natural Areas committee
- Met with CNF FLT regarding new RNA proposals
- Reviewed multiple proposals for scientific research and management actions in Region 5 RNAs

Other Activities

- Published or have in press 16 scientific papers and book chapters
- Visited five National Forests in Region 5 and two National Forests in Region 1 during the course of the fiscal year

- <u>Presentations</u>
    - September 30, 2021. *Fire trends in California.* Council on Watershed Health and UC Cooperative Extension webinar. 120 attendees
    - December 1, 2020. *New tools, methods, and partnerships for chaparral sustainability*. USGS Fire Science and Management in an Uncertain Future Symposium, virtual presentation. 111 attendees

- November 24, 2020. *Some ruminations on fire trends in California.* South African Functional Climate Change Research Network, Conversations on Climate Change lecture series, virtual presentation. 78 attendees
- November 19, 2020. *Fuels management and forest restoration in the Sierra Nevada: the case for active forest management on the Valentine Reserve.* University of California-Santa Barbara Natural Reserve System lecture series, virtual presentation. 137 attendees
- October 7, 2020. *Fire regime alteration in Research Natural Areas.* California Native Plant Society Lassen Chapter, virtual presentation. 35 attendees

- <u>International missions and support</u>:
  - Planned to present at MEDECOS conference in South Africa, but event was postponed to 2022 due to covid-19
  - Supported fire risk modeling project in the country of Georgia
  - Hosted international forestry intern from Germany
  - Gave lecture on climate change adaptation to the international Beyond Carbon Network
  - Gave presentation to Eastern Europe US Embassy staffs on Forest Service support to climate change response
  - Developed plan with WO-IP to conduct a detail with IP to help the staff develop climate change adaptation-related programs and projects

San Gorgonio Wilderness, San Bernardino National Forest

Fire Science Retreat in the eastern Sierra Nevada with participants from numerous agencies

Salvage harvest study, collaboration with UC-Davis, Sequoia National Forest

Golden Trout Wildernes meadow monitoring, Inyo NF

California Prescribed Fire Monitoring Program crew

LNU Fire postfire chaparral monitoring being filmed by public television film crew

Tamarack Fire interagency field trip, Humboldt-Toiyabe NF

PROVINCE ECOLOGY PROGRAMS

Central Sierra Province

Provincewide

Ecological Restoration

- Participated on Western Aspen Alliance Steering Committee
- Led and completed vegetation monitoring protocols for Sierra Meadow Partnership – WRAMP
- Participated in the Tahoe Central Sierra Initiative:
    - Contributed to HRV analysis for TCSI landscape through funded CalFire CCI grant
    - Reviewed TCSI assessment report
    - TCSI Science Coordination Team member
    - Reviewed TCSI Landis modeling
    - Participated on Blueprint Users Group

Vegetation, Fire and Fuels

- Collaborated with the ecology program, the Pacific Southwest Research Station and Forest staff on finalizing the Post Fire Restoration Strategy General Technical Report (GTR-270)
- Continued collaborative project with Southern Sierra Province: "Effectiveness of forest management treatments at reducing drought and bark-beetle caused tree mortality in California"
    - Young et al. (in press). *Ecological Applications*. See Publications and Reports, page 12.
- Participated on the California Fire Science Consortium (CFSC) steering committee
- Provided feedback on the POSCRPT natural regeneration tool integration with online resources with the intent of completing an analysis of natural regeneration probability in the 2020 fires
- Participated in initiation of a re-analysis of FRID (i.e., update of Safford and Van De Water 2014)
- Participated on a team to review region decision support tools for application across the region for both landscape and project level planning with the California Wildfire and Forest Resilience Task Force

Forest Planning/NEPA

- Participated in training and review of Vibrant Planet Land Tender online decision support tool, "an intuitive, real-world technology that brings natural resource management and wildfire prevention into the modern era"
- Provided technical feedback on ACCEL project which is a regionwide approach to data and tools to accelerate forest restoration in California
    - Provided feedback on segmentation of landscape and pertinent data sources necessary for project planning
    - Representative for province on review team for the ACCEL project
- Developed a fuel treatment effectiveness annotated bibliography with the Regional Office to respond to litigation requests
- Provided guidance to pre-assessment forest planning for the Central Sierra Province in preparation of planning
- Worked on Natural Range of Variability Updates for forest planning:
    - Currently completing Chaparral NRV for California in conjunction with the Northern and Southern California Province

Inventory and Monitoring

- Summarized whitebark pine data for the RO to utilize in development of the whitebark pine conservation assessment.
- Meyer, M.D., M.R. Slaton, S.E. Gross, R.J. Butz, and C. Clark. 2020. Structure, composition, and health of whitebark pine ecosystems in California: a statewide assessment. Unpublished report. USDA Forest Service Pacific Southwest Region, Bishop, CA. 30 p.
- Worked with other field crews to coordinate work on several projects to accomplish monitoring in the Central Sierra Nevada and region
- Continued Ecology plot cards scanning and completion of data entry for the Central Sierra Province
- Contributed to WO Collaborative Forest Landscape Restoration Projects (CFLRP) monitoring plan to be implemented on new CFLR programs
- Contributed to the WO monitoring guidance and regulations
- Collaborated with UNR on Whitehall/Little Valley Field Station dedicated to research, instruction, and community outreach
- Produced monitoring management briefs for monitoring projects across the Central Sierra Province (e.g., Placer Big Trees Sequoia Grove – TNF, Aspen Monitoring Projects – TNF, ENF)

- Summarized journal articles for CFSC science management briefs

Climate Change

- Completed four climate trend summaries for each Forest (ENF, TNF, STF and LTBMU) in the province along with a template for future climate change trend summaries in the Sierra Nevada. The template includes instructions on how to summarize climate data and other relevant data sources.
- Contributed to refugia workshop manuscript: Toward climate change refugia conservation at an ecoregion scale in the Sierra Nevada. Conservation Science and Practice
- Sustainability scorecard:
- Pre-populated monitoring element for all R5 forests
- Co-led with LTBMU response

Other Activities

- Recruited and managed workload of detailer in the Central Sierra Associate Ecologist position
- Maintained Ecologist Certifications with the Ecological Society of America, certified through 2021
- Provided budget and grant and agreement support to the regional program due to assistant regional ecologist position being vacant
- Attended and presented at FLT meetings
- Hired one field crew (3 employees) through UC Davis. Provided risk assessments for appropriate field work during COVID19
- Acted as Assistant Regional Ecologist for 6 weeks
- Attended 2021 fire science consortium focused on Eastside Sierra Nevada fire and forest management
- Continued to provide support to an International Programs Detail in Kenya with the Northern Rangeland Trust

Presentations

The following presentation list is not exhaustive, it only includes more formal presentations.

Estes, B.L. 2020. Tahoe Central Sierra Initiative: Modeling Historic Range of Variability to Inform Restoration Planning. Natural Areas Conference, The Evolution of Forest Restoration Planning in the Central Sierra Nevada Symposium Session, October 22, 2020.

Estes, B.L. 2021. Eldorado & Stanislaus National Forests Climate Change Trend Summaries. Virtual Presentation to the Amador Calaveras Consensus Group Monitoring Workgroup, February 10, 2021.

Estes, B.L. 2021. Sierra Nevada Forest Ecology and Management. Virtual Presentation to the UC Naturalists Program with the American River Conservancy, April 22, 2021.

Estes, B.L. [with 18 coauthors]. 2021. Postfire restoration framework for national forests in California. Virtual presentation to the ACCG Monitoring Workgroup. May 12, 2021.

Estes, B.L. 2021. Overview of the Caples Restoration Project. Restorative Burning: Outcomes from the 2019 Caples Fire, Virtual Presentation with the California Fire Science Consortium, May 4, 2021.

Gross, S.E. 2020. Key planning tools for the Lake Tahoe West Restoration Partnership: Resilience Assessment and Restoration Strategy. Natural Areas Conference, Modeling social-ecological systems as part of the Lake Tahoe West Restoration Partnership Symposium Session, November 3, 2020.

Gross, S.E. 2020. Meadow Assessment Comparison. Virtual presentation to Klamath Meadow Partnership on Meadow Assessment Comparison, November 2020.

Collaboration

- Amador-Calaveras Consensus Group (ACCG): http://acconsensus.org/about/members/ (see forests for specific tasks)
- American River Conservancy: Participation in the UC CA Naturalists and Climate Stewards Program
- Calaveras Healthy Impact Product Solutions (CHIPS): WCB Arnold Avery Project Monitoring with ACCG Monitoring Workgroup, collaboration on CalFire CCI grant
- CalFire: Lake Tahoe West, SOFAR
- California Tahoe Conservancy, Lake Tahoe West, development of a Climate Action Portfolio
- Desert Research Institute: Climate Change tools
- Institute of Bird Populations: WCB Grant for Aspen Restoration Work, Power Fire Bee Work, ACCG Monitoring Workgroup
- Lake Tahoe West: https://www.nationalforests.org/who-we-are/regional-offices/california-program/laketahoewest
- North Yuba Partnership, https://www.yubawater.org/317/North-Yuba-Forest-Partnership
- Pacific Southwest Research Station: Postfire restoration framework GTR, TCSI, Caples Creek Watershed, North Yuba Partnership, Sagehen, LTBMU meadow monitoring

- Point Blue: ACCG Monitoring Workgroup, King Fire Variable Density Salvage Study, Power Fire Post Fire Restoration Impacts on Birds
- Region 5 Remote Sensing Lab: ENF Lidar, ACCEL, remote sensing products for post fire landscapes
- Sierra Nevada Conservancy: TCSI, North Yuba Partnership
- Sierra Nevada Meadow Partnership: https://www.sierrameadows.org/
- South Fork of the American Cohesive Strategy Collaborative (SOFAR): http://sofarcohesivestrategy.org/
- South Yuba River Citizen League (SYRCL): Aspen Restoration Project, NYP, meadow monitoring
- Tahoe Central Sierra Initiative (TCSI): http://restorethesierra.org/tahoesierra/ (see above for specific collaborative activities)
- The Nature Conservancy: TCSI, North Yuba Partnership
- UC Davis: Seasonal Field Crews: Sierra Nevada tree mortality project, Yuba Drone Validation
- University of Nevada at Reno: Climate Change Refugia Conservation
- Yosemite Stanislaus Solutions Group: http://yosemitestanislaussolutions.com/

Eldorado National Forest

Ecological Restoration

- Caples Restoration Project
    - Coordinated with Fire Behavior Analyst Team (FBAT) to complete postfire effects monitoring and report completion, which was presented at various meetings detailing initial first fire order effects
    - Worked with collaborators (e.g., California Academy of Science, CalFire, UC Davis) on the Caples Watershed Project and coordination with the Academy on avian monitoring
    - Contributed to the funded WCB grant, Metrics of Wildlife Community Resilience for Sierra Nevada Forests: Development and Application
        - Participated on hiring panel for a Postdoc to work on the WCB grant
    - Coordination with California Academy of Science botany researcher and interns to resample vegetation in Caples 2019 Fire

Vegetation, Fire and Fuels

- Caples Watershed California Fire Science Consortium Webinar covering aspects of the 2019 Caples Fire

- South Fork of the American River Cohesive Strategy Participation
    - Participated and provided input on field trips, Caples Watershed Fieldtrip
    - Participated on the Landscape Design Committee
        - Develop Red Fir Management Strategy for the SOFAR collaborative

Forest Planning/NEPA

- Worked with ACCG to disseminate scientific information to support project planning through presentations and field visits with the planning committee and the full group
- Provided Project Support on Forest Restoration Projects

Inventory and Monitoring

- Worked with Pacific Southwest Research Station and California Academy of Science researchers to develop monitoring network in the Caples Ecological Restoration project
- Facilitated/organized Amador-Calaveras Consensus Group (ACCG) monitoring work group
    - Completed annual monitoring reporting
    - Maintained monitoring database and populated database with all current monitoring to identify monitoring gaps and to track existing monitoring
    - Assisted on planning for ACCG meadow restoration projects
    - Participated on ACCG Strategic Landscape Assessment Subgroup
    - Contributed to successful WCB grant that funds monitoring in the Power Fire through the ACCG Monitoring Workgroup contracted through Institute for Bird Populations
    - Contributed to a CalFire CCI grant to monitor fuel breaks in the Arnold Avery project
- Caples Project:
    - Sampled 38 mixed conifer common stand exams outside of the 2019 Caples Fire, which reburned in the 2021 Caldor Fire
    - Coordinated with FBAT to resample monitoring plots burned in the Caldor Fire
- Foster Firs Project (only a portion resampled due to 2021 Caldor Fire) - collaborated with the Amador Calaveras Consensus Group and UC Davis to conduct post treatment monitoring in a red fir forest with varying treatments.
- Francis Cow Camp Meadow (4 plots) – collaborated with the Eldorado National Forest to assess treatment effectiveness in the meadow.

Climate Change

- Completed the Eldorado National Forest Climate Change Trend Summary

Other Activities

- Research Permit Coordination: Contact for permits for monitoring and research

Stanislaus National Forest

Ecological Restoration

- Provided ecological restoration support to the SERAL project as extended member of ID Team

Vegetation, Fire and Fuels

- Participated in the fire risk assessment for the Stanislaus National Forest in collaboration with the Rocky Mountain Research Center; assisted in:
- Development of PODs
- Development of HVRAS and fire response functions

Forest Planning/NEPA

- Worked with ACCG to disseminate scientific information to support project planning through presentations and field visits with the planning committee and the full group
- Provided review and ecological support to and collaboration in ACCG on project planning – participated in planning meetings
- Participated on development of large landscape-scale project planning – SERAL
    - Part of expanded ID team
    - Provided guidance on lessons learned from other large landscape collaboratives
    - Reviewed proposed action
    - Collaborated with specialists on components of proposed action and analysis (e.g., vegetation and fire indicators and desired conditions)
    - Participated in ForSys development

Inventory and Monitoring

- Facilitated/organized Amador-Calaveras Consensus Group (ACCG) monitoring work group
    - Completed annual monitoring reporting
    - Maintained monitoring database and populated database with all current monitoring to identify monitoring gaps and to track existing monitoring
    - Assisted on planning for ACCG meadow restoration projects
    - Participated on ACCG Strategic Landscape Assessment Subgroup

    - Contributed to successful WCB grant that funds monitoring in the Power Fire through the ACCG Monitoring Workgroup contracted through Institute for Bird Populations
    - Contributed to a CalFire CCI grant to monitor fuel breaks in the Arnold Avery project
- Hemlock Project – collaborated with the Amador Calaveras Consensus Group to conduct post treatment monitoring in mixed conifer and red fir forest with varying treatments
- Contributed to CHIPS monitoring protocols on the Arnold Avery project to evaluate effectiveness of fuel breaks

Climate Change

- Completed Stanislaus National Forest Climate Change Trend Summary. This summary was used as example for an updated climate trend summary template

Other Activities

- Provided responses to concerns from collaborative groups on the scoping of the SERAL project

Tahoe National Forest

Ecological Restoration

- Completed an agreement with the Sierra Nevada Conservancy and USDA Forest Service and LandEco to finalize a Landscape Restoration Plan in the North Yuba River Watershed

Vegetation, Fire and Fuels

- Participated in North Yuba Partnership
    - Attended steering and planning committee meetings
    - Part of the planning workgroup and the TCSI science integration team
    - Assisted with HRV application to NEPA framework and monitoring
    - Participated on the North Yuba Project ID Team
    - Contributed to the scoping (purpose and need) of the North Yuba Project
    - Participated in Vegetation, Fuels, and Habitat Management Subgroup
    - Participated in the North Yuba monitoring work group
        - Development of the monitoring questions and indicators
        - Collaborated on monitoring section in North Yuba scoping document

Forest Planning/NEPA

- Participated with working group on developing Historic Range of Variability (HRV) in the North Yuba Watershed

    - Developed biophysical units (BPUs) modified for future climate to address future range of variability
    - Continued participation in working groups to determine use of HRV in forest planning
- Contributed to the Tahoe National Forest Wildfire Plan Amendment process through the scoping process, Managing natural fire for multiple resource benefits

Inventory and Monitoring

- Yuba Project Meadow Conifer Removal Monitoring – collaborated with the Tahoe National Forest Yuba District staff and the National Forest Foundation to evaluate effectiveness of conifer removal in several meadows.
    - Meadows monitored: M107 (9 transects), M106B (6 transects), M105 (9 transects), M103 (8 transects), Church (17 transects)
- North Yuba Partnership –collaborated with Derek Young (UC Davis) and Ed Smith (The Nature Conservancy) to assess the use of drone imagery to help guide project planning for the North Yuba Large Landscape Project – completed four stem mapped plots
- Contributed to the implementation of WCB grant for Yuba River Headwater Aspen Restoration Assessment and Planning that has been recommended for funding

Climate Change

- Continued to draft manuscript on the Future Range of Variability in the North Yuba watershed based on RM Lands outputs
- Completed the Tahoe National Forest Climate Change Trend Summary

Lake Tahoe Basin Management Unit

Ecological Restoration

- Participated in Lake Tahoe West Collaborative Landscape project: https://www.nationalforests.org/who-we-are/regional-offices/california-program/laketahoewest
    - Developed Lessons Learned document based off of a collaborative survey and workshop
    - Participated in Monitoring Team to develop a LTW monitoring plan
        - Developed and prioritized questions and indicators to support plan
        - Worked with a team from Blue Planet who has been contracted to complete the LTW monitoring plan
- Restoration of fire adapted ecosystems

- Star Meadow - mapped and flagged all piles within 10 feet of whitebark pine to meet project RPMs

Vegetation, Fire and Fuels

- Meeks Meadow
  - Review of Washoe Tribe of CA and NV cultural plan
  - Participation in development of monitoring plan

Forest Planning/NEPA

- Provided feedback to ACCEL project as representative of the LTBMU

Inventory and Monitoring

- Restoration of fire adapted ecosystems
  - Resampled Baldwin Meadows and assessed other meadows for monitoring needs (Star, Benwood)

Climate Change

- Completed the Lake Tahoe Basin Climate Change Trend Summary

Lake Tahoe and the Tamarack Fire from Ralston Peak, Desolation Wilderness, Eldorado NF

Central Sierra field crew monitoring Baldwin Meadow on the Lake Tahoe Basin Management Unit

Central Sierra field crew monitoring legacy trees in collaboration with the AMSET Enterprise Team after the 2019 Caples on the Eldorado National Forest

Monitoring high elevation meadows prior to treatment on the Yuba River Ranger District, Tahoe National Forest

Region 5 Ecology Program and Eldorado National Forest staff visit Francis Cow Meadow and view conifer encroachment in the meadow.

A view of the 2019 Caples Fire where the observer can view the complex effects from the fire with some fire-killed trees in the background and green trees in the foreground.

Northern Province

Provincewide

Ecological Restoration

- Co-author of post-fire restoration GTR written by the Regional Ecology Program, forest staff, and PSW researchers (PSW-GTR-270)
- Co-author of Interventions to Restore Wildfire-Altered Forests in California; GTR written by PSW researchers, Regional Ecology Program, and forest staff (*in development*)
- Lead coordinator of the Klamath Meadows Partnership – a collaborative group with the goal of increasing the pace and scale of meadow conservation and restoration work in the Klamath Mountains and North Coast Ranges in CA.

Vegetation, Fire and Fuels

- Maintained fireline red card qualifications as Ecologist, Resource Advisor (READ), and Burned Area Emergency Response (BAER)
- Advisory committee member for the Northern California section of the California Fire Science Delivery Network
- Member of the Northern Province Strategic Fire Planning Group
- Ongoing collaboration and province point-of-contact for Port Orford Cedar issues and root disease with PSW in Region 5 and PNW in Region 6
- Coordinator for Research Natural Areas (RNAs) on the Klamath, Mendocino, Shasta-Trinity, and Six Rivers National Forests
- Met with researchers from Humboldt State University, PSW-Redwood Sciences Laboratory, PSW-Redding Silviculture Laboratory, USGS, and National Park Service to facilitate ongoing collaborations
- Continued participation with graduate students, tribal members, professors, agency employees, and community members interested in research in the Klamath Mountains – Karuk Collaborative
- Ongoing application of the Post-fire Spatial Conifer Regeneration Prediction Tool (Shive et al. 2018; Stewart et al. 2020) to help support management decisions on recent fires
- Provided updated summaries of fire return interval departures (FRID) at the forest and district level.
- Collaborated in ongoing effort to compare fire return interval departures between main geographic areas, vegetation types and management jurisdictions across Region 5

- Provincial point of contact on vegetation and ecological HRVs to support development of wildfire risk assessment
- Joined a virtual meeting with Congressman Huffman to discuss post-fire recovery after the 2020 August Complex on the Mendocino, Shasta-Trinity, and Six Rivers NFs

Forest Planning/NEPA

- Forest Pre-Assessments (Klamath, Mendocino, Rogue-River Siskiyou, Shasta-Trinity, and Six Rivers)
    - Vegetation and fire ecology lead
        - Data coordination between Region 5 and Region 6
            - ❖ Build and review data crosswalks
            - ❖ Provide decision support
        - Provided reviews and modifications of R6 potential natural variation (PNV) mapping efforts for use in forest plan revisions
        - State and transition model building for NRV metrics
    - Drafted and/or completed Natural Range of Variation Assessments for:
        - Chaparral
        - Douglas-fir
        - Yellow pine and Mixed conifer (PSW-GTR-273)
        - Riparian habitats
- Forest Assessments (Klamath, Mendocino, Rogue-River Siskiyou, Shasta-Trinity, and Six Rivers)
    - Terrestrial Ecosystems Team Leads
        - Developed methods for assessing ecosystem integrity
        - Stratified major vegetation types throughout the five-forest area
        - Identified and described unique and rare ecosystems within the planning area
        - Completed analyses of key ecosystem characteristics, existing conditions and trends, and departures from the natural range of variation (NRV)
        - Organized and co-led small group workshops to assign ecological integrity ratings to terrestrial ecosystems
        - Produced write-ups summarizing ecological integrity for select ecosystems from workshops
        - Coordinated in-depth reviews of terrestrial ecosystems assessment and appendix - provided rewrites to contractor as needed for large sections
        - Provided coordination and reviews of fire management, aquatic and riparian, and species of conservation concern assessment sections
- Northern Province lead for the Climate Change Vulnerability Assessments

- Coastal Mountains Wildfire Risk Assessment
    - Highly valued resources or assets (HVRA) point of contact and Province lead
- Continued collaboration with R5 Remote Sensing Lab to continue implementation of local updates and corrections to existing vegetation mapping and to facilitate roll-out of the EVEG layers for the Northern Province forests
- Continued working with Northwest Forest Plan forest wildlife biologists and the R5 Remote Sensing Lab to create revised Northern spotted owl and other threatened and endangered (T&E) species habitat crosswalks within the R5 existing vegetation GIS layers
- Participated in R5 conference calls on whitebark pine and red fir ecology and management
- Coordinated with Research Natural Area (RNA) committee and R5 RO staffs on corrections to RNA boundaries in the corporate database
- Participated in regular forest planning calls with Regional planning team

Inventory and Monitoring

- Completed analyses of data and publications on drought-induced mortality, post-fire regeneration following multiple burns, post-fire invasive species colonization, and conservation of rare conifers.
- Ongoing compilation and organization of data from previous Province Ecologists – supervising a volunteer student from Humboldt State University to scan ecology plot cards for upload into a database

Climate Change

- Continued participation and support for the Northern California climate change adaptation project being led by EcoAdapt: http://ecoadapt.org/programs/adaptation-consultations/norcal/products

Other Activities

- Adjunct Professor in the Department of Forestry and Wildland Resources at Humboldt State University
- Reviewed scientific manuscripts for:
    - Ecological Applications
    - Forest Ecology and Management
    - International Journal of Wildland Fire

- Maintained professional memberships with the Ecological Society of America, Association for Fire Ecology, Natural Areas Association, California Native Plant Society, and the International Association of Wildland Fire
- Completed basic first aid, CPR refresher, Safety Journey and other mandatory training
- Maintained official federal passport
- Provided ongoing support to the Northern Rangelands Trust in Kenya through International Programs
- Provided ongoing support to the Nkhotakota Wildlife Reserve in Malawi through International Programs
- Acting associate regional ecologist
- 120-day Detail with R5 Ecosystem Planning Staff
- Research Natural Area (RNA) coordinator for Northern Province

Presentations

The following presentation list is not exhaustive, it only includes more formal presentations.

Bohlman, G.N. 2020. Following fire with fire: Fire as a key restoration tool in areas affected by California's 2nd largest wildfire. Natural Areas Conference, Fire Restoration and Consequences for Ecosystem Management Symposium Session, November 3, 2020.

Collaboration

- EcoAdapt (Northern California climate change adaptation project)
- Firescape Mendocino (Ecological restoration of landscape fire)
- Humboldt State University/Department of Biological Sciences (Northern Province inventory and monitoring; Red fir health in Sugar Creek RNA, Klamath NF; Sims and Saddle fires regeneration, understory species recovery, and re-burn severity, Shasta-Trinity and Six Rivers National Forests; species range analysis of knobcone pine)
- Humboldt State University/Department of Forestry and Wildland Resources (Adjunct professor; student advisement)
- Northern California Prescribed Fire Council (Promote, protect, and expand use of prescribed fire in Northern California fire-adapted landscapes)
- PNW-Research Station (PNW) (NWFP Forest Planning science synthesis; NWFP Bioregional Assessment data resolution; Potential Natural Vegetation map expansion)
- PSW-Research Station (PSW) (NWFP science synthesis; Klamath Mts: fire severity study)
- University of California-Davis/Center for Watershed Sciences (Pilot effort to map meadows in the Klamath Mountains)

- Western Klamath Restoration Partnership (Ecological restoration of landscape fire)
- Klamath Meadows Partnership (Conservation and restoration of meadows)

Six Rivers National Forest

Ecological Restoration

- Provided ongoing support to the Western Klamath Restoration Partnership (WKRP) for meetings, field visits, monitoring, modeling, LiDAR, and science core team participation
- Ran the post-fire spatial conifer regeneration prediction tool (POSCRPT) for the 2020 August Complex and produced a brief summarizing the outputs

Vegetation, Fire and Fuels

- Provided support for the Six Rivers Fire and Fuels Project – a forest-wide effort to use prescribed fire to reduce fuels and wildfire risk, increase ecosystem resilience, and support socio-cultural use of the landscape
- Provided ongoing support and roll-out assistance to R5 Remote Sensing Lab for the new Fire Return Interval Departure (FRID) layer
- Provided project support as requested to Six Rivers NF Fire and Natural Resources staffs

Forest Planning/NEPA

- Forest planning updates and strategy with program managers
- Supported effort to explore formally establishing specific RNAs during forest plan revision

Inventory and Monitoring

- Provided input for year-end WFRP monitoring report for Northern Province Ecology Program budget in WFHF

Climate Change

- Provided project-level support on climate change questions
- Began updating Six Rivers NF climate change trend summary

Other Activities

- Met with Six Rivers NF Staff Officer to facilitate future coordination and build program of work
- Provided support to Six Rivers NF Fire Ecologist and Natural Resources staff as requested
- Participated in Six Rivers program of work and workforce planning meetings

Klamath National Forest

Ecological Restoration

- Provided ongoing support to the Western Klamath Restoration Partnership (WKRP) for meetings, field visits, monitoring, modeling, LiDAR, and science core team participation
- Participated in a field trip to tour and discuss ongoing and future work in East Fork Scott meadows with members of the Klamath National Forest and the Klamath Meadows Partnership
- Participated in a field visit to discuss the effectiveness of past restoration efforts at Kegg Meadows on the Klamath National Forest.

Vegetation, Fire and Fuels

- Provided ongoing support and roll-out assistance to the R5 Remote Sensing Lab for the Fire Return Interval Departure (FRID) layer
- Presented to KNF and FWS on Fuels Programmatic spatial layer that identified areas across the Klamath and Shasta-Trinity NFs where dense, closed canopy forests are less likely to be sustainable on the landscape due to fire risk

Forest Planning/NEPA

- Provided support for the Klamath and Shasta-Trinity Fuels Programmatic – a two forest-wide effort to place fuel break treatments along strategic ridgetop areas and along roads, within WUI, and conduct roadside fuels reduction along key roads.
- Provided support to KNF Fire and Natural Resources staffs as requested
- Provided in-depth reviews of the Klamath National Forest Assessment

Inventory and Monitoring

- Provided ecological monitoring section for the FY 2020 Monitoring and Evaluation Report

Climate Change

- Provided project-level support on climate change questions as requested
- Began updating Klamath NF climate change trend summary

Other Activities

- Provided support to KNF Fire Ecologist and Natural Resources staff as requested
- Met with Klamath NF Staff Officer to facilitate future coordination and build program of work

Mendocino National Forest

Ecological Restoration

- Ran the post-fire spatial conifer regeneration prediction tool (POSCRPT) for the 2020 August Complex and produced a brief summarizing the outputs

Vegetation, Fire and Fuels

- Provided ongoing support and roll-out assistance to the R5 Remote Sensing Lab for the new Fire Return Interval Departure (FRID) layer
- Participated in a field trip to the Four Beetles project (July 28, 2021) to see the effects of the 2020 August Fire Complex on the landscape and discuss the effectiveness of past thinning projects

Forest Planning/NEPA

- Participated in FireScape Mendocino collaborative meetings and the Landscape-Scale Vegetation working group calls, meetings, and field exercises

Inventory and Monitoring

- Led a UC Davis monitoring crew to collect data on two projects:
    - Status and trend of Macnab and Sargent cypress post-fire regeneration within and adjacent to the Frenzel Creek Research Natural Area
    - Condition of stands previously sampled in 2009 that are located within the Buttermilk Late Successional Reserve (LSR) and burned in the 2020 August Complex

Climate Change

- Provided project-level support on climate change questions as requested
- Began updating Mendocino NF climate change trend summary

Other Activities

- Provided support to Mendocino NF Natural Resources staff as requested
- Met with Mendocino NF Staff Officer to facilitate future coordination and build program of work

Shasta-Trinity National Forest

Ecological Restoration

- Ran the post-fire spatial conifer regeneration prediction tool (POSCRPT) for the 2020 August Complex and produced a brief summarizing the outputs

Vegetation, Fire and Fuels

- Provided ongoing support and roll-out assistance to the R5 Remote Sensing Lab for the new Fire Return Interval Departure (FRID) layer
- Presented to IDT and FWS on Fuels Programmatic spatial layer that identified areas across the Klamath and Shasta-Trinity NFs where dense, closed canopy forests are less likely to be sustainable on the landscape due to fire risk

Forest Planning/NEPA

- Provided project-level support on climate change questions

Climate Change

- Provided project-level support on climate change questions as requested
- Began updating Shasta-Trinity NF climate change trend summary

Other Activities

- Provided support to Shasta-Trinity NF Natural Resources staff as requested
- Met with Shasta-Trinity NF Staff Officer to facilitate future coordination and build program of work

Supporting Placer County RCD with private land prescribed burn

Virtual meeting with Congressman Huffman to discuss post-fire recovery after the 2020 August Complex

Field trip to the Four Beetles project on the Mendocino National Forest to see the effects of the 2020 August Fire Complex and discuss past treatment effectiveness

Province Ecologist Ramona Butz measuring a tree with UC Davis crew member in the Buttermilk Late Successional Reserve within the 2020 August Complex footprint on the Mendocino NF.

Field trip to tour and discuss ongoing and future work in East Fork Scott meadows with members of the Klamath National Forest and the Klamath Meadows Partnership

Field visit to an ongoing restoration site at Kegg Meadows on the Klamath National Forest.

Field visit to the Frenzel Creek RNA located on the Mendocino National Forest to determine plot locations for post-fire monitoring

Sierra Cascade Province

Provincewide

Ecological Restoration

- Worked with the Regional Ecology Program and researchers from PSW to develop a comprehensive post-fire restoration strategy for Region 5 (GTR-270). Co-authored Chapter 2, which outlines the decision framework for post-fire restoration in California's National Forests and Chapter 6, which describes a case study in arid shrublands.
- Presented framework to partners at the UC Cooperative Extension Stakeholder's Exchange. Quincy, CA. Sept. 16, 2021
- Completed analysis and coauthored a manuscript investigating whether fire restored reference conditions in red fir stands across a wide geographic range. Utilized data collected from contemporary field plots as well as historical stand inventories (VTM).
    - Merriam et al. 2022. *Forest Ecology and Management*. See Publications and Reports, page 12.

Vegetation, Fire and Fuels

- Worked with a diverse group of research scientists to co-author a review paper examining the principles behind fuel reduction and forest restoration projects and identifying situations where the two approaches align and where they may diverge
    - Stephens et al. 2021. *BioScience*. See Publications and Reports, page 12.
    - Wrote a brief summarizing the findings from the paper for the California Fire Science Consortium https://www.cafiresci.org/research-publications-source/category/forestrestorationandfuelreduction)
- Contributed to two book chapters focused on California fire ecology. See Publications and Reports, page 12
- Completed an analysis of regeneration potential using the Postfire Conifer Regeneration Prediction Tool (POSCRPT) for three large wildfires that occurred in the Sierra Cascade Province in 2020: North Complex (Plumas), Sheep Fire (Lassen and Plumas), and Hog Fire (Lassen NF). Provided spatial data and summarized results (management brief) to line officers and district staff working on post-fire salvage and reforestation efforts.
- Provided feedback on the POSCRPT tool and initiated an analysis of natural regeneration across the region following the 2020 fires.
- Collaborated with UC Berkeley and PSW to complete an analysis of high-resolution repeat LiDAR data to assess ecological resilience following multiple successive wildfires. Published manuscript.

- Steel et al. 2021. *Journal of Ecology*. See Publications and Reports, page 12
- Collaborated with Florida Atlantic University to complete an analysis of 134 field plots, which were established following the Storrie and Rich fires and remeasured in 2017 and 2018 after the Chips Fire reburn. Submitted manuscript to Forest Ecology and Management (in review)
    - Paudel, A., Coppoletta, M., Merriam, K., Markwith, S. Persistent suppression legacy, rapid change, and the absence of passive system restoration in Sierra Nevada mixed-severity reburns. (in review)
- Partnered with other Region 5 Ecologists to conduct an analysis and assessment of change in Fire Return Interval Departure (FRID) across the region between 2011 and 2019.

Forest Planning/NEPA

- Lead author on a General Technical Report (GTR-269) which summarizes the natural range of variability for red fir and subalpine ecosystems in northern California and southwestern Oregon. These documents were developed in support of forest planning efforts in the Northwest Forest Plan area.
    - Coppoletta et al. 2021. PSW-GTR-269. See Publications and Reports, page 12.
- Participated in a red fir workshop with regional and Washington Office ecologists and completed a red fir ecological integrity assessment in support of forest planning.
- Participated in the Fire Data Sources and Tools Working Group to identify tools for land management plan monitoring at a national and regional level.
- Contributed to ecological integrity assessments for hardwood vegetation, sagebrush steppe, and Baker cypress in support of the Northwest Forest Plan revision.

Inventory and Monitoring

- Worked with a diverse group of scientists and managers, including collaborators from the USDA Forest Service, California Tahoe Conservancy, California State Water Resources Control Board, Desert Research Institute, US Fish and Wildlife Service, American Rivers, San Francisco Estuary Institute, and the University of Nevada Cooperative Extension to review and summarize 11 different meadow assessment methodologies
    - Gross et al. *In press*. See Publications and Reports, page 12.
- Served as a member of the regional Research Natural Area (RNA) committee. Reviewed and approved research permits for RNAs across the region and advised fire teams on RNA suppression tactics.

- Hired and supervised a UC Davis field crew (June-October). Trained and coordinated data collection for nine monitoring projects that assessed the effects of forest thinning, mastication, prescribed burning, and wildfire on native vegetation on the Plumas and Lassen NFs.

Climate Change

- Updated climate trend assessment for the Plumas, Lassen and Modoc National Forests including expanded sections on the effects of historic and predicted future climate change on fire activity, hydrology, vegetation, and wildlife.

Other Activities

- Peer reviewed manuscripts for the scientific journals: Ecosystems, Ecosphere, Plant Ecology and Madroño.
- Peer reviewed technical report for National Park Service Inventory and Monitoring Program
- Reviewed Species of Conservation Concern report for Baker cypress for the California Native Plant Society.

Collaboration

- Project lead for the Storrie Fire Serpentine and Clustered Lady Slipper Fire Restoration Project, which includes an agreement with the Mooretown Rancheria to complete hand thinning treatments in sensitive habitats impacted by the 2000 Storrie Fire.
- Project lead for the Moonlight Fire Aspen Restoration Project, which includes an agreement with the Feather River Resource Conservation District to complete hand thinning treatments and Plumas Audubon to complete monitoring in aspen stands impacted by the 2007 Moonlight Fire.
- Cultivated partnerships between the Feather River Ranger District, Butte County Resource Conservation District, UC Davis, American Forests, and PSW to identify climate-adapted species and seed sources for post-fire restoration after the Camp Fire as part of the Concow Resilience Project.
- Collaborated with Sierra Institute, Friends of Plumas Wilderness, and Plumas National Forest staff to develop and implement a volunteer-based wilderness monitoring program in the Bucks Lake Wilderness.
- Worked with UC Davis to outreach, interview, and hire a summer field crew.
- Collaborated with researchers from UC Berkeley, PSW, and Florida Atlantic University to complete an analysis of ecological resilience following multiple successive wildfires; submitted manuscripts to scientific journals.

- Collaborated with researchers from Penn State, PSW, and PNW to complete an analysis of future fire risk in the Beaver Creek Pinery on the Lassen NF using FVS-FFE. Incorporated results into management recommendations and developed presentation for Natural Areas Conference (November 2020).
- Worked in close partnership with the Tehama RCD to meet the deliverables of a grant from the Sierra Nevada Conservancy to survey for botanical and cultural resources in the Ishi Wilderness (part of the Ishi Fire Restoration Project).
- Participated in the Sierra Meadows Partnership, an organization led by Caltrout to engage partners to lead meadow research and restoration efforts throughout the Sierra Nevada, to increase the pace and scale of meadow restoration, to advance meadow restoration protocols and strategies, and to generate and leverage funding for meadow conservation (https://caltrout.org/regions/sierra-headwaters-region/keystone-initiative-sierra-headwater-meadows/sierra-meadows-research-and-restoration-partnership-smrrp/).
- Worked with a diverse group of scientists and managers, including collaborators from the USDA Forest Service, California Tahoe Conservancy, California State Water Resources Control Board, Desert Research Institute, US Fish and Wildlife Service, American Rivers, San Francisco Estuary Institute, and the University of Nevada Cooperative Extension to review and summarize 11 different meadow assessment methodologies.

Presentations

The following presentation list is not exhaustive, it only includes more formal presentations.

Coppoletta, M. 2021. Vegetation, fuel, and disturbance feedback loops. Fire science presentation given to TREX participants. Feather River College. March 27, 2021.

Coppoletta, M. 2020. It's now or never: the narrowing window of opportunity for maintaining fire resilience in a restored old-growth stand. Natural Areas Conference, Fire Restoration and Consequences for Ecosystem Management Symposium Session, November 3, 2020. https://www.naturalareas.org/docs/WilliamsNAC20SymposiumFlyer.pdf

Merriam, K.E. 2021. Post-fire Restoration Framework. Presentation to the Plumas National Forest Leadership Team, October 21, 2020.

Merriam, K.E. 2021. Post-fire Restoration Framework. Presentation to the Feather River Ranger District Collaborative Group, January 19, 2021.

Interviewed for article in Scientific American, by Ula Chrobak: Severe Wildfires Raise the Chance for Future Monstrous Blazes, November 24, 2020.

(https://www.scientificamerican.com/article/severe-wildfires-raise-the-chance-for-future-monstrous-blazes/)

Lassen National Forest

Ecological Restoration

- Project lead for the Ishi Fire Restoration Project, a proposed 37,000-acre prescribed fire project on the Almanor Ranger District of the Lassen National Forest.
    - Worked in partnership with the Tehama County Resource Conservation District to award contracts for resource surveys of the project area.
    - Formalized the project ID team and held preliminary meetings to identify survey needs and potential resource concerns.
    - Completed field visits to the Burroughs pinery and Graham pinery to assess treatment feasibility.
    - Modeled fire behavior in the Ishi Fire Restoration Project planning area using modeling tools in the Interagency Fuel Treatment Decision Support System (IFTDSS) and wrote summary report for the Sierra Nevada Conservancy.
- Collaborated with researchers from PSW and PNW to refine analysis of future fire risk in the Beaver Creek Pinery on the Lassen NF using FVS-FFE. Incorporated results into management recommendations and presented the results at the virtual Natural Areas Conference (November 2020).
- Collaborated with Penn State University and PSW to coauthor a manuscript investigating structural changes in the Beaver Creek Pinery over a 22-year period.
    - Pawlikowski, N., Taylor, A., Coppoletta, M., and Knapp, E. Legacy Effects of Wildfires Drive Structural Heterogeneity in an Old-Growth Ponderosa Pine and Black Oak Forest. Journal of Vegetation Science (in review)

Vegetation, Fire and Fuels

- Completed an analysis of regeneration potential using the Postfire Conifer Regeneration Prediction Tool (POSCRPT) for the 2020 Sheep Fire and 2020 Hog Fire. Provided spatial data and summarized results (management brief) to line officers and district staff working on post-fire salvage and reforestation efforts.
- Provided input on the Green Island RNA Prescribed Burn Project, developed in partnership with the Sierra Institute with funding from the Sierra Nevada Conservancy.
- Collaborated with UC Berkeley and PSW to complete an analysis of high-resolution repeat LiDAR data to assess ecological resilience following the 2012 Chips Fire reburn. Published manuscript.
- Steel et al. 2021. *Journal of Ecology*. See Publications and Reports, page 12

Forest Planning/NEPA

- Completed a General Technical Report (GTR-269) which summarizes the natural range of variability for red fir and subalpine ecosystems in northern California and southwestern Oregon, including portions of the Lassen NF.
    - Coppoletta et al. 2021. PSW-GTR-269. See Publications and Reports, page 12.
- Participated in a red fir workshop with regional and Washington Office ecologists and completed a red fir ecological integrity assessment in support of northwest forest planning.

Inventory and Monitoring

- Continued to serve as the monitoring coordinator for the Burney Hat Creek Collaborative Forest Landscape Restoration Project (CFLRP).
    - Completed the monitoring summary for the CFLRP annual report and provided input for CFLRP project extension proposal.
    - Coordinated and distributed six monitoring briefs that evaluated the effects of thinning treatments on understory microclimate (i.e., wind speed, temperature, etc.), soil water uptake, and tree growth; effects of fire on bitterbrush and a rare fire following plant; and thinning on a rare lichen.
    - Collaborated with the Fall River RCD to develop a website repository for CFLRP monitoring briefs (https://www.fallriverrcd.org/monitoring-reports)
    - Secured funding and developed a partnership with the University of Wisconsin to conduct pre- and post-treatment acoustic monitoring for spotted owl and goshawk in the Badger project
    - Participated in sub-committee focused on strategic planning within the CFLRP. Completed landscape assessment of treatment need and ecological condition and prepared summary report.
    - Obtained data from internal and external partners for the Burney Hat Creek data portal and assisted with fire hazard assessment across the CFLRP.
    - Revisited permanent field plots in the Plum and North 49 projects to assess the effects of treatments on sagebrush ecosystems and spotted owl foraging habitat.

Climate Change

- Updated climate trend assessment for the Lassen National Forest including expanded sections on the effects of historic and predicted future climate change on fire activity, hydrology, vegetation, and wildlife.

Modoc National Forest

Ecological Restoration

- Collaborated with Modoc Forest Botanist and BLM Rangeland Management Specialist to plan reintroduction of livestock grazing at vernal pool sites occupied by the federally listed plant species *Orcuttia tenuis*.
- Distributed research brief and other outreach materials to the Modoc NF leadership on GTR 270, "Postfire Restoration Framework for National Forests in California".

Forest Planning/NEPA

- Contributed to ecological integrity assessments for hardwood vegetation, sagebrush steppe, and Baker cypress in support of the Northwest Forest Plan revision.
- Provided comments in response to the Fish and Wildlife Service's Biological Opinion on the Effects of Continued Authorization of Livestock Grazing Management on the Modoc National Forest on Three Federally Listed Threatened and Endangered Species.
- Worked with Forest GIS Coordinator to accurately map the Crumes Research Natural Area (RNA) boundary. Provided additional supporting documentation about the status of the RNA.
- Completed a General Technical Report (GTR-269) which summarizes the natural range of variability for red fir and subalpine ecosystems in northern California and southwestern Oregon, including subalpine forests on the Modoc NF.
    - Coppoletta et al. 2021. PSW-GTR-269. See Publications and Reports, page 12.

Inventory and Monitoring

- Worked with Western Regional Climate Center and Modoc Forest staff to identify source of gaps in Alturas COOP weather station record.

Climate Change

- Updated climate trend assessment for Modoc National Forest including expanded sections on the effects of historic and predicted future climate change on fire activity, hydrology, vegetation, and wildlife.

Plumas National Forest

Ecological Restoration

- Continued to serve as project lead for the *Moonlight Fire Aspen Restoration Project*.

  - Assessed aspen and meadow treatment units and worked with Mt Hough RD staff and the Feather River RCD to identify additional acres for treatment; prepared a request to the regional office for additional funding.
  - Coordinated with the Feather River Resource Conservation District to implement hand thinning treatments (4.8 acres).
  - Coordinated with Plumas Audubon to complete aspen monitoring; analyzed two-years of browse data and developed aspen fencing plan for the RCD.
- Continued to serve as project lead for the *Storrie Fire Serpentine and Clustered Lady Slipper Fire Restoration Project*, which is a partnership between the Plumas National Forest and Mooretown Rancheria.
  - Coordinated with Mooretown Rancheria and Greenville Rancheria to complete the final hand thin and pile treatments (132 acres) within clustered lady slipper units.
  - Completed post-treatment monitoring in permanent plots to assess the effects of treatments on rare species and understory plant diversity.

Vegetation, Fire and Fuels

- Served as a member of the Burned Area Emergency Response (BAER) team for the Beckwourth Complex and Dixie Fire and completed the invasive species assessment.
- Participated in Plumas Cal-TREX Prescribed Fire Training Exchange (March 26-28), which included working as a Fire Effects Monitor (FEMO) trainee on two cooperative prescribed burns. Presented to TREX participants on vegetation, fuel, and disturbance regimes and ecological feedback loops at Feather River College.
- Worked with Resource Advisors and other members of the Incident Command Team during the Dixie Fire to mitigate impacts to natural resources. Implemented emergency post-fire rehabilitation efforts to address the loss of rare conifer populations.
- Completed an analysis of regeneration potential using the Postfire Conifer Regeneration Prediction Tool (POSCRPT) for the 2020 North Complex and 2020 Sheep Fire. Provided spatial data and summarized results (management brief) to line officers and district staff working on post-fire salvage and reforestation efforts.
- Collaborated with UC Berkeley and PSW to complete an analysis of high-resolution repeat LiDAR data to assess ecological resilience following the 2012 Chips Fire. Published manuscript.
- Steel et al. 2021. *Journal of Ecology*. See Publications and Reports, page 12

Forest Planning/NEPA

- Participated in Concow Resilience and Concow Pyrodiversity projects, in collaboration with the Feather River Ranger District, Butte County Resource Conservation District, UC

Davis, American Forests, and Pacific Southwest Research Station (PSW) to plan post-fire restoration after the Camp Fire. Presented information about climate change adaptation, climate refugia, and reference fire regimes. Facilitated research collaboration to identify climate-adapted species and seed sources for post-fire restoration with PSW.

Inventory and Monitoring

- Worked with staff from the Feather River Ranger District of the Plumas National Forest to refine and implement treatment prescriptions for the Valley Creek Special Interest Area (SIA). Treatments were funded as part of a Sierra Nevada Conservancy grant to reduce fire risk and increase the resilience of this remnant late seral forest.
    - Established an additional 20 permanent (0.1 acre) monitoring plots and collected pre-treatment data on large tree size and vigor, surface fuels, duff and litter depth, and surrounding stand structure.
    - Mentored a Quincy High School student who completed a senior project focused on Valley Creek Special Interest Area. Worked with the student to identify relevant management questions; synthesize field data and analyze it using Excel; and summarize the results in a format that is useful to managers.
- Partnered with the Sierra Institute for the Environment, Friends of Plumas Wilderness, and Plumas staff to develop a Survey 123 app for volunteer-based wilderness monitoring. Trained volunteers and coordinated a wilderness monitoring field day (June 2021) that resulted in 42 site assessments, including 20 new sites. Completed data analysis and report for Wilderness Stewardship reporting.
- Established permanent monitoring plots to evaluate the effects of mastication on the abundance of the invasive grass, medusahead (*Taeniatherum caput-medusae*).
- Revisited long-term monitoring plots to evaluate the effects of prescribed fire and thinning on the abundance of the rare Webber's milkvetch (*Astragalus webberi*); established new plots in collaboration with private landowners.
- Revisited these plots after the Dixie Fire
- to assess fire severity in permanent plots.

Climate Change

- Developed climate refugia analysis for the North Complex Fire, including detailed recommendations for reforestation opportunities based on current and predicted climatic conditions within the fire area.
- Updated climate trend assessment for the Plumas National Forest including expanded sections on the effects of historic and predicted future climate change on fire activity, hydrology, vegetation, and wildlife.

Assessing the risk of non-native species invasion following the 2021 Dixie Fire, Plumas National Forest.

Field crews collect post-treatment data after implementation of the Storrie Fire Restoration project, Plumas NF.

Collecting post-treatment data as part of the Burney Hat Creek CFLRP on the Lassen NF.

Collecting fire weather data on a Fire Effects Monitoring (FEMO) module during a TREX prescribed burn.

Field crews assess the effects of the 2021 Dixie Fire on the rare Baker cypress in the Mud Lake RNA, Plumas NF.

Adapting to the challenge of safely doing field work in the Sierra Nevada during the smoky fire season!

Southern California Province

Provincewide

Ecological Restoration

- Supported UC Santa Barbara Bren School Master's students in developing a historical range of variability report for the structure of conifer forests
    - Guided group through literature review and data summary
    - Provided survey data from FIA and USFS corporate data bases and validated data analysis
    - Reviewed draft report and final group presentation

Vegetation, Fire and Fuels

- Developed a structured decision-making framework for forest management across southern California in partnership with San Diego State University scientist. Includes the spatial definition of forest refugia from fire, climate, and human influences, and incorporates consideration of forest vulnerabilities and priorities to determine whether management should focus on resisting change, accommodating change, or facilitating community transformation. The framework can be applied at both landscape and project scales.
- To delineate the project extent for the Southern Montane Forests Project, created a map of montane hardwood and conifer forests areas across the region. Used montane forest extent to update the Time Since Last Fire (TSLF) map for montane forest areas to include fire seasons since 2017.
- Conducted extensive review of scientific literature and wrote updated threat assessment (fire exclusion, climate, drought induced mortality, ozone/atmospheric pollution, insect and fungal agents, invasive species) for southern California montane forests.
- Mentored intern from Westmont College in a regional review of bark beetle ecology
- Served on the Science Advisory Panel for the California Forest Management Task Force and contributed to the Prioritizing Forest Health Investments report
- Reviewed LandTender software developed by Vibrant Planet and evaluated its potential as a prioritization tool for vegetation management
- Participated in George Wright Society Fire workshop and contributed to projects related to southern California forests

- Served on oversight committee for the Santa Clara Ecosystem Service and Socio-Economic Vulnerability Assessment
    - Guided development of an interactive visualization tool (EcoServe) that interfaces with ecosystem service data to provide estimates of ecosystem services lost from wildfire

Forest Planning/NEPA

- Provided input on LMP monitoring for climate change and focal species trends
- Worked with R5 Remote Sensing Lab to develop focal species monitoring for exotic annual grasses and published journal article describing the technique.
- Worked with Forest Health Protection to develop a methodology for determining tree mortality trends by elevation across the province
- Developed monitoring templates and datasets for multiple LMP monitoring questions
- Participated in monthly regional conference calls with resource staff officers

Inventory and Monitoring

- Hired and supported a field crew to monitor recent burns and fuels activities
- Developed monitoring plans and oversaw logistics for monitoring across the province
- In partnership with Remote Sensing Lab, conducted field data collection designed to support validation of eDart for hardwood forest types, to enable expanded use of this model across southern California forest types

Climate Change

- Served as project coordinator for the Southern Montane Forests Project: A Climate-Informed Conservation Strategy
- Served on Extended Team for Southern California Recreation, Infrastructure, and Ecosystem Services Climate Vulnerability Assessment & Adaptation Strategy Partnership.
- Collaborated with UC Davis and WWETAC to collect and process data to inform aboveground carbon pool development in shrublands following fire, with the goal of estimating carbon storage in southern California shrublands

Other Activities

- Participated in multi-day type conversion workshop to identify the drivers of landscape-level vegetation change and reviewed draft publication focusing on type conversion
- Supported efforts to hire and onboard USFS associate ecologist for southern California
- Served on Region 5 Research Natural Areas (RNA) committee

- Media interviews with The Guardian, Ojai Magazine, and Vogue
- Consulted with graduate students and university faculty regarding applied research on National Forest lands
- Served on three USFS hiring panels
- Synthesized chaparral literature for Natural Range of Variation document for Region 5
- Provided feedback to Regional Office staff regarding plot locations for California spotted owl surveys
- Participated in San Francisco State University "Meet a Scientist" panel
- Peer reviewed manuscripts for Biological Invasion
- Maintained fire red card and READ/REAF certification

Collaboration

- Participated as a graduate committee member for:
- Three UC Santa Barbara PhD students focusing on chaparral and fuel break restoration
- One Cal Poly, SLO Master's student focusing on meadow restoration
- One Sonoma State University Master's student focusing on estimating biomass with terrestrial LiDAR
- Developed and finalized Memorandum of Understanding between US Forest Service and Climate Science Alliance
- Coordinated a joint project letter of introduction to Tribes between the Regional Tribal Relations Specialist, Forest Tribal Relations Officers, and Climate Science Alliance (external partner). Letter was co-signed by all Zone Forest Supervisors and Climate Science Alliance.
- Represented Southern Montane Forests Project at Climate Science Alliance Tribal Workgroup meeting; introduced Southern Montane Forests Project to Workgroup members and participated in breakout discussions.
- Organized and conducted series of introductory Southern Montane Forests Project webinars for Forest leadership and staff.
- Managed Southern Montane Forests Project leadership group of U.S. Forest Service and external partners with diverse areas of expertise and constituencies.
- Coordinated two advisory group meetings for Southern Montane Forest Project and maintained communication with group members.
- Administered grants and agreements:

- Implemented first year of a cost-share agreement with UCSB to provide continued ecological and monitoring support to the southern California forests
- Implemented the third year of a cost-share agreement with UC Riverside to evaluate ecological recovery following the Powerhouse Fire (Angeles NF)
- Implemented the third year of a cost share agreement with UCSB to identify native species and develop fuel break restoration methods
- Implemented the second year of an interagency agreement with USGS Southwest Climate Adaptation Science Center to develop a climate-informed conservation strategy for Southern California's montane forests
- Implemented the second year of a cost share agreement with San Diego State University to produce a meaningful engagement strategy for the Southern California Montane Forests Project
- Served on Research and Conservation Committee for the Santa Barbara Botanic Garden
- Served as a member of the Technical Advisory Group for National Fish and Wildlife Foundation (NFWF) wildfire restoration funds for select fires across southern California
- Served on the California Fire Science Consortium southern California section

Presentations

Molinari, N.A. and E. Underwood. 2020. Prioritizing post-fire restoration in chaparral shrublands in southern California. Natural Areas Conference. October 5, 2020

Molinari, N.A. 2020. The complexities of wildfire and the role of land management. Westmont College All-Campus Lecture Series. November 10, 2020

Molinari, N.A. 2020. Prescribed fire: Ecological objectives revisited. RT-300FS Burn Boss Refresher. November 18, 2020

Molinari, N.A. 2021. Land management and wildfire. UC Santa Barbara Fire Ecology Course. January 25, 2021.

Hennessy, S.M., M.K. Jennings and A.D. Pairis. Southern Montane Forests Project Introduction. Large Landscape Call, March 3, 2021.

Molinari, N.A. 2021. Wildfire and ecosystems: The good, the bad and the unknown. Association of Women in Water, Energy and the Environment Webinar Series. March 10, 2021.

Hennessy, S.M., M.K. Jennings and A.D. Pairis. Southern Montane Forests Project Introduction. All-Zone Webinars hosted by LA Urban Center, April 21 and 28, 2021.

Molinari, N.A. 2021. Science-based products relevant to fire recovery and forest health. Angeles National Forest Leadership Team (FLT). May 19, 2021.

Hennessy, S.M. Project Progress Report for Southern Montane Forests Project. Angeles National Forest Leadership Team (FLT), July 21, 2021.

Hennessy, S.M. Project Progress Report for Southern Montane Forests Project. Inland Empire Resource Conservation District. October 1, 2021.

Angeles National Forest

Ecological Restoration

- Provided support to National Fish and Wildlife Foundation (NFWF) by providing technical review of proposals and project reports for the Copper, Sayre, Ranch and Powerhouse fires
    - Reviewed NFWF proposals related to vegetation recovery and restoration
    - Worked with grantees to develop projects, including identification of important questions and exploration of methodologies
    - Served as the person of contact for multiple NFWF proposals:
        - Guided UC Davis in developing a decision support tool for post-fire restoration (PReP Tool) and published manuscript
        - Engaged with USFS Pacific SW Research Station and UC Davis to develop monitoring plan for *Phytophthora* focused field and greenhouse study, and nursery certification program
- Generated annual grass cover maps for the Copper and Powerhouse fire scars
- Collaborated with UC Riverside to develop post-fire restoration sampling in the Powerhouse Fire
- Identified areas in need of restoration, established monitoring on dozer lines, processed monitoring data to validate PReP Tool, and establish monitoring of reforestation efforts
- Participated in Powerhouse Fire field trips and conference calls to discuss restoration needs and prioritize field sampling locations

Climate Change

- Produced climate refugia maps (developed by Jim Thorne) for montane forests within the Powerhouse Fire footprint to help prioritize reforestation efforts in the face of climate change
- Conducted site visit to Powerhouse and Lake Fire restoration areas to discuss climate adapted restoration strategies with Angeles NF resource officer and USGS Southwest CASC deputy director
- Updated climate change trend assessment to describe recent trends in climate, wildfire, wildlife, vegetation and hydrology (in progress)

Cleveland National Forest

Vegetation, Fire and Fuels

- Participated in project to evaluate effects of seasonal prescribed fire on black oak
- Consulted with fire ecologists and oak specialists on project
- Developed a Cal-Fire grant with UCSB requesting funds for continued monitoring
- Developed sections of the establishment record for proposed San Diego River Gorge Research Natural Area and participated in a planning field trip to Pleasants Peak proposed RNA

Forest Planning/NEPA

- As a planning team member for the Laguna Expansion Project Adaptation Workshop, supported R5 Climate Change Integration Team priorities to promote increased adoption of the Adaptation Workbook and to include climate change considerations in early-stage NEPA.
- Prior to Adaptation Workshop, developed a climate fact sheet and presentation, and worked with an external partner to summarize previous project NEPA. Served as workshop presenter.

Inventory and Monitoring

- Conducted five rounds of Least Bell's Vireo monitoring
- Obtained newly released habitat suitability models from USGS for Least Bell's Vireo
- and Southwestern Willow Flycatcher and incorporated into Forest mapping for monitoring site selection.
- Monitoring of seasonal prescribed fire on Mt. Laguna to evaluate the natural resource effects associated with late season burning.
- Developed a CalFire proposal with UC Santa Barbara to acquire out of agency funding to help with the monitoring effort.
- Revisited 30 vegetation and fuel monitoring plots following prescribed fire and expanded the study to include 18 baseline plots that will be burned in the winter and spring of 2022

Los Padres National Forest

Ecological Restoration

- Collaborated with UC Santa Barbara to drill seed a 3-acre section of East Camino Cielo Fuelbreak using locally collecting native seeds. Developed Cal-Fire proposal to expand the footprint of the restoration project.
- Member of the National Fish and Wildlife (NFWF) advisory team to allocate fire settlement restoration funds for the Zaca, Piru, and Jesusita Fires
- Provided review and identified priority projects for the 2020-21 RFP
- Reviewed veg and fuels proposals, served on award selection committee
- Worked with grantees to develop projects, including identification of important questions and exploration of methodologies
- Served as person of contact for four grantees and participated in kickoff meetings for new grantees
- Collaborated with UCSB, Santa Barbara Botanic Garden and UC Davis on chaparral restoration within the Piru Fire scar, including field trips and initiation of NEPA review
- Worked with scientists at UC Santa Barbara, UC ANR and Reed College to conduct a bigcone Douglas-fir spatial analysis and reforestation project in the Zaca Fire scar
- Mentored Santa Barbara City College (SBCC) student to explore germination success and growth of native seeds for restoration potential as part of an Environmental Horticulture Internship.
- Collaborated with Santa Barbara Botanic Garden and Conservation Biology Institute to develop EEMS Model for identifying priority areas of restoration in the Thomas and Whittier fires based on modeled and citizen science collected data on weeds and erosion.

Vegetation, Fire and Fuels

- Worked as REAF on the Alisal Fire to map areas affected by fire suppression and develop actions for fire suppression repair
- Reviewed the project proposal and scope of work for the PG&E-LPNF Ecological Restoration Project
- Provided support during scoping period for Reyes Peak NEPA review
- Participated in Large Landscape Calls as a representative of the Los Padres

Inventory and Monitoring

- Conducted monitoring to evaluate the grazing effects on vegetation, including blue oak seedlings and saplings, on the Happy Canyon grazing allotment
- Mentored undergraduate from Columbia University to revisit monitoring plots established immediately following the Thomas Fire to understand post-fire recovery trends
- Completed a Monitoring and Evaluation brief focusing on chaparral restoration for the 2017 LMP project monitoring report

Other Activities

- Provided narrative, maps and imagery on fire ecology for signage at Pothole Trailhead and forest-wide signage
- Provided review of the botanical sections of the Wilderness Narratives produced for the Sespe and Matilija Wilderness areas
- Participated in field trip with Ojai Valley Conservancy to discuss impacts from the Thomas Fire and identify projects that benefit USFS and OVC managed lands
- Participated in the move of the Supervisor's Office from Goleta to Solvang
- Provided updates for the monthly forest-wide POW meetings
- Acting Ecosystem and Fuels Staff Officer during February and October 2021

San Bernardino National Forest

Forest Planning/NEPA

- Provided technical guidance for Nestle water extraction permit in Strawberry Creek
- Advised on Adaptive Management Plan implementation
- Engaged with partners through site visits and monthly IDT calls
- Provided review of year 1 Nestle monitoring report and survey protocols
- Responded to FOIA requests
- Conducted field monitoring in Twin, Strawberry and City creeks
- Presented climate projections and adaptation information during Forest kickoff field meeting for Santa Ana River Watershed Project.

Inventory and Monitoring

- Monitoring of Rx fire effects on Bluff Mesa (BDF) to inform fire behavior models (for burn plans) and evaluate objectives (post-fire)

- Visited 11 monitoring plots that were Rx burned to evaluate whether burn plan objectives are being met
- Established 15 new monitoring sites in South Big Bear to serve as baseline data in preparation for future prescribed fire operations
- Entered common exam data into FFI database and shared with district staff
- Supported forest staff in developing monitoring plant for assessing grazing impacts on Quino checkerspot butterfly host plants

Climate Change

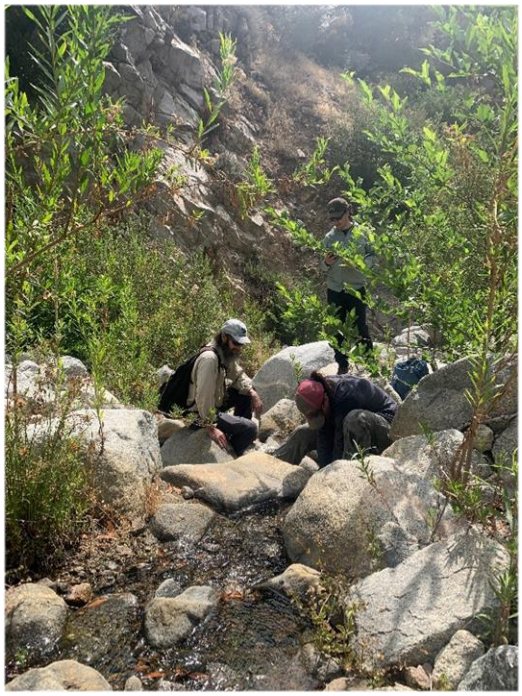
- Updated climate change trend assessment to describe recent trends in climate, wildfire, wildlife, vegetation and hydrology (in progress)

Field assessment of fire effects in Santa Ana River watershed, San Gorgonio Wilderness, San Bernardino NF

Fire effects in a burn unit with open canopy yellow pine and mixed conifer. Province ecologists participated in a prescribed fire kickoff field trip with Fuels and Fire staff and conducted monitoring.

Evaluating need for ecological restoration following wildfire suppression activities on the Alisal Fire (Los Padres NF). Participants include Chumash Fire, Los Padres staff and other Resource Advisors.

Ecology Field Crew works with fuels staff on the Mountain Top Ranger District (San Bernardino NF) to measure rx fire effects in the Bluff Mesa project area



Sampling for aquatic organisms in Strawberry Creek in support of the Nestle water extraction activities. Field trip included hydro-geologists from the WO Groundwater Program and staff from the San Bernardino National Forest.

Field visit to a low-elevation forest site lost in the 2013 fire season, Angeles NF. Province Associate Ecologist Sarah Hennessy and Resource Officer Steve Bear discuss strategies for managing low-elevation sites where fire severity is exacerbated by warming climate and natural forest regeneration is less likely. Photo by Carolyn Enquist, USGS Southwest Climate Adaptation Science Center.

Southern Sierra Province

Ecological Restoration

- Coauthored science publication focused on *Pyrosilviculture* and the restoration of dry forests in the western US and applied concepts to the revised Sequoia and Sierra forest plans
- Served as co-editor for the postfire restoration framework PSW-GTR-270 and repeatedly presented framework to scientists, land managers, and stakeholders throughout California

Vegetation, Fire and Fuels

- Served as co-PI for JFSP-funded project entitled Effects of changing wildfire management strategies (with Rocky Mountain Research Station, Forest Stewards Guild, Northern Arizona University, and Northern Research Station)
- Coauthored science manuscript entitled Changes in geographic characteristics and severity of managed wildfires following the 2009 wildfire management guidance (manuscript in review)
- Served on California Fire Science Consortium (CFSC) Sierra Nevada section
- Gave field presentation on fire ecology and management to the Rural County Representatives of California (RCRC) annual meeting at the UC Valentine Reserve
- Provided technical input to the ACCEL forest treatment prioritization project

Forest Planning/NEPA

- Served on Forest Plan Revision core team as the planning ecologist for the Sequoia and Sierra National Forests
- Served as lead author for the terrestrial ecosystems and agents of change sections for Sierra and Sequoia forest plans and FEIS
- Finalized agents of change and terrestrial ecosystems sections of the FEIS and revised forest plans
- Revised the carbon supplemental report with new science information
- Drafted 2020 Creek Fire and SQF Complex supplemental report supporting the FEIS and revised Sequoia and Sierra forest plans
- Assisted with integration of fisher and California spotted owl conservation strategy recommendations in the revised forest plans
- Provided interview to Fresno Bee reporter focused on forest management and the revised forest plans for the Sierra and Sequoia National Forests

- Coauthored Natural range of variation for red fir and subalpine forests in northwestern California and southwestern Oregon to support Northwest forest planning (with PSW)
- Assisted with development of forest plan monitoring guides for the, Inyo, Sierra, and Sequoia National Forests

Inventory and Monitoring

- Coauthored science manuscript (in press) with other Region 5 ecologists entitled Reestablishing natural fire regimes to restore forest structure in California's red fir forests: The importance of regional context
- Coauthored science publication entitled Do forest fuel reduction treatments confer resistance to beetle infestation and drought mortality? conducted at the Teakettle Experimental Forest
- Coauthored science manuscript (in review) entitled: The effectiveness of forest thinning for increasing tree growth resistance to drought depends on environmental context

Climate Change

- Co-authored the Climate Change Trend Assessment Summaries for the Sierra, Sequoia, and Inyo National Forests

Other Activities

- Provided formal legal declaration and declaration response pertaining to fire and forest ecology in a lawsuit against the U.S. Forest Service filed in the United States District Court for the Eastern District of California
- Provided input to the California Wildfire and Forest Resilience Task Force, Science Advisory Panel on the use of the climate-wise reforestation toolkit for the overview of land management decision support (DS) tools in California
- Administered grants and agreements for R5 Ecology Program
- Initiated outreach for the assistant ecologist position in the Southern Sierra Province
- Represented the Sierra and Sequoia National Forests on the following news stories:
    - Fresno Bee – Interviewed – **Severe fire can be good for giant sequoias. The 'hopeful' new research – and a giant debate.** Severe fire can be good for giant sequoias. The 'hopeful' new research – and a giant debate. 11/2021
    - Daily Californian – Interviewed – **Together we're stronger: Coalition advocates for sequoia conservation**. 'Together we're stronger': Coalition advocates for sequoia conservation (dailycal.org). 09/2021
    - San Diego Tribune – Interviewed - **Wildfire, drought and chainsaws: California's iconic trees are casualties in the war on fire.** Despite raging wildfires,

California's giant sequoia and other iconic trees are starving for flames - The San Diego Union-Tribune (sandiegouniontribune.com) 08/2021

- Visalia Delta Times – Interviewed – **Shocking study finds 10% of world's giant sequoias killed by Castle Fire**. Castle Fire may have killed a tenth of the world's giant sequoia, a shocking new NPS study has found (visaliatimesdelta.com) 06/2021
- Fresno Bee – Interviewed **-Fire killed thousands of mature giant sequoias, Sierra research shows. What's happening now?** Giant sequoias in Sierra killed by CA wildfire. What's next? | The Fresno Bee 06/2021
- Capital Public Radio – Interviewed -**After Drought And Wildfires, California's Giant Sequoias Face A New Enemy: Bark Beetles**. After Drought And Wildfires, California's Giant Sequoias Face A New Enemy: Bark Beetles - capradio.org 12/2020

Collaboration

- Airborne Snow Observatories, Inc: Creek Fire resilience and recovery project
- California Climate Action Corps Forestry Fellows Program: Aspen monitoring project
- Co-organized tour with Sequoia National Forest staff and Sierra Nevada Conservancy in 2020 Castle Fire groves and acquired drone imagery
- Co-organized tour with the Pacific Southwest Research Station scientists to tour sequoia groves to develop research program
- Dinkey Collaborative Forest Landscape Restoration Project (CFLRP): Monitoring coordination
- Forest Stewards Guild: Changing wildfire management strategies project
- Giant Sequoia Working Group: Giant sequoia grove post-fire monitoring
- National Park Service: Reestablishing natural fire regimes in red fir forests project
- Northern Arizona University: Changing wildfire management strategies project
- Pacific Northwest Research Station: Teakettle Experimental Forest project
- Pacific Southwest Research Station: Indiana Summit Research Natural Areas post-fire monitoring project, Postfire restoration framework GTR, Reestablishing natural fire regimes in red fir forests project, Teakettle Experimental Forest project
- Plumas Corporation: Eastern Sierra Fire Restoration and Maintenance Project (ESCCRP)
- Region 5 Remote Sensing Lab: Whitebark pine statewide assessment, Creek Fire resilience and recovery project
- Rocky Mountain Research Station: Changing wildfire management strategies project
- Save the Redwoods League: Giant sequoia grove post-fire monitoring

- Sierra Nevada Conservancy: Eastern Sierra Fire Restoration and Maintenance Project (ESCCRP), Grant Grove & Hume Lake forest resilience project
- University of California Berkeley: Managed wildfires and forest carbon stability and pyrodiversity project
- University of California Davis: Sierra Nevada tree mortality project
- University of New Mexico: Teakettle Experimental Forest project
- University of Washington: Creek Fire resilience and recovery project
- USDA California Climate Hub: Creek Fire restoration project

Presentations

Meyer, M.D. [with 18 coauthors]. 2020. Framework for post-fire restoration in California's national forests. Presented at the 2020 Natural Areas Association Virtual Conference. November 20, 2020.

Meyer, M.D. 2020. Forests in flux: Are Sierra Nevada forests primed for catastrophic change? Presented to the Eastern Sierra Climate and Communities Resilience Project. November 12, 2020.

Meyer, M.D. 2020. Do forest restoration treatments mediate drought-induced mortality in true firs in the Sierra Nevada? Presentation at the California Forest Pest Council Virtual Annual Meeting.

Meyer, M.D. [with 18 coauthors]. 2021. Postfire restoration framework for national forests in California. Virtual presentation to the California Fire Science Consortium Forest and Fire Ecology Random (FFERAL) Lectures. March 10, 2021.

Meyer, M.D. 2021. Why is monitoring important? The relevance of fire effects monitoring to natural resource management. Virtual presentation at the RT300FS burn boss refresher on the Inyo National Forest. March 15, 2021.

Meyer, M.D. [with 18 coauthors]. 2021. Framework for post-fire restoration in California's national forests. Virtual presentation to the California Forest Management Task Force Sierra and Eastside Regional Prioritization Group. April 9, 2021.

Meyer, M.D. [with 18 coauthors]. 2021. Framework for post-fire restoration in California's national forests. Virtual presentation to the Alpine Biomass Collaborative. June 1, 2021.

Meyer, M.D. and M.P. North. 2021. Fire ecology and forest management in Sierra Nevada forest ecosystems. Field presentation to the Rural County Representatives of California (RCRC) annual meeting in Mammoth Lakes, CA. June 17, 2021.

Wuenschel, A. 2020. Sierra Nevada Tree Mortality. Presentation to Sierra Nevada Alliance. https://sierranevadaalliance.org/event/sierra-nevada-alliance-monthly-webinar-sierra-nevada-tree-mortality-feat-amarina-wuenschel/

Wuenschel, A. 2020. Symposium Organizer "Drought Management in California Ecosystems' 2020 Natural Areas Association Virtual Conference. November 20, 2020.

Wuenschel, A., Z. Steel, M. Meyer, S. Ostoja, and M. North. 2021. Climate-wise Reforestation Toolkit. Presentation to the California Tree Mortality Data Collection Network. https://ucanr.edu/sites/forestry/files/347901.pdf

Wuenschel, A. 2021. Climate Change and our Southern Sierra Forests. Presentation to Yosemite Democrats. https://www.facebook.com/events/online/climate-change-and-our-forests-with-amarina-wuenschel-us-forest-service-ecologis/167726205233166/

Wuenschel, A. 2021. CAL-Adapt and Climate Engine: Overview & USDA Forest Service Region 5 Appications (USFS R5). Presentation to the R5 Climate Change Integration Team Webinar Series.

Wuenschel, A. 2021. X-Border Brown Baginar. Postfire Reforestation in the Disturbance Whiplash Era. Presentation to Sierra and Sequoia National Forest Staff. Feb. 24. 2021.

Inyo National Forest

Ecological Restoration

- Provided support to the Eastern Sierra Climate and Communities Resilience Project (ESCCRP)
- Served on the ESCCRP Proposed Actions, Outreach and Education, and Research and Monitoring working groups
- Co-organized field tour of reference stands and possible demonstration forest areas in the ESCCRP to forest staff and partners

Vegetation, Fire and Fuels

- Assisted with the CFSC Fire Science Retreat on the Inyo NF, including field presentations on local fire ecology topics and postfire forest management
- Gave presentation on the importance of fire effects monitoring in the RT300 burn boss refresher virtual course organized on the Inyo NF

Forest Planning/NEPA

- Provided technical review of the Eastern Sierra Fire Restoration and Maintenance Project Decision Memo
- Provided guidance on the analysis of spatial data for the Inyo Forest Plan Monitoring Program

Inventory and Monitoring

- Conducted monitoring of treated and untreated aspen stands on the Inyo NF (UC Davis, California Climate Action Corps Forestry Fellows)
- Conducted postfire Jeffrey pine inventory in the 2008 Sherwin Fire on the Inyo NF

Climate Change

- Co-authored and reviewed the Climate Change Trend Assessment Summary for the Inyo National Forest

Sequoia National Forest

Ecological Restoration

- Modeled postfire conifer regeneration in the Castle Fire using POSCRTPT and created information brief

Vegetation, Fire and Fuels

- Primary author on press release on Castle Fire impacts to sequoia groves
- Drafted talking points for Forest Supervisor on Castle Fire impacts to groves for Los Angeles Times article
- Created internal brief on recent fire history of Giant Sequoia National Monument groves
- Media interviews with Capital Public Radio and National Parks Traveler on Castle Fire impacts to giant sequoia groves in the Giant Sequoia National Monument

Forest Planning/NEPA

- Reviewed Giant Sequoia National Monument Plan monitoring for synergies with the revised Sequoia forest plan monitoring program, with a focus on giant sequoia grove monitoring
- Advised on Castle Fire post-fire restoration NEPA project

Inventory and Monitoring

- Coauthored draft manuscript (in review) on the effects of recent wildfires on giant sequoia groves on the Giant Sequoia National Monument and Sierra National Forest based on grove inventory data
- Partnered with UC Berkeley and Save the Redwoods League to design a sampling strategy for groves burned in the Castle Fire. Trained and coordinated field crews. Collected postfire inventory data of giant sequoia survival and regeneration following the 2020 Castle Fire on the Giant Sequoia National Monument
- Developed proposal at the request of the R5 Remote Sensing Lab for LiDAR acquisition across sequoia groves to submit to the State of California
- Drafted report of Piute cypress monitoring conducted in 2019 in partnership with the Santa Barbara Botanical Gardens and UC Berkeley
- Technical point of contact on effort to refine sequoia grove boundaries with the USFS R5 Remote Sensing Lab and US Geological Survey

Climate Change

- Coordinated the Climate Change Trend Assessment Summary for the Sequoia National Forest

Other Activities

- Research Permit Coordination: Reviewed applications, provided feedback to researchers on sampling techniques, and drafted four research permit letters related to giant sequoia post-fire effects, genetics, and disease
- Participated with Giant Sequoia Working Group meetings and monitoring subcommittee

Sierra National Forest

Ecological Restoration

- Provided support to Creek Fire post-fire restoration assessment planning effort, including drafting a Creek Fire restoration assessment report and serving as the Creek Fire restoration coordinator
- Provided ongoing support to PSW for collaborative ecological research at Teakettle Experimental Forest
- Served as monitoring coordinator for the Dinkey Collaborative Forest Landscape Restoration Project (CFLRP) (SNF)
- Primary author of the Dinkey Collaborative CFLRP extension proposal

Vegetation, Fire and Fuels

- Modeled postfire conifer regeneration in the Creek Fire using POSCRTPT and created information brief
- Awarded two CalFire Forest Health Research grants focused on post-fire effects and recovery following the 2020 Creek Fire and 2020 fire season

Forest Planning/NEPA

- Lead point of contact for Creek Fire Restoration NEPA between Sierra NF staff and Enterprise Team
- Co-organized with USDA CA Climate Hub a Sierra NF staff workshop to daylight important restoration issues within the Creek Fire footprint
- Co-organized with USDA CA Climate Hub a tribal engagement workshop to better understand restoration objectives from tribal viewpoints
- Provided Creek Fire restoration strategy report and technical input for the Enterprise Team developing the Purpose and Need and Proposed Action for the Creek Fire landscape

Inventory and Monitoring

- Coauthored draft manuscript on the effects of recent wildfires on giant sequoia groves on the Giant Sequoia National Monument and Sierra National Forest based on grove inventory data
- Coordinated with University of Washington to ground truth LiDAR data collected on the Sierra National Forest for CCI grants
- Conducted CCI monitoring across fire severity gradients in the 2020 Creek Fire and provided ground truth support to the University of Washington LiDAR acquisition team
- Conducted monitoring on a Sierra Nevada Conservancy project in Blue Rush and provided ground truth support to the University of Washington LiDAR acquisition team
- Conducted baseline condition monitoring of eight Sierra Nevada meadows prior to restoration work through a grant with California Fish and Wildlife Board. Monitoring focused on plant composition, soil and hydrological components of meadow.

Climate Change

- Climate Change Coordinator for Sierra NF; completed the climate change scorecard
- Coordinated the Climate Change Trend Assessment Summary for the Sierra National Forest

Other Activities

- Participated in field visit of Creek Fire with Sierra Nevada Conservancy and University of Washington partners to discuss restoration and research opportunities

Enjoying pristine Sierra Nevada air in Casa Vieja Meadow, Golden Trout Wilderness, Inyo NF

Field visit with the Sierra Nevada Conservancy, American Forests and Sequoia National Forest staff to the Belknap Giant Sequoia Grove

Aspen monitoring led by the Region 5 Ecology Program with assistance from several California Climate Action Corps Forestry Fellows in the Eastern Sierra Climate and Communities Resilience Project, Inyo NF

Fire and forest ecologists discuss the effects of severe wildfires and reforestation on the resilience of eastside Jeffrey pine forests during the California Fire Science Retreat on the Inyo NF

R5 Ecology Program and UC Berkeley Crews conducting monitoring in the Belknap Grove on the Sequoia National Monument

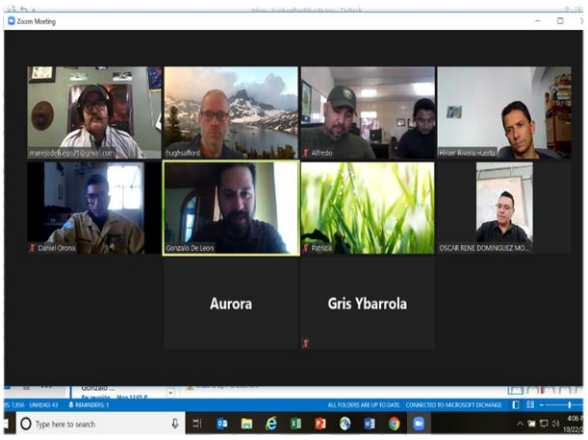
Field presentation to the Rural County Representatives of California (RCRC) at the UC Valentine Reserve

Dinkey Collaborative field trip to Blue Canyon on the Sierra National Forest

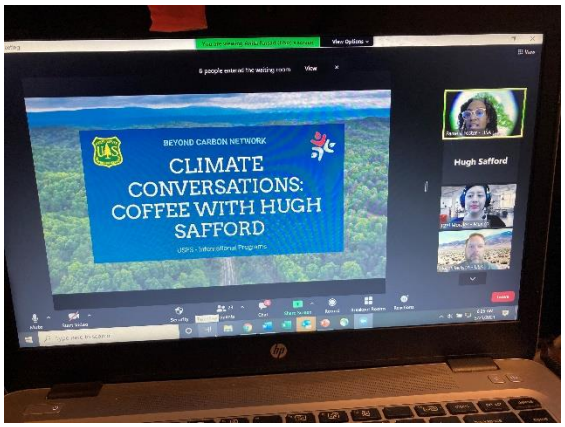
Ecology Program International Support

German intern Melanie Schlüter joins the Cal Rx Burn Monitoring crew

Safford presentation to South Africa Climate Change Conversations lecture series



Providing technical advice on rx burning to Mexican Forest Service and Park Service staff



Inaugural lecture to International Programs' *Beyond Carbon Network*

R5 Ecology Program External Partners (2021)

- **Airborne Snow Observatories, Inc** (Creek Fire resilience and recovery project)
- **Amador-Calaveras Consensus Group** (ACCG, Collaborative Forest Landscape Restoration Project)
- **American Forests** (Camp Fire post-fire restoration)
- **American River Conservancy** (UC CA Naturalists and Climate Stewards Program)
- **American Rivers** (Comparison of Meadow Assessment Protocols)
- **Burney Hat Creek Collaborative** (Collaborative Forest Landscape Restoration Project)
- **Butte County Resource Conservation District** (Camp Fire post-fire restoration)
- **Calaveras Healthy Impact Product Solutions** (WCB Arnold Avery Project, CalFire CCI grant)
- **CalFire** (California Fire Science Consortium, California fire perimeter database, prescribed fire monitoring, Lake Tahoe West, SOFAR)
- **California Climate Action Corps Forestry Fellows Program** (aspen monitoring)
- **California Fire Science Consortium**
- **California Polytechnic State University, San Luis Obispo** (graduate committee member)
- **California State Water Resources Control Board** (Comparison of Meadow Assessment Protocols)
- **California Tahoe Conservancy** (Comparison of Meadow Assessment Protocols, landscape-scale restoration, Climate Adaptation and Vulnerability, Lake Tahoe West)
- **California Trout, Inc.** (meadow restoration, June Mountain whitebark pine monitoring)
- **Climate Science Alliance** (SoCal Montane Forest Conservation Strategy)
- **Desert Research Institute** (climate change tools, Comparison of Meadow Assessment Protocols)
- **Dinkey Collaborative** (Collaborative Forest Landscape Restoration Project)
- **EcoAdapt** (Northern California climate change adaptation project)
- **Fall River RCD** (landscape-scale monitoring, Burney Hat Creek CFLRP)
- Feather River Resource Conservation District (Moonlight Fire Aspen Restoration Project)
- **Firescape Mendocino** (Ecological restoration of landscape fire)

- **Florida Atlantic University** (Join Fire Science Project)
- **Forest Stewards Guild** (Changing wildfire management strategies project)
- **Friends of Plumas Wilderness** (citizen science wilderness monitoring program)
- **Giant Sequoia Working Group** (Giant sequoia grove post-fire monitoring)
- **Humboldt State University** (Northern Province inventory and monitoring; Red fir health in Sugar Creek RNA, Klamath NF; Sims and Saddle fires regeneration, understory species recovery, and re-burn severity, Shasta-Trinity and Six Rivers National Forests; species range analysis of knobcone pine; Adjunct professor; student advisement)
- **Institute of Bird Populations** (aspen restoration, Power Fire bee work, ACCG Monitoring Workgroup)
- **Klamath Meadows Partnership** (Conservation and restoration of meadows)
- **Mooretown Rancheria** (Storrie Fire Serpentine and Clustered Lady Slipper Fire Restoration Project)
- **National Fish and Wildlife Foundation** (TAC for wildfire restoration projects)
- **National Park Service** (Reestablishing natural fire regimes in red fir forests project)
- **North Yuba Forest Partnership**
- **Northern Arizona University** (Changing wildfire management strategies project)
- **Northern California Prescribed Fire Council** (Promote, protect, and expand use of prescribed fire in Northern California fire-adapted landscapes)
- **Pacific Northwest Research Station** (NWFP Forest Planning science synthesis; NWFP Bioregional Assessment data resolution; Potential Natural Vegetation map expansion, Beaver Creek Pinery project, Teakettle Experimental Forest)
- **Pacific Southwest Research Station** (Post-fire restoration framework GTR, TCSI, Caples Creek, Caples Creek Watershed, North Yuba Partnership, Sagehen, meadow monitoring, NWFP science synthesis; Klamath Mts: fire severity study, Teakettle Experimental Forest, Indiana Summit Research Natural Area post-fire ecological monitoring, Reestablishing natural fire regimes in red fir forests project, Camp Fire post-fire restoration, reburn severity project)
- **Penn State University** (Beaver Creek Pinery, Joint Fire Science Project)
- **Plumas Audubon Society** (Moonlight Fire Aspen Restoration Project)
- **Plumas Corporation** (Eastern Sierra Fire Restoration and Maintenance Project (ESCCRP)
- **Point Blue** (ACCG Monitoring Workgroup, King Fire Variable Density Salvage Study, Power Fire Post Fire Restoration Impacts on Birds)

- **Region 5 Remote Sensing Lab** (Post-fire restoration framework GTR, LiDAR applications and development, remote sensing applications, landscape-scale restoration, whitebark pine statewide assessment, Creek Fire resilience and recovery project)
- **San Diego State University** (conservation strategy for montane forests in southern California)
- **San Francisco Estuary Institute** (Comparison of Meadow Assessment Protocols)
- **Santa Barbara Botanic Garden**
- **Save the Redwoods League** (Giant sequoia grove post-fire monitoring)
- **Sierra Institute** (Bucks Lake Wilderness citizen science wilderness monitoring program)
- **Sierra Nevada Conservancy** (Grant Grove & Hume Lake forest resilience project, Ishi Fire Restoration Project, TCSI, North Yuba Partnership landscape-scale restoration, Eastern Sierra Fire Restoration and Maintenance Project (ESCCRP)
- **Sierra Nevada Meadow Partnership**
- **Sonoma State University** (graduate committee member)
- **South Fork of the American Cohesive Strategy Collaborative** (SOFAR)
- **Spatial Informatics Group** (landscape-scale monitoring, Burney Hat Creek CFLRP)
- **Tehama RCD** (Ishi Fire Restoration Project)
- **The Nature Conservancy** (Northern and Southern Sierra Partnership climate change adaptation planning, ecological forestry, North Yuba Partnership, Tahoe-Central Sierra Initiative)
- **University of California, Berkeley** (reburn severity Joint Fire Science project, managed wildfires and forest carbon stability and pyrodiversity project)
- **University of California, Davis** (Ecology field crews, Sierra Nevada tree mortality project, Yuba Drone Validation, Camp Fire post-fire restoration, meadow mapping the Klamath mountains, Sierra Nevada tree mortality project)
- **University of California-Riverside** (Powerhouse Fire restoration)
- **University of California-Santa Barbara** (graduate committee member, ecological and monitoring support to S. California national forests, fuel-break restoration methods study)
- **University of Nevada at Reno** (Climate Change Refugia Conservation**,** CFLRP monitoring)
- **University of Nevada Cooperative Extension** (Comparison of Meadow Assessment Protocols)
- **University of New Mexico** (Teakettle Experimental Forest restoration project)
- **University of Washington** (Creek Fire resilience and recovery project)

- **University of Wisconsin** (acoustic monitoring in the Burney Hat Creek CFLRP)
- **US Fish and Wildlife Service** (Comparison of Meadow Assessment Protocols)
- **USDA California Climate HUB** (Creek Fire restoration project)
- **USDA Forest Service Forest Health and Protection** (Tree mortality monitoring project)
- **USGS Southwest Climate Adaptation Science Center** (conservation strategy for montane forests in southern California)
- **Western Klamath Restoration Partnership** (Ecological restoration of landscape fire)
- **Yosemite Stanislaus Solutions Group**
- **34 North** (landscape-scale monitoring, Burney Hat Creek CFLRP)

Ecology Program staff at Table Mountain near Oroville