Pacific Southwest Region
Ecology Program
Annual Report

FY 2020

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

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R-5 Regional 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 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:

- provide expert ecological input and advice to the Regional Forester, Regional Office staff, and Region 5 Forests and Districts
- assist in development of Regional ecological priorities as they pertain to the USDA and USFS Strategic Plan goals and R5 Strategic Priorities
- act as the principal ecological liaison between USFS Region 5 and other federal and state agencies, research institutions, NGOs, public and media
- provide assistance to the Province Ecologists in the form of funding, technical expertise, logistical support
- provide assistance and ecological input to bioregional and forest assessments for Forest Plan processes
- develop and steward applicable Regional and National standards
- review Ecology Program work plans and products

- aid in the recruitment of qualified candidates for ecology positions Regionwide
- represent Region 5 and the Regional Ecology Program at local, Regional, and National functions and events
- support Region 5 Forests in their interpretation and implementation of the R5 Ecological Restoration initiative
- support Region 5 efforts to manage for climate change mitigation and adaptation
- coordinate Fire Return Interval Departure mapping in Region 5
- serve on the executive committee for the California Fire Science Consortium
- manage the Research Natural Area (RNA) Program
- serve 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
- climate change interpretation
- support to fuels treatment planning
- inventory and monitoring design, implementation and analysis
- 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) is partially supported by a Regional earmark. In FY 2019 total earmark funding came to $950,000 (NFHF), about 75% of the REP's base cost. Province Ecologists supplement their Regional allocation with Forest-level funding and funding derived elsewhere (examples include USFS State and Private Forestry, the Tahoe Science Program, the Joint Fire Sciences Program, and various California state agencies such as Cal Fire 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 ten in 2016. The Regional Ecology

Program is a national leader in developing partnerships (see p. 63) 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.

Region 5 Regional Ecology Program staff retreat, Quail Ridge UC Natural Reserve, April 2018

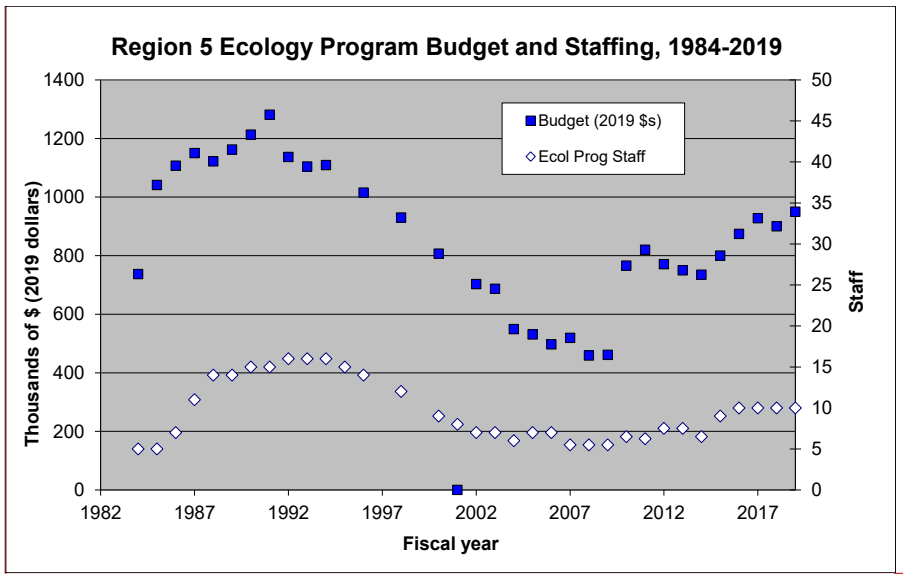

Figure 1. Ecology Program (REP) funding (does not include Regional and Assistant Regional ecologists, who are funded from RO internal budget), and number of REP staff (including RO staff), 1984-2019.

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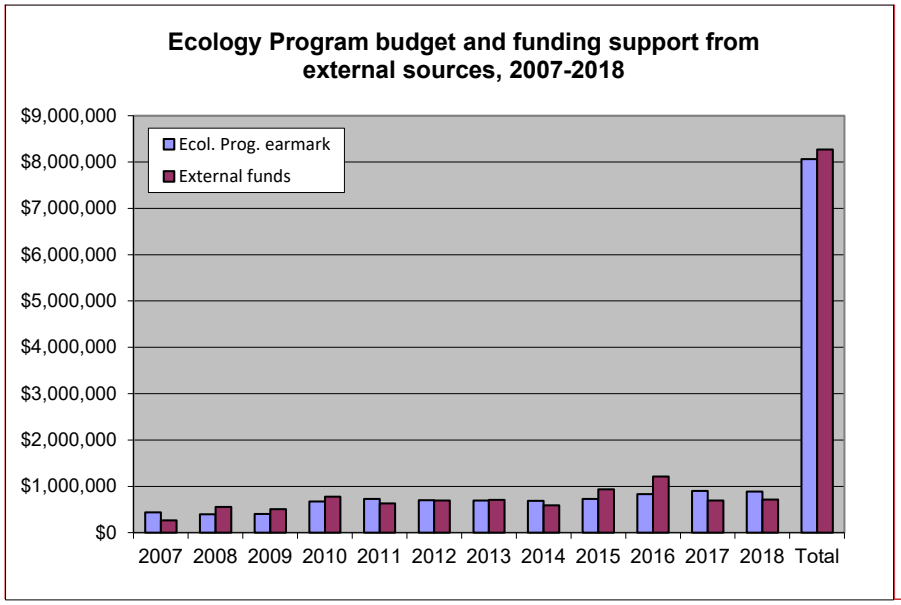

Figure 2. REP earmark funding and funding secured from external sources by the REP, 2007-2019. "External" = funding from outside the Region 5 National Forest System annual budget.

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REGIONAL ECOLOGY PROGRAM PUBLICATIONS AND REPORTS

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Bohlman, G.N., H.D. Safford, C. Skinner. In press. Natural Range of Variation (NRV) for Yellow Pine and Mixed Conifer Forests in Northwestern California and Southwestern Oregon, USA. Gen. Tech. Rep. PSW-GTR-XXX. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station.

Bost, D. M., J. Reilly, E. S. Jules, M. H. DeSiervo, Z. Yang, R. J. Butz. 2019. Assessing spatial and temporal patterns of forest decline across a diverse landscape in the Klamath Mountains, CA, USA using a 28-year Landsat time-series. *Landscape Ecology* 4:2599–2614. https://doi.org/10.1007/s10980-019-00907-7

Bovee, K. M., K.E. Merriam, M. Coppoletta. 2021. Mechanically-created gaps promote flowering and seed set of rare Penstemon personatus: disentangling canopy opening from ground disturbance. Forest Ecology and Management: 480.

Bovee, K.M., K.E. Merriam, M.C. Gosejohan, M.C., P.J. Weisberg. 2019. Long-term benefits to vernal pool annuals may outweigh short-term consequences of livestock grazing on the Modoc Plateau. Proceedings of the conference: Vernal Pool Landscapes: Past, Present, and Future, April 11, 2018, Chico, California. Studies from the Herbarium 20: 27-44.

Coppoletta, M., B. Collins, S. Markwith, K. Merriam, A. Paudel, Z.L. Steel, J. Lydersen, D. Foster. 2020. Effects of post-fire management on vegetation and fuels following successive wildfires in mixed conifer forests. Joint Fire Science Program Final Report (Project ID: 16-1-05-13) https://www.firescience.gov/projects/16-1-05-13/project/16-1-05-13_final_report.pdf.

Coppoletta, M.; M.D. Meyer, M.P. North. In press. Natural Range of Variation (NRV) for Red Fir and Subalpine Forests in Northwestern California and Southwestern Oregon, USA. Gen. Tech. Rep. PSW-GTR. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station.

Dove, N. C., H. D. Safford, G. N. Bohlman, B. L. Estes, and S. C. Hart. 2020. High-severity wildfire leads to multi-decadal impacts on soil biogeochemistry in mixed-conifer forests. Ecological Applications 00(00):e02072. 10.1002/eap.2072

Estes, B., R. Butz, M. Slaton, J. Kerkering. 2019. Opuntia mapping and monitoring in Kenya. USFS Technical Mission Report (Session III). 32 pp.

Fettig, C.J., A. Wuenschel, J. Balachowski, R.J. Butz, A.L. Jacobsen, M.P. North, S.M. Ostoja, R.B. Pratt, R.B. Standiford. 2019. Drought management recommendations for California. In: Vose, J., T. Patel-Weynand, D. L. Peterson, and C. H. Luce, eds. Drought impacts on U.S. forests and rangelands: Translating science into management responses. WO-GTR-98.

Washington, DC: U.S. Department of Agriculture, Forest Service, Washington Office: 71–93.

Gross, S., J. Greenberg, K. Merriam. In press. Comparison of Meadow Assessment Protocols. Region 5 Technical Report, USDA Forest Service, Vallejo, California.

Gross, S. U. Wijayratne, G. Bohlman, R. Butz. 2020. Natural Range of Variation of Non-Meadow Riparian Habitat in the Northwestern Bioregion Assessment Area. Unpublished report. USDA Forest Service, Pacific Southwest Region, Vallejo, CA.

Lydersen, J.M., B.M. Collins, M. Coppoletta, M.R. Jaffe, H. Northrop, S.L. Stephens. 2019. Fuel dynamics and reburn severity following high severity fire in a Sierra Nevada mixed-conifer forest. Fire Ecology. 15(1) 43.

McCord, M.G., M.J. Reilly, E.S. Jules, R.J. Butz. 2020. Early seral pathways of vegetation change following repeated, short interval high-severity wildfire in a low elevation mixed-conifer-hardwood forest landscape of the Klamath Mountains, California. Canadian Journal of Forest Research 50(1):13-23. https://doi.org/10.1139/cjfr-2019-0161

McGarigal, K., B. Estes, S. Conway, M. Tierney, T. Walsh, L. Perrot, E. Smith. 2020. Upper Yuba River Watershed Historical Range of Variability and Current Landscape Departure. 208 pages.

Merriam, K.E., M.C. Gosejohan, P.J. Weisberg. 2019. Hydrologic influences on plant community structure in vernal pools of northeastern California. Proceedings of the conference: Vernal Pool Landscapes: Past, Present, and Future, April 11, 2018, Chico, California. Studies from the Herbarium 20: 45-59.

Meyer, M.D.*, J.W. Long, and H.D. Safford (editors). In press. Restoring post-fire landscapes in California's national forests. Gen. Tech. Rep. PSW-GTR-2xx. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station.

Meyer, M.D., J.W. Long. H.D. Safford, S.C. Sawyer, M.P. North, A.M. White. 2020. Principles of post-fire restoration. Chapter 1 in Restoring post-fire landscapes in California's national forests, Meyer, M.D., J.W. Long, and H.D. Safford (editors). Gen. Tech. Rep. PSW-GTR-2xx. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station.

Meyer, M.D., M. Slaton, A. Wuenschel, K.E. Merriam. 2020. Sagebrush steppe case study. Chapter 7 in Restoring post-fire landscapes in California's national forests, Meyer, M.D., J.W. Long, and H.D. Safford (editors). Gen. Tech. Rep. PSW-GTR-2xx. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station.

Meyer, M.D., M.R. Slaton, S.E. Gross, R.J. Butz, C. Clark. In review. Structure, Composition and Health of Whitebark Pine Ecosystems in California: A Statewide Assessment. Canadian Journal of Forest Research.

Meyer, M.D., A. Wuenschel, M. Slaton. 2020. Indiana Summit Research Natural Area post-fire ecological assessment. Unpublished report. USDA Forest Service Pacific Southwest Region, Bishop, CA. 37 p.

Molinari, N.A. and C. D'Antonio. 2020. Where have all the wildflowers gone? The role of exotic grass thatch. *Biological Invasion.* 22: 957-968.

Molinari, N.A. and M. Meyer. 2020. Fire and Restoration in Mediterranean Ecosystems. *International Programs Report.*

Molinari, N.A., E.C. Underwood, S.C. Sawyer, R.J. Butz. 2020. California chaparral case study. Chapter 5 in Restoring post-fire landscapes in California's national forests. Meyer, M.D., J.W. Long, & H.D. Safford (editors). Gen. Tech. Rep. PSW-GTR-2xx. Albany, CA: U.S. Department of Agriculture, Pacific Southwest Research Station.

Reilly, M. J., M. McCord, S. Brandt, K. Linowski, R. J. Butz, E. S. Jules. 2020. Repeated, high-severity wildfire catalyzes invasion of nonnative plant species in forests of the Klamath Mountains, northern California, USA. *Biological Invasions* 22:1821–1828. https://doi.org/10.1007/s10530-020-02227-3

Reilly, M.J., E.S. Jules, V. Monleon, R.J. Butz. 2019. Range-wide population structure and dynamics of a serotinous conifer, knobcone pine (*Pinus attenuata* L.), under an anthropogenically-altered disturbance regime. *Forest Ecology and Management* 441:182-191. https://doi.org/10.1016/j.foreco.2019.03.017

Safford, H.D., R.J. Butz, G.N. Bohlman, M. Coppoletta, B.L. Estes, S.E. Gross, K.E. Merriam, M.D. Meyer, N.A. Molinari, A. Wuenschel. In press. Fire ecology of the North American Mediterranean-climate zone. In: B. Collins and C.H. Greenberg, eds. Fire ecology and management of US forested ecosystems: past, present, and future. Springer.

Slaton, M., M. Meyer, S. Gross, J. Nesmith, J. Dudney, P. van Mantgem, R.J. Butz. 2019. Subalpine sentinels: the status of whitebark pine (*Pinus albicaulis*) in California. *Fremontia* 47(1):34-42.

Slaton, M., J. Holmquist, M. Meyer, R. Andrews, J. Beidl. 2019. Traditional ecological knowledge used in forest restoration benefits natural and cultural resources: the intersection between Pandora moths, Jeffrey pine, people, and fire. Natural Areas Journal 39(4):461-471. article weblink

Steel, Z.L., M.J. Goodwin, M.D. Meyer, G.A. Fricker, H.S.J. Zald, M.D. Hurteau, M.P. North. In press. Do forest fuel reduction treatments confer resistance to beetle infestation and drought mortality? Ecosphere.

Stephens, S.L., M.A. Battaglia, D.J. Churchill, B.M. Collins, M. Coppoletta, C.M. Hoffman, J.M. Lydersen, M.P. North, R.A. Parsons, S.M. Ritter, J.T. Stevens. In press. Forest restoration and fuels reduction: Convergent or divergent? Bioscience.

Taylor, A.H., C. Airey-Lauvaux, B. Estes, L. Harris, C.N. Skinner. 2020. Spatial patterns of nineteenth century fire severity persist after fire exclusion and a twenty-first century wildfire in a mixed conifer forest landscape, Southern Cascades, USA. Landscape Ecology.

Vanderhoof, M.K., T.J Hawbaker, A. Ku, K.E. Merriam, E. Berryman, M. Cattau. In press. Tracking rates of post-fire conifer regeneration distinct from deciduous vegetation recovery across the western United States. Ecological Applications.

Williams, J.N., J.W. Long, M.D. Meyer, B. Estes, H.D. Safford. 2020. In press. Post-fire regeneration in yellow pine-mixed conifer forests of California: challenges, tools and applications for fire-adapted forests. In: B. Collins and C.H. Greenberg, eds. Fire ecology and management of US forested ecosystems: past, present, and future.

Williams, J.N., J.W. Long, M.D. Meyer, B. Estes, M. Coppoletta, H.D. Safford. In press. Predicting post-fire conifer regeneration in California forests: current state, future directions, and applications to Mediterranean Basin forest. In: Pines and their mixed forest ecosystems in the Mediterranean Basin.

Wuenschel, A., M. Meyer, K. Shive. 2020. Fire Effects of the 2017 Railroad Fire on the Nelder Grove. Report to Sierra National Forest and the Department of Justice. USDA Forest Service, Pacific Southwest Region, North Fork, CA.

Young, D.J., B. Estes, S. Gross, A. Wuenschel, M. Meyer, C. Restaino. In review. Forest thinning can increase resistance to extreme drought except in very dry sites.

Young, D.J., A.M. Evans, J.M. Inguez, A. Thode, M.D. Meyer, S.J. Hedwall, S. McCaffrey, and P. Shin. In press. Effects of policy change on wildland fire management strategies: Evidence for a paradigm shift in the western US? International Journal of Wildland Fire. https://www.publish.csiro.au/WF/pdf/WF19189

Young, D.J., M. Meyer, B. Estes, S. Gross, A. Wuenschel, C. Restaino, H.D. Safford. 2020. Forest recovery following extreme drought in California, USA: natural patterns and effects of pre-drought management. Ecol. Appl. 30(1): e02002. https://doi.org/10.1002/eap.2002

R5 ECOLOGY PROGRAM MAJOR ACCOMPLISHMENTS

LINKS TO USDA & USFS STRATEGIC GOALS AND REGION 5 STRATEGIC PRIORITIES

USDA STRATEGIC PLAN 2018-2022

(https://www.usda.gov/sites/default/files/documents/usda-strategicd-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.fed.us/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

(Regional Ecologist and Assistant Regional Ecologist accomplishments are combined; Assistant position is currently vacant)

Commented [WL-F4]: Hugh add in RO accomplishments. I left what was here from FY19 in case there was overlap.

Ecological Restoration

- Project leader for ecosystem services assessment of southern California National Forests
- Project leader, Natural Range of Variation assessments for Northern Province Forests
- Visited Mountain Fire for preliminary assessment of tree regeneration, San Bernardino NF
- Updated and revised Fire Return Interval Departure (FRID) mapping for California
- Finished draft NRV assessment for yellow pine and mixed conifer for California NWFP area
- Presented to Sierra Nevada Conservancy field trip to Rim Fire, Stanislaus National Forest
- Carried out third segment of Fulbright Global Award, studying postfire restoration practices in Portugal
- Involved in early planning for Concow Creek watershed proposal to CalFire CCI

Vegetation, Fire and Fuels

- Taught 3-day Fire Ecology course for UC-Berkeley Jepson Herbarium field institute, April 2019

- Acted as director for Sierra Nevada region of the California Fire Science Consortium (CFSC)
- Gave two television interviews, four newspaper/online interviews, and one book interview on fire and fuels subjects
- Participated in "Northshore" project planning, Upper Lake District, Mendocino NF
- Supervised team that inventoried fire effects to wildfire and prescribe burned stands on Inyo National Forest, Springs Fire, July, 2019
- Trained and supervised crew that carried out forest inventory at UC-Valentine Reserve, Mammoth Lakes
- Participated in and lectured at Eastside prescribed fire and NRV workshop, Mammoth Lakes District, Inyo National Forest
- With collaborators from Yale University, carried out inventory of postfire tree regeneration in the Rim Fire, Stanislaus National Forest
- Provided crew to sample forest inventory plots on Mt. Palomar District, Cleveland NF
- Served on science advisory board, Center for Fire Research and Outreach, UC-Berkeley
- Organized FERAL (Forest Ecology Random Lecture) series at UC-Davis, hosted four eminent speakers
- Led multiple field trips for external groups to view Lake Tahoe Basin forest and fuel management projects
- Led field trip for Doris Duke foundation-supported *Conservation Scholars* program to Indiana Summit RNA on the Inyo National Forest
- Provided field support to inventory of Babcock Fire effects, Yosemite NP, August, 2019
- Participated in interagency prescribed fire, Bliss State Park, October, 2018
- Worked on firing team, prescribed fire at Sotcher Lake, Inyo National Forest, October, 2018
- Worked one day with prescribed burning teams associated with Springs Fire, Inyo NF, July, 2019

Forest Planning/NEPA

- Reviewed multiple Natural Range of Variation assessments for support of NWFP forest planning
- Served on GIS data committee for NWFP Forests
- Coordinated with Region 6 staff on data and mapping projects relating to NWFP forest planning

Inventory and Monitoring

- Completed inventory of forest succession in Gondola and Showers Fires, Lake Tahoe Basin
- Entered into collaborative agreement with CalFire to monitor prescribed fire effectiveness and effects across the Sierra Nevada

Climate Change

- Member, lead author team, 4th California Climate Change Assessment, Sierra Nevada section
- Member, steering committee, USDA Climate Hub, SW Region
- Reviewed MC2 dynamic vegetation model fire and carbon outputs for southern California
- Reviewed Ecoadapt True fir forests vulnerability assessment, NorCal climate change vulnerability assessment synthesis, March 2019
- Began project with UN-Reno collaborators to reconstruct past drought cycles from tree ring data in the Truckee and Carson River watersheds
- Was interviewed for a book on western forests and climate change
- Reviewed RIOCCADAPT (Latina American and Iberian climate change adaptation strategic planning) chapter on fire, November, 2018
- Project leader for ecosystem services assessment of Santa Clara River watershed, project includes evaluation of potential effects of climate change on services; joint project with University of California, US Geological Survey, PSW Research Station, Michigan State University
- Member of team carrying out Socioeconomic Climate Change Vulnerability Assessment for southern California
- Worked with USFS International Programs staff and UC-Davis partners to organize and implement International Climate Change and Natural Resources Management Seminar; trained 25 international land and resource managers

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
- Reviewed multiple proposals for scientific research and management actions in Region 5 RNAs
- Co-author on publication examining fire-vegetation relationships in California RNAs

Other Activities

- Met with IP staff to begin planning for pollinators and forest management workshop to be held in Davis in winter, 2020
- Hosted four interns from the International Forestry Fellows Program, one from Sweden and three from Georgia; hosted an intern from the University of Cumbria, England
- Collaborator on USDA-Hispanic Serving Institutions Program grant with faculty from San Diego State University to engage Hispanic students in forestry and natural resource science
- Published or have in press 24 scientific papers and book chapters

- Visited 10 National Forests in Region 5 and one National Forest in Region 3 during the course of the fiscal year
- International missions and support:
  - Worked with USFS-International Programs to develop agenda for International Climate Change and Natural Resources Management Seminar
  - Gave presentation on climate change and forest management and led subalpine forest field trip for Mandela Washington Fellows group (young African leaders), June, 2019
  - Attended MedPine 6 conference, Tel Aviv, Israel, lectured on fire use in management, October, 2018
  - Led field trip to LTBMU management field sites for USFS-International Programs Middle East and Africa staff
  - Carried out two technical assistance visits to postfire restoration project and delivered report to University of Lisbon working group, Cascais, Portugal
  - Hosted five international forestry interns, summer and fall, 2019, from Sweden, Georgia (3), and England
  - Gave lectures on USFS ecosystem and fire management practices to University of Swansea (Wales), Universidad Politécnica (Madrid, Spain), Universidade de Lisboa (Portugal), and European Forest Institute-Mediterranean branch, (Barcelona, Spain)

REP/CALIFORNIA FIRE SCIENCE CONSORTIUM COST SHARE

Commented [WL-F5]: Hugh update?

Position was vacant for all of fy 2019, program of work carried out by REP/UC-Davis costshare ecologist and Regional Ecologist

Vegetation, Fire and Fuels

- Coordinated program of work for Sierra Nevada section of Cal. Fire Science Consortium
- Helped organize two VFF workshops on the Inyo National Forest
  - Jeffrey pine management workshop, May
  - Eastside prescribed fire and NRV workshop, October
- Helped with organization of field trip to Jeffrey pine prescribed fire and forest thinning sites, Inyo National Forest
- Wrote and oversaw completion of ten science briefs on important publications in fire and vegetation ecology and management
- Hosted four distinguished speakers on forest ecology and management topics as a part of the FFERAL lecture series at UC-Davis
- Attended annual meetings and conference calls for the California Fire Science Consortium

Inventory and Monitoring

- Completed study evaluating effectiveness of forest thinning in mitigating bark beetle induced mortality across the Sierra Nevada

REP/UC-DAVIS ECOLOGY COST SHARE (50% position)

Commented [WL-F6]: Hugh update?

See REP/CFSC costshare position for more accomplishments

Vegetation, Fire and Fuels

- Conducted monitoring of red fir forest status after forest thinning, LTBMU sites
- Leading study examining the relationship between pre-fire bark beetle mortality and subsequent wildfire severity in Sierra Nevada mixed-conifer forests
  - Carried out 2019 field data collection, analyzed data and began manuscript
- Received grant from CalFire to investigate forest ecosystem recovery from drought and beetle mortality in terms of carbon, tree regeneration, and plant communities
  - Hired postdoctoral scholar to head project, carried out 2019 field data collection
- Attended 2-week prescribed fire training in Oregon, received red card through USFS sponsorship
- Participated in three prescribed fires
- Provided support to California Fire Science Consortium in absence of CFSC technical coordinator

Other Activities

- Hired and managed Regional Ecology Program and Safford Lab field crews: wrote position descriptions; coordinated review of applicants and hiring of crew members; reviewed and approved timesheets; processed crew reimbursement requests; managed vehicle rental, maintenance, damage reports, and returns; coordinated 2019 crew evaluations.
- Agreements: acted as UC-Davis point-of-contact for incoming agreements
- Accounts: monitored account activity; investigated issues; provided information to USFS staff as requested
- Technical activities including installing/updating software, researching/coordinating field supply purchase
- Wrote end-of-year and mid-year progress reports for USFS-UCD funding agreements

International Forestry Fellows Program interns, Mammoth Lakes

Jepson Herbarium fire ecology field course, Hopland REC and Mendocino National Forest

California Fire Science Consortium annual meeting, Carr Fire field trip

Forestry for Lawyers field course, Plumas National Forest

Doris Duke Conservation Scholars on Bald Mountain, Inyo National Forest

Safford lab and affiliates, UC-Davis Department of Environmental Science and Policy

Commented [WL-F7]: Hugh – send Laura photos and captions from this year to add in throughout report. These are from last year (keeping them in for ease of formatting when adding new ones).

PROVINCE ECOLOGY PROGRAMS

CENTRAL SIERRA PROVINCE

Provincewide

Ecological Restoration

- Presentation on Sierra Nevada Forest Ecology and Management to the UC California Naturalists Program
- Participated on Western Aspen Alliance Steering Committee
    - Development of Region 5 Aspen working group and work on MOU
- Participated in Sierra Nevada Meadow Partnership
    - Contributed to development of monitoring plan – leading the development of vegetation protocols
- Presented at the Watershed Improvement Summit: A Roadmap to Resilience: Introducing the Tahoe-Central Sierra Initiative (TCSI) Resilience Framework, Assessment, and Blueprint
- Participated on 2020 Natural Areas Conference planning committee (conference was scheduled for Reno but was converted to virtual due to COVID19)
- Tahoe Central Sierra Initiative
    - Participated on development of TCSI research components with Science Committee (LIDAR and Historic Range of Variability)
    - Participated on Monitoring Committee
    - Participated on acquisition of Eldorado NF LiDAR
    - Contributed to HRV analysis for TCSI landscape through funded CalFire CCI grant

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
- Continued collaborative project with Southern Sierra Province: “Effectiveness of forest management treatments at reducing drought and bark-beetle caused tree mortality in California”
    - Completed final report for mortality monitoring work submitted to Forest Health and Protection. The project contributed to four publications (one still in review), two science briefs, 16 presentations to over 770 people, and an LA Times interview.

  - Young, D., B. Estes, S. Gross, A. Wuenschel, M. Meyer, and C. Restaino (in review). *Forest thinning can increase resistance to extreme drought except in very dry sites*. Tree core analysis.
- Participated on the California Fire Science Consortium (CFSC) steering committee
- Maintained red card certification
- Provided feedback on the POSCRPT natural regeneration tool integration with online resources
- Contributed to yellow pine/mixed conifer, chaparral, meadow/grassland and pinyon juniper portions of Safford, H.D., Butz, R., Bohlman, G.N., Coppoletta, M., Estes, B.L., Gross, S.E., Merriam, K.E., Meyer, M.D., Molinari, N.A., and Wuenschel, A. Fire ecology of the North American Mediterranean-climate zone. In: B. Collins and C.H. Greenberg, eds. Fire ecology and management of US forested ecosystems: past, present, and future. (in press)
- Contributed to Williams, John N., Long, Jonathan W., Meyer, Marc D., Estes, Becky, Safford, Hugh D. 2020. Post-fire regeneration in yellow pine-mixed conifer forests of California: challenges, tools and applications for fire-adapted forests. In: B. Collins and C.H. Greenberg, eds. Fire ecology and management of US forested ecosystems: past, present, and future. (in press)
- Development of FACTS – GI tool to summarize treatment by thinning, prescribed fire, wildland fire, and thinning/fire
- Participated in initiation of a re-analysis of FRID – Safford and Van DeWater 2014
- Presented at Association for Fire Ecology meeting in Tucson, AZ, Forest density-reduction treatments, stand structural characteristics, regeneration and climate mediate drought-induced tree mortality in forests of the Sierra Nevada, USA

Forest Planning/NEPA

- Completed Monitoring Planner Detail (Shana Gross)
- Provided guidance to pre-assessment forest planning for the Central Sierra Province
- Work on Natural Range of Variability Updates for forest planning
  - Completing Chaparral NRV for California in conjunction with the Northern and Southern California Province
    - Worked with RSL to obtain FIA data for current conditions in chaparral in California
  - Gross, S. U. Wijayratne, G. Bohlman, and R. Butz 2020. *Natural Range of Variation of Non-Meadow Riparian Habitat in the Northwestern Bioregion Assessment Area*. Unpublished report. USDA Forest Service, Pacific Southwest Region, Vallejo, CA.

Inventory and Monitoring

- Populated Element 3 (monitoring) of sustainability scorecard for the RO and all R5 forests
- Summarized whitebark pine data for the RO to utilize in development of the white bark pine conservation assessment.
    - Meyer, M.D., M.R. Slaton, S.E. Gross, R.J. Butz, and C. Clark (in review). *Structure, Composition and Health of Whitebark Pine Ecosystems in California: A Statewide Assessment*. Canadian Journal of Forest Research.
- Worked with other field crews to coordinate work on other projects to accomplish monitoring in the Central Sierra Nevada
- Gross, S., J. Greenberg, K. Merriam (eds). 2020. Comparison of Meadow Assessment Protocols. To be published as Region 5 Technical Publication. USDA Forest Service, Pacific Southwest Region, Vallejo, CA.
    - Presentation to Sierra Meadows Partnership
- Completing Ecology plot cards scanning and completion of data entry

Climate Change

- Worked to update Climate Trend Summaries for each Forest in the province by developing a template to update local Forest data
- Presentation for R5 Climate change integration: Translating Science into Management – Spatially explicit meadow vulnerability assessment and associated decision framework
- Presentation at Sierra climate change refugia workshop – Prioritizing and monitoring meadow conservation and restoration actions based on climate vulnerability
- Contributed to refugia workshop manuscript (in development): Climate Change refugia in the Sierra Nevada

Other Activities

- Maintained Ecologist Certifications with the Ecological Society of America, certified until 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
- Interviewed and selected two candidates from the International Forestry Fellowship Program (program was cancelled due to COVID19)
- Acted as Assistant Regional Ecologist for 6 weeks (Estes)

- Continued to provide support to an International Programs Detail in Kenya with the Northern Rangeland Trust (Estes)
    - Developed and distributed final monitoring protocol with virtual training videos to facilitate second year of monitoring

Presentations

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

- R5 Climate change integration: Translating Science into Management – Spatially explicit meadow vulnerability assessment and associated decision framework
- Sierra climate change refugia workshop – Prioritizing and monitoring meadow conservation and restoration actions based on climate vulnerability
- UC California Naturalists Program: Forest Ecology and Management
- Watershed Improvement Summit: A Roadmap to Resilience: Introducing the Tahoe-Central Sierra Initiative (TCSI) Resilience Framework, Assessment, and Blueprint
- Association for Fire Ecology meeting in Tucson, AZ: Forest density-reduction treatments, stand structural characteristics, regeneration and climate mediate drought-induced tree mortality in forests of the Sierra Nevada, USA

Collaboration

Collaborative Groups

- North Yuba Partnership, https://www.yubawater.org/317/North-Yuba-Forest-Partnership
- Amador-Calaveras Consensus Group (ACCG): http://acconsensus.org/about/members/
- Lake Tahoe West: https://www.nationalforests.org/who-we-are/regional-offices/california-program/laketahoewest
- South Fork of the American Cohesive Strategy Collaborative (SOFAR), http://sofarcohesivestrategy.org/
- Tahoe Central Sierra Initiative (TCSI), http://restorethesierra.org/tahoesierra/
- Sierra Nevada Meadow Partnership: https://www.sierrameadows.org/
- Yosemite Stanislaus Solutions Group: http://yosemitestanislaussolutions.com/

Eldorado National Forest

Ecological Restoration

- Caples Restoration Project
    - Coordinated with Fire Behavior Analyst Team (FBAT) to complete post fire effects monitoring and report completion which was presented at various meetings detailing initial first fire order effects
    - Provided input to Caples Creek interpretation signage post fire to be incorporated at trailhead
    - Provided input to article, California Looks to Battle Mega Wildfires with Fire by Jane Braxton Little
    - Developed post fire regeneration brief for the Caples Fire
    - Worked with collaborators to (e.g., California Academy of Science, CalFire, UC Davis on the Caples Watershed Project and coordination with the Academy to coordinate avian monitoring
    - Contributed to the recommended for funding WCB grant Metrics of Wildlife Community Resilience for Sierra Nevada Forests: Development and Application
- Provided feedback on meadow restoration at Calf Pasture. Cored trees to better understand age of encroaching conifers.

Vegetation, Fire and Fuels

- 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 draft Red Fir Management Strategy for the SOFAR collaborative
        - Developed a tool with GIS subgroup to prioritize red fir treatment

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

- Continued collaboration on projects in Power fire with Point Blue, Institute of Bird Populations, and PSW
- 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
  - Completed ACCG Ecological Indicator Report
  - 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
- Caples
  - 60 Mixed Conifer Common Stand Exams Sampled
  - 16 Aspen plots sampled at Martin Meadows

Climate Change

- Evaluated climate vulnerability models for red fir with SOFAR collaborative group as a basis for developing a red fir strategy. Collaborated with climate science experts to evaluate potential data sources.
- Began coordination to update the climate change summaries for the forest

Stanislaus National Forest

Ecological Restoration

- Participated on MOTOR Cross border field trip with Sierra National Forest to discuss current and potential restoration treatments

Vegetation, Fire and Fuels

- Participated in the fire risk assessment for the STF in collaboration with the Rocky Mountain Research Center
  - 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 (formerly MOTOR)
  - Part of expanded IDT 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 ForSyX 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
  - Completed Ecological Indicator Report
  - 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

Climate Change

- Used STF as example for updated climate trend summary template

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
- Contributed to the successful award of Yuba Headwater Aspen Restoration Assessment and Planning grant from WCB to South Yuba River Citizens League
- Participation in Our Forests Community Partners Program promoting environmental education (postponed due to COVID19)

Vegetation, Fire and Fuels

- Participated on North Yuba Partnership
  - Attended steering and planning committee meetings
  - Part of the planning workgroup and the TCSI science integration team
  - Led development of Ecological Assemblages for the Strategic Area Risk Assessment and participated in group organizing the logistics of the assessment
  - Synthesized EDART data for evaluation of current conditions

    - Contributed to the CFLRP application for the North Yuba Partnership that has been recommended for funding
    - Contributed to the WCB grant application for the North Yuba Restoration Project that has been recommended for funding
    - Contributed to a newsletter submission on the use of historic range of variability in planning for Blue Forests
- Contributed to the WCB grant application for Yuba River Headwater Aspen Restoration Assessment and Planning that has been recommended for funding.
- Middle Truckee River Watershed – Synthesized EDART data for development of condition units

Forest Planning/NEPA

- Participated with working group on developing Historic Range of Variability in the North Yuba Watershed
    - Held two workshops to fine tune data outputs to meet the needs of project planning for the North Yuba Partnership
    - Developed Biophysical units used to assess the HRV at the stand level to aid with project level planning
    - Presented results of Yuba River HRV project to the FLT
- Contributed to the Tahoe National Forest Wildfire Plan Amendment process through the scoping process, Managing natural fire for multiple resource benefits

Inventory and Monitoring

- Post-treatment project effectiveness monitoring at Sagehen Experimental Forest, 48 vegetation plots sampled (remaining plots will be sampled Oct 2020).
- Ten transects established at Bear Trap to evaluate the effectiveness of conifer removal from meadows
    - Trained SYRCL for the establishment of conifer effectiveness transects at Chapman and Freeman Meadows
- Van Norden Meadow – trained SYRCL on Sierra Meadow Partnership Vegetation Monitoring Protocol

Climate Change

- Continued work on drafting manuscript on the Future Range of Variability in the North Yuba watershed based on RM Lands outputs
- Began coordination to update the climate change summary for the forest

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
    - Contributed to Landscape Restoration Strategy
    - Reviewed science modeling feedback
    - Developing Lessons Learned Document based off of a collaborative survey and workshop
    - Participated in Monitoring Team to develop a LTW monitoring plan
    - Collaborated with PSW on riparian/meadow monitoring to support LTW
- Restoration of fire adapted ecosystems
    - Participated in development of burn plan for Star Meadow and Benwood Meadow
    - Awarded TRPA Best in Basin for Baldwin meadow broadcast burn as part of the Restoration of Fire Adapted Ecosystems project (80-acre wet meadow burn in FY2019).
    - Hosted a field tour of meadow restoration projects to two neighboring Forests (Plumas and Lassen) to share opportunities for meadow restoration techniques.

Vegetation, Fire and Fuels

- Updated LTB READ preparedness documents – served as Co-lead READ
- Meeks Meadow
    - Review of Washoe Tribe of CA and NV cultural plan
    - Participation in development of monitoring plan

Forest Planning/NEPA

- Provide feedback to TRPA regarding meadow monitoring and delineation:
    - Participated in the development of a remote sensing conifer encroachment assessment method – translated to TRPA threshold reporting
    - Provided feedback on NDVI meadow monitoring tool DRI developed and how to apply to TRPA's threshold reporting

Inventory and Monitoring

- Reviewed upland ecosystem science to action plan – Tahoe Science Advisory Committee Work Order #015 initiated by CTC

- Oversaw LTB long term meadow data collection, 8 plots were sampled that were inaccessible in 2019 due to flooding as well as additional restoration plots at the Upper Truckee River
- 14 vegetation plots paired with 14 piezometers at Meeks meadow in coordination with the Washoe Tribe of CA and NV

Climate Change

- Participated in the development of a Climate Action Portfolio for the Lake Tahoe Basin – effort led by California Tahoe Conservancy
- Provided feedback on the City of South Lake Tahoe's Climate Action Plan

Field trip to the North Yuba Watershed with the North Yuba Partnership. This stop was at Saddleback Lookout to get a bird's eye view of the project area.

Workshop with partners on the Tahoe NF discussing results from the Historic Range of Variability analysis and identifying incorporation into project planning.

Beverly Bulaon with USDA Forest Service, Forest Health and Protection trains the Central Sierra Ecology field crew on how to identify causes of tree mortality following the 2019 Caples Fire on the Eldorado NF.

Aspen resprout monitoring training with the Central Field Crew and Amador Calaveras Consensus Group monitoring work group following restoration treatments at Martin Meadows on the Eldorado NF.

The Central Sierra Ecology field crew lays out transects in a monitoring plot at Sagehen Experimental Forest.

The field crew trying to locate a long-term monitoring plot on the Truckee Marsh, LTBMU.

NORTHERN PROVINCE

Provincewide

Ecological Restoration

- Co-author of post-fire restoration GTR being written by the Regional Ecology Program, forest staff, and PSW researchers
- Co-author of Interventions to Restore Wildfire-Altered Forests in CA GTR written by PSW researchers, Regional Ecology Program, and forest staff.
- Expanded engagement with Humboldt State University professors and students in the areas of ecological restoration, climate change, and fire management
- Co-founder and 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 R5 and PNW in R6
- Coordinator for Research Natural Areas (RNAs) in 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
- Participated in monthly meetings with southwestern Oregon Zone ecologist, Nature Conservancy forester, and other professionals working in forests located in southwestern Oregon and northern California
- Member of the Northern Province Fire Ecology Working Group

- Published several papers on drought-induced mortality, post-fire regeneration following multiple burns, post-fire invasive species colonization, reintroduction of fire, and the conservation of rare conifer species:
    - Bost, D. M. J. Reilly, E. S. Jules, M. H. DeSiervo, Z. Yang, and R. J. Butz. 2019. Assessing spatial and temporal patterns of forest decline across a diverse landscape in the Klamath Mountains, CA, USA using a 28-year Landsat time-series. *Landscape Ecology* 4:2599–2614. https://doi.org/10.1007/s10980-019-00907-7
    - McCord, M. G., M. J. Reilly, E. S. Jules, and R. J. Butz. 2020. Early seral pathways of vegetation change following repeated, short interval high-severity wildfire in a low elevation mixed-conifer-hardwood forest landscape of the Klamath Mountains, California. *Canadian Journal of Forest Research* 50(1):13-23. https://doi.org/10.1139/cjfr-2019-0161
    - Meyer, M. D., S. E. Gross, M. Slaton, R. J. Butz, and C. Clark. *In review.* Structure, composition, and health of whitebark pine ecosystems in California: a statewide assessment. *Canadian Journal of Forest Research.*
    - Reilly, M. J., M. McCord, S. Brandt, K. Linowski, R. J. Butz, and E. S. Jules. 2020. Repeated, high-severity wildfire catalyzes invasion of nonnative plant species in forests of the Klamath Mountains, northern California, USA. *Biological Invasions* 22:1821–1828. https://doi.org/10.1007/s10530-020-02227-3
- Ongoing application of the Post-fire Spatial Conifer Regeneration Prediction Tool (Shive et al. 2018) 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

Forest Planning/NEPA

- BioRegional Assessment
    - Completed Bioregional Assessment (BioA) and Supplemental Report for 19 National Forests in the NWFP area
        - Lead author for chapters in both the BioA and Supplemental Report:
            - Wildlife
            - Climate change
        - Significant input for chapters and supplemental materials in both the BioA and Supplemental Report on:

        - Fire ecology
        - Forest ecology
        - Invasive species
        - Non-forested systems
- Pre-Assessments and Forest Assessments
    - Vegetation and fire ecology lead
        - Data coordination between R5 and R6
            - Build and review data crosswalks
            - Decision support
        - 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
        - Vegetation stratification
    - Northern Province lead for the Climate Change Vulnerability Assessment
    - Natural Range of Variation Assessments (drafts and completed documents)
        - Chaparral
        - Douglas-fir
        - Yellow pine and Mixed conifer
        - Riparian
    - Coastal Mountains Wildfire Risk Assessment
        - HVRA point of contact and Province lead
- Member of the joint R5/R6 Ecological Sustainability Workgroup formed to identify data layers for use in forest plan revision, resolve conflicts between R5 and R6 layers, and review/advise on creation of new PNV layers for the Bioregional Assessment
    - Provided feedback for Potential Natural Variation mapping efforts of the California portion of the NWFP
- 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 new EVEG layers for the Northern Province forests
- Continued collaboration with the R5 Remote Sensing Lab to create and ground truth a seral stage geospatial interface (GI) tool for the Northwest Forest Plan forests
- Continued working with Northwest Forest Plan forest wildlife biologists and the R5 Remote Sensing Lab to create revised NSO 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

- Northern Spotted Owl habitat layers planning with wildlife biologists and Province Resource Board
- Regular forest planning calls with Regional planning team

Inventory and Monitoring

- Analyses of data and publication preparation 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
- Led pilot effort to develop a comprehensive map of meadows across the Northern Province

Climate Change

- Completed Climate Change Vulnerability Assessments for NW California with EcoAdapt: http://ecoadapt.org/programs/adaptation-consultations/norcal/products
    - Presentation of completed assessments to NWFP Planning Team

Other Activities

- Adjunct Professor in the Department of Forestry and Wildland Resources at Humboldt State University
- Certified as *Senior Ecologist* by the Ecological Society of America
- Reviewed scientific manuscripts for:
    - *Ecological Applications*
    - *Forest Ecology and Management*
    - *International Journal of Wildland Fire*
    - *Journal of Arid Environments*
    - *PLOS One*
- Presented to Diana Craig and Barney Gyant on select projects
- 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
- Basic first aid and 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
- Acting associate regional ecologist

- Research Natural Area (RNA) coordinator for Northern Province

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)

Klamath National Forest

Ecological Restoration

- Ongoing support to the Western Klamath Restoration Partnership (WKRP) for meetings, field visits, monitoring, modeling, LiDAR, and science core team participation

Vegetation, Fire and Fuels

- Provided ongoing support and roll-out assistance to the R5 Remote Sensing Lab for new Klamath existing veg layer (EVEG) and new Fire Return Interval Departure (FRID) layer
- Provided updated summaries of fire return interval departures (FRID) at the forest and district level
- Worked with UC Davis (Landscape Management Unit tool) and forest fire ecologists to develop a spatial layer identifying 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 – 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

Inventory and Monitoring

- Provided ecological monitoring section for the FY 2019 Monitoring and Evaluation Report

Climate Change

- Provided project-level support on climate change questions as requested
- Provided input on the effects of thinning on carbon sequestration to support a grant application

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 FY20 program of work
- Responded promptly to Dry Lake/Horse Creel FOIA requests

Mendocino National Forest

Ecological Restoration

- Incorporated the post-fire spatial conifer regeneration prediction tool (POSCRPT) output into the 2018 Ranch Fire post-fire restoration strategy

Vegetation, Fire and Fuels

- Provided ongoing support and roll-out assistance to the R5 Remote Sensing Lab for new Mendocino existing veg layer (EVEG) and new Fire Return Interval Departure (FRID) layer

Forest Planning/NEPA

- Participated in FireScape Mendocino collaborative meetings and the Landscape-Scale Vegetation working group calls, meetings, and field exercises
    - Participated in workshop in Stonyford, March 2020

Climate Change

- Provided project-level support on climate change questions as requested
- Provided input for the climate change scorecard as requested

Other Activities

- Met with Mendocino NF natural resources to facilitate future coordination and build FY 2020 program of work
- Provided support to MNF Fire Ecologist and Natural Resources staff as requested

Shasta-Trinity National Forest

Vegetation, Fire and Fuels

- Provided ongoing support and roll-out assistance to the R5 Remote Sensing Lab for new Shasta-Trinity existing veg layer (EVEG) and new Fire Return Interval Departure (FRID) layer
- Worked with UC Davis (Landscape Management Unit tool) and forest fire ecologists to develop a spatial layer identifying 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
- Provided support for the Klamath and Shasta-Trinity Fuels Programmatic – 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

Climate Change

- Provided project-level support on climate change questions

Other Activities

- Met with Shasta-Trinity NF natural resources to facilitate future coordination and build FY 2020 program of work
- Provided support to SHF Fire Ecologist and Natural Resources staff as requested

Six Rivers National Forest

Ecological Restoration

- Ongoing support to the Western Klamath Restoration Partnership (WKRP) for meetings, field visits, monitoring, modeling, LiDAR, and science core team participation

Vegetation, Fire and Fuels

- Provided support for the Six Rivers Fire and Fuels Project – 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 Six Rivers existing vegetation layer (EVEG) and new Fire Return Interval Departure (FRID) layer
- Provided updated summaries of fire return interval departures (FRID) at the forest and district level.
- Provided project support as requested to SRF 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

Other Activities

- Met with Six Rivers NF Staff Officer to facilitate future coordination and build FY 2020 program of work
- Provided support to SRF Fire Ecologist and Natural Resources staff as requested
- Participated in Six Rivers program of work and workforce planning meetings

Plasket Meadow - The August Complex is now California's largest recorded wildfire, burning more than 1 million acres in the Northern Province.

Red Salmon Complex is one of several fires that burned in the Northern Province this year.

Field visit to a meadow in the Klamath Mountains. The Klamath Meadows Partnership was recently established in order to work with external partners to increase the pace and scale of meadow conservation and restoration in the Klamath Mountains and North Coast Ranges.

SIERRA CASCADE PROVINCE

Provincewide

Ecological Restoration

- Finalized a comprehensive post-fire restoration strategy in collaboration with the Regional Ecology Program and PSW.
    - Served as lead author for Chapter 2 (Decision Framework) and co-author for a case study describing post-fire restoration in arid shrublands
    - Meyer, M. Long, J., Safford, H., Estes, B., Merriam, K., Molinari, N., Gross, S., Coppoletta, M., Sawyer, S., Butz, R., Wuenschel, A., White, A., Collins, B., North, M., Conway, S., Slaton, M., Isbell, C., Walsh, D., and Underwood, E. *In press*. Framework for Post-fire Restoration in California's National Forests. General Technical Report. USDA Forest Service, Pacific Southwest Research Station, Vallejo, California.

Vegetation, Fire and Fuels

- Completed an analysis of regeneration potential following three large wildfires that occurred in the Sierra Cascade Province using the spatially explicit POSCRPT model.
    - Provided spatial data and summarized results to line officers and district staff working on post-fire salvage and reforestation efforts.
    - Co-presented a webinar for the California Fire Science Consortium describing management applications related to POSCRPT outputs and implications for restoration.
- Worked with a diverse group of research scientists to write a manuscript that investigated the divergence and overlap between fuels reduction and forest restoration projects:
    - Stephens, S.L., M.A. Battaglia, D.J. Churchill, B.M. Collins, M. Coppoletta, C.M. Hoffman, J.M. Lydersen, M.P. North, R.A. Parsons, S.M. Ritter, and J.T. Stevens. *In press.* Forest restoration and fuels reduction: Convergent or divergent? Bioscience.
- Contributed to two book chapters focused on California fire ecology:
    - Williams, J.N., Long, J.W., Meyer, M., Estes, B., Coppoletta, M., and Safford, H.D. *In press.* Predicting post-fire conifer regeneration in California forests: current state, future directions, and applications to Mediterranean Basin forest. In: Pines and their mixed forest ecosystems in the Mediterranean Basin.
    - Safford, H.D., R.J. Butz, G.N. Bohlman, M. Coppoletta, B.L. Estes, S.E. Gross, K.E. Merriam, M.D. Meyer, N.A. Molinari, and A. Wuenschel. *In press.* Fire ecology of

the North American Mediterranean-climate zone. In: B. Collins and C.H. Greenberg, eds. Fire ecology and management of U.S. forested ecosystems: past, present, and future. Springer.

Inventory and Monitoring

- 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/
- Served as a member of the regional Research Natural Area (RNA) committee. Reviewed and approved research permits for RNAs across the region, refined criteria for RNA status definitions, developed prescribed fire guidance, and worked with the Pacific Southwest Region to update the regional RNA GIS layers. Presented the results of a study investigating fire regime alternation in California's Research Natural Areas (RNAs) to California State University Chico students as part of their Department of Biological Sciences Seminar
    - https://media.csuchico.edu/media/Fire+Regime+Alteration+in+Natural+Areas/0_8nilwc55/66947222

Climate Change

- Drafted an 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:
    - Gross, S., B. Estes, K. Merriam, L. Wolf, and A. Wuenschel, L. *In prep*. A summary of current trends and probable future trends in climate and climate-driven processes for the Sierra Nevada. USDA Forest Service, Region 5 Ecology Program.
- Co-authored a chapter on the role of timber harvest in the Wildland Urban Interface, as part of a PSW-led effort to develop a General Technical Report (GTR) focused on Urban and Wildland Urban Interface Forests and Rangelands in a Changing Environment:
    - van Doorn, Natalie, Brandt, Leslie, Roman, Lara, Riemann, Rachel, Reeves, Matt, Hanberry, Brice, Staudhammer, Christie, Fahey, Robert, and Coppoletta, Michelle. *In prep.* Vegetation in the Wildland-Urban Interface and Urban Natural Areas. In: Urban and Wildland Urban Interface Forests and Rangelands in a Changing Environment. Gen. Tech. Rep. PSW-GTR. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station.

Presentations

- Coppoletta, M. 2019. Fire regime alternation in natural areas: the need to restore a key ecological process. California State University Chico, Department of Biological Sciences Seminar. October 25, 2019 (https://media.csuchico.edu/media/Fire+Regime+Alteration+in+Natural+Areas/0_8nilwc55/66947222).
- Shive, K. and Coppoletta, M. 2020. Predicting spatial patterns of conifer regeneration after severe wildfire: implications for restoration. Webinar for the Sierra Nevada section of the California Fire Science Consortium. May 8, 2020. (http://www.cafiresci.org/events-webinars-source/category/coniferregen).
- Coppoletta, M. 2020. Introduction to the Ishi Fire Restoration Project. Ishi Fire Restoration Workshop, Chico, CA. February 3, 2020.

Collaboration

- Principle and Co-principle investigators for a collaborative Joint Fire Science Project that includes researchers from the Pacific Southwest Research Station, University of California at Berkeley, and Florida Atlantic University to investigate vegetation and fuel succession following two successive wildfires.
- 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 collaboration 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.
- 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, S., J. Greenberg, and K. Merriam. *In press*. Comparison of Meadow Assessment Protocols. Region 5 Technical Report, USDA Forest Service, Vallejo, California.

- Collaborated with Sierra Institute, Friends of Plumas Wilderness, and Plumas National Forest staff to develop a citizen science wilderness monitoring program in the Bucks Lake Wilderness.
- Worked with Friends of Plumas Wilderness and Sierra Forest Legacy to host the second workshop related to fire restoration within and adjacent to the Ishi Wilderness. The 36 workshop participants included representatives from the Forest Service, National Park Service, Cal Fire, Butte and Tehama County RCDs, local tribes, wilderness advocacy groups (The Wilderness Society, Friends of Plumas Wilderness), non-profit environmental organizations (The Nature Conservancy, Sierra Forest Legacy, Fire Restoration Group, Lassen Forest Preservation Trust), local tribes (Pit River, Maidu Summit Consortium), Chico State University, and Sierra Pacific Industries.
- Peer reviewed manuscripts for the scientific journals: Journal of Ecology, Ecology and Evolution, Ecosystems, Madroño, and Plant Ecology.

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 obtain $100,000 in funding through the Sierra Nevada Watershed Improvement Program's Forest Health Program to complete field surveys, fire modeling, and other pre-planning activities for the Ishi Fire Restoration Project.
    - Worked with Friends of Plumas Wilderness and Sierra Forest Legacy to host the second workshop related to fire restoration within and adjacent to the Ishi Wilderness. The 36 workshop participants included representatives from the Forest Service, National Park Service, Cal Fire, Butte and Tehama County RCDs, local tribes, wilderness advocacy groups (The Wilderness Society, Friends of Plumas Wilderness), non-profit environmental organizations (The Nature Conservancy, Sierra Forest Legacy, Fire Restoration Group, Lassen Forest Preservation Trust), local tribes (Pit River, Maidu Summit Consortium), Chico State University, and Sierra Pacific Industries.
- Completed 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).

- Planned and coordinated a field tour on the Lake Tahoe Basin for Plumas and Lassen interdisciplinary team members to discuss methods and approaches to meadow restoration.

Vegetation, Fire and Fuels

- Completed and submitted the final report for a JFSP project (JFSP #16-1-05-13) that investigated the effects of post-fire management on vegetation and fuels following successive wildfires in mixed conifer forests on the Plumas and Lassen National Forests.
    - This is a collaboration between the Sierra Cascade Province Ecology program, PSW, University of California at Berkeley, and Florida Atlantic University
    - Coppoletta, M., Collins, B., Markwith, S. and Merriam, K. 2020. Effects of post-fire management on vegetation and fuels following successive wildfires in mixed conifer forests. Final Report on JFSP PROJECT ID: 16-1-05-13. Joint Fire Science Program, Boise, Idaho.
- Collaborated with UC Berkeley and PSW to complete an analysis of high-resolution repeat LiDAR data to assess ecological resilience following multiple successive wildfires; submitted manuscript to Journal of Ecology:
    - Steel, Zachary; Foster, Daniel; Coppoletta, Michelle; Lydersen, Jamie; Wing, Brian; Stephens, Scott; Collins, Brandon. *In review*. Ecological resilience and vegetation transition in the face of multiple large wildfires. Journal of Ecology.
- 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.
    - Draft manuscript: Paudel, A., Coppoletta, M., Merriam, K., Markwith, S. *In prep.* Persistent suppression legacy, rapid change, and the absence of passive system restoration in Sierra Nevada mixed-severity reburns.
- Co-authored a manuscript investigating the influence of snags, large logs, and shrub cover on reburn severity on the Lassen and Plumas National Forests:
    - Lydersen, J.M., Collins, B.M., Coppoletta, M., Jaffe, M.R., Northrop, H., and Stephens, S.L. 2019. Fuel dynamics and reburn severity following high severity fire in a Sierra Nevada mixed-conifer forest. Fire Ecology 15(1) 43.
- Ran the spatially explicit POSCRPT model to predict regeneration potential in the Eiler Fire.
    - Collaborated with the Northern Province Associate Ecologist to develop a protocol for monitoring natural regeneration to sample post-fire landscapes with high predicted probability of natural regeneration.

- Published a manuscript in Forest Ecology and Management investigating the effects of thinning and clearing on the sensitive plant species *Penstemon personatus* on the Lassen National Forest and adjacent Collins Pine properties:
    - Bovee, K. M., Merriam, K.E., and Coppoletta, M. 2021. Mechanically-created gaps promote flowering and seed set of rare *Penstemon personatus*: disentangling canopy opening from ground disturbance. Forest Ecology and Management: 480.

Forest Planning/NEPA

- Completed edits on the final version of the bioregional assessment that summarizes the natural range of variability for red fir and subalpine ecosystems in the Northwest Forest Plan assessment area:
    - Coppoletta, M., Meyer, M.D., and North, M.P. *In press.* Natural range of variation (NRV) for red fir and subalpine forests in northwestern California and southwestern Oregon. Gen. Tech. Rep. PSW-GTR. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station.
- Revised the bioregional assessment summarizing the natural range of variability for hardwood vegetation types in the Northwest Forest Plan assessment area, including the Modoc and Lassen National Forests.

Inventory and Monitoring

- Continued to serve as the monitoring coordinator for the Burney Hat Creek Collaborative Forest Landscape Restoration Project (CFLRP).
    - This includes leading the multiparty monitoring working group; completing annual monitoring and 10-year ecological indicator reports; participating in local and regional (i.e. strategic planning) collaborative meetings; and coordinating all CFLRP-related monitoring efforts.

Modoc National Forest

Ecological Restoration

- Published two conference proceedings describing the effects of grazing management and hydrology on vernal pool species, including the federally listed as threatened slender Orcutt grass (*Orcuttia tenuis)*:
    - Bovee, K.M., Merriam, K. E., and Gosejohan, M. C., &Weisberg, P. J. 2019. Long-term benefis to vernal pool annuals may outweigh short-term consequences of livestock grazing on the Modoc Plateau. Proceedings of the conference: Vernal

Pool Landscapes: Past, Present, and Future, April 11, 2018, Chico, California. Studies from the Herbarium 20: 27-44.

- Merriam, K. E., Gosejohan, M. C., &Weisberg, P. J. 2019. Hydrologic influences on plant community structure in vernal pools of northeastern California. Proceedings of the conference: Vernal Pool Landscapes: Past, Present, and Future, April 11, 2018, Chico, California. Studies from the Herbarium 20: 45-59.

Inventory and Monitoring

- Assisted the California Department of Fish and Wildlife with descriptions and rarity rankings for vernal pool vegetation types mapped on the Modoc Plateau as part of their vegetation classification and mapping program.

Forest Planning/NEPA

- Completed edits on the final version of the bioregional assessment that summarizes the natural range of variability for red fir and subalpine ecosystems in the Northwest Forest Plan assessment area:
  - Coppoletta, M., Meyer, M.D., and North, M.P. *In press.* Natural range of variation (NRV) for red fir and subalpine forests in northwestern California and southwestern Oregon. Gen. Tech. Rep. PSW-GTR. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station.
- Revised the bioregional assessment summarizing the natural range of variability for hardwood vegetation types in the Northwest Forest Plan assessment area, including the Modoc and Lassen National Forests.
- Participated in project design and NEPA planning for meadow and aspen restoration projects on the Modoc National Forest, including serving on and providing technical assistance to the Parman and Bald Mountain ID teams.
- Provided technical assistance with response to comments on the Draft Biological Assessment for Livestock Grazing Management Effects to Shortnose Sucker, Lost River Sucker, Critical Habitat for Each Species, and Slender Orcutt Grass.

Plumas National Forest

Ecological Restoration

- Participated in Concow Resilience Project, a collaboration between the Feather River Ranger District, Butte County Resource Conservation District, UC Davis, American Forests, and PSW to plan post-fire restoration after the Camp Fire.
  - Presented information about climate change adaptation and climate refugia.
  - Facilitated research collaboration to identify climate-adapted species and seed sources for post-fire restoration.

- Project lead for the ($1,391,989) Serpentine and Clustered Lady Slipper Fire Restoration Project, a partnership between Mooretown Rancheria and the Plumas National Forest.
    - Coordinated with Mooretown Rancheria and Greenville Rancheria to complete 598 acres of hand thin and pile treatments within high priority serpentine units.
    - Wrote treatment prescriptions, trained implementation on avoidance mitigations, designated individual pile locations (across 310 acres) to minimize impacts to rare plant species, and inspected units after treatment completion.
- Project lead for the Moonlight Fire Aspen Restoration Project, which includes removal of encroaching conifers, reduction of hazardous fuels, and fencing of stands to protect from excessive browsing in over 1700 acres of aspen.
    - In coordination with the Feather River Resource Conservation District, developed aspen treatment prescriptions and implemented initial hand thinning treatments (10.6 acres).
    - Partnered with Plumas Audubon staff to complete the second year of aspen browse monitoring.
- Served as project lead for Storrie and Rich Fire restoration project designed to monitor thinning and burning treatments implemented to reduce fire risk in PACs established for California spotted owls and goshawks.
- Planned and coordinated a field tour on the Lake Tahoe Basin for Plumas and Lassen interdisciplinary team members to discuss methods and approaches to meadow restoration.

Vegetation, Fire and Fuels

- Completed and submitted the final report for a JFSP project (JFSP #16-1-05-13) that investigated the effects of post-fire management on vegetation and fuels following successive wildfires in mixed conifer forests on the Plumas and Lassen National Forests.
    - This is a collaboration between the Sierra Cascade Province Ecology program, PSW, University of California at Berkeley, and Florida Atlantic University:
    - Coppoletta, M., Collins, B., Markwith, S. and Merriam, K. 2020. Effects of post-fire management on vegetation and fuels following successive wildfires in mixed conifer forests. Final Report on JFSP PROJECT ID: 16-1-05-13. Joint Fire Science Program, Boise, Idaho.
- Collaborated with UC Berkeley and PSW to complete an analysis of high-resolution repeat LiDAR data to assess ecological resilience following multiple successive wildfires:
    - Steel, Zachary; Foster, Daniel; Coppoletta, Michelle; Lydersen, Jamie; Wing, Brian; Stephens, Scott; and Collins, Brandon. *In review.* Ecological resilience and vegetation transition in the face of multiple large wildfires. Journal of Ecology.

- 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:
    - Paudel, A., Coppoletta, M., Merriam, K., and Markwith, S. *In prep.* Persistent suppression legacy, rapid change, and the absence of passive system restoration in Sierra Nevada mixed-severity reburns.
- Co-authored a manuscript investigating the influence of snags, large logs and shrub cover on reburn severity on the Lassen and Plumas National Forests:
    - Lydersen, J.M., Collins, B.M., Coppoletta, M., Jaffe, M.R., Northrop, H., and Stephens, S.L. 2019. Fuel dynamics and reburn severity following high severity fire in a Sierra Nevada mixed-conifer forest. Fire Ecology 15(1) 43.
- Worked with staff from the Feather River Ranger District of the Plumas National Forest, Forest Health Protection, and Sierra Forest Legacy to develop 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 22 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.
    - Developed an agreement with UC Davis to conduct post-treatment monitoring within the SIA.

Inventory and Monitoring

- Completed statistical analysis to investigate how mastication and prescribed fire timing, intensity, and variability influences the effectiveness of long term medusahead (*Taeniatherum caput-medusae*) control.
- Worked with Dr. Morris Johnson from the Pacific Northwest Research Station to develop a grant proposal (Citizen Science Competitive Funding Program) to monitor the outcomes of salvage logging and tree planting in the Walker Fire. Helped to coordinate data collection, which occurred in 2020.
- Collaborated with UC Berkeley and PSW scientists to collect fire scar samples from forests on serpentine and adjacent non-serpentine soils on the Plumas National Forest for comparative study.
- Collaborated with Sierra Institute, Friends of Plumas Wilderness, and Plumas National Forest staff to develop a citizen science wilderness monitoring program in the Bucks Lake Wilderness.

Meadow restoration field tour for Lassen and Plumas NF managers, held on the Lake Tahoe Basin Management Unit.

Participants discuss the reintroduction of fire into the Ishi Wilderness on the Lassen NF during a collaborative workshop.

Dr. Scott Stephens (UC Berkeley) and Dr. Brandon Collins (PSW) assist in the collection of fire scar samples on the Plumas NF.

Pre-treatment monitoring of forest conditions in the Valley Creek Special Interest Area on the Plumas NF.

Treatments completed as part of the Storrie Fire Serpentine Restoration Project on the Plumas National Forest.

SOUTHERN CALIFORNIA PROVINCE

Provincewide

Ecological Restoration

- Supported UCSB Bren School Master's students in developing a historical range of variability report for conifer forests
    - Developed a successful proposal to secure five Master's students for 2020-2021 school year
    - Convened USFS managers and UCSB students to develop work plan
    - Guided group through literature review and data summary (in progress)
- Worked with the Regional Ecology Program and researchers from the Pacific Southwest Research Station to develop a comprehensive post-fire restoration strategy for Region 5. Lead author for Chapter 5 (Chaparral case-study) and co-author for Chapter 3 (Post-fire ecological assessment).
- Explored the use of a newly developed post-fire conifer regeneration tool (PostScript) for southern California conifer forests

Vegetation, Fire and Fuels

- Member of oversight committee and Forest Service liaison for the Santa Clara Ecosystem Service and Socio-Economic Vulnerability Assessment
    - Oversaw development of an interactive visualization tool (EcoServe) to interface with ecosystem service data for resource damage assessments and project planning
    - Engaged with CIO and WWETAC for tool hosting
- Supervised intern to develop FRID briefing papers for each forest
- Participated in Forest Vegetation Simulator virtual training

Forest Planning/NEPA

- LMP monitoring for climate change and focal species trends
    - Worked with R5 Remote Sensing Lab to develop focal species monitoring for exotic annual grasses
    - Worked with FHP and GIS Specialist on the CNF to develop a methodology for determining tree mortality trends by elevation across the province
    - Developed monitoring templates and plans for multiple LMP monitoring questions
- Participated in monthly regional conference calls with resource staff officers
- Summarized fire history and Vegetation Type Mapping data within conifer forests to provide insights into project planning

Inventory and Monitoring

- Hired and supported a field crew to monitor recent burns and fuels activities
    - Trained fire staff in vegetation and fuels monitoring methods
- Developed monitoring plans and oversaw logistics for monitoring across the province
- Contributed field data to CA Department of Fish and Wildlife and California Native Plant Society to help with community level analysis focused on oaks

Climate Change

- Developed an aboveground carbon sampling protocol to implement in shrubland ecosystems
    - Received CalFire CCI funding to collaborate with WWETAC and UC Davis to measure post-fire biomass recovery in shrublands
- Contributed climate change section for southern California oak management guide

Other Activities

- Participated in multi-day type conversion workshop to identify the drivers of landscape-level vegetation change
- Supported efforts to hire an USFS associated ecologist for southern California
    - Worked with USGS SW Climate Science Center to acquire funds and CNF to establish the position
    - Developed hiring materials and served on hiring panel
- Served on Region 5 Research Natural Areas (RNA) committee
- Engaged with journalist from LA Times, Central Coast News, and the Santa Maria Sun
- Consulted with graduate students and university faculty regarding applied research on National Forest lands
- Synthesized chaparral literature to develop a Natural Range of Variation document for R5 (in progress)
- Maintained fire red card and READ/REAF certification

Presentations

- Molinari, N.A. & M.D. Meyer (co-presenters). Connecting fire and ecosystem restoration in California shrublands and forests: New tools and strategies. Society for Ecological Restoration 8th World Conference. Cape Town, South Africa, September 23, 2020.
- The causes and consequence of a changing fire regime. Cheadle Center for Biodiversity and Ecological Restoration Seminar Series. UC Santa Barbara, October 7, 2019.
- Connecting fire and ecosystem restoration in California shrublands and forests. Santa Barbara Fire Safe Council. October 17, 2019.
- Land management issues in chaparral. UCSB EEMB/ES 119: Ecology and Management of CA Wildlands. East Camino Cielo, Los Padres National Forest, Nov 1, 2019.

- Conifer forest management: The use of prescribed fire. UCSB Environmental Studies Special Topics. Virtual. April 16, 2020.
- A postfire restoration prioritization tool for chaparral shrublands. California Fire Science Consortium. Webinar. April 30, 2020. *Co-led with Emma Underwood and Mark DeGuzman*
- Prioritizing post-fire restoration in chaparral shrublands in southern California. Natural Areas Association Conference. September 31, 2020. *Co-led with Emma Underwood*

Collaboration

- Participated as a graduate committee member for:
    - Three UCSB PhD students focusing on chaparral and fuelbreak restoration
    - One Cal Poly, SLO Master's student focusing on meadow restoration
    - One CSU, Sonoma Master's student focusing on estimating biomass with terrestrial LiDar
- Established new cost-share agreement with UC Santa Barbara to provide continued ecological and monitoring support to the southern California forests
- Implemented the second year of a cost-share agreement with UC Riverside to evaluate ecological recovery following the Powerhouse Fire (ANF)
- Implemented the second year of a cost share agreement with UC Santa Barbara to identify native species and develop fuel break restoration methods
- Developed a project report focused on fire, drought, and ecosystem restoration in Mediterranean-climate regions. Report highlighted knowledge exchange during an International Programs sponsored a trip to South Africa.
- Served on the Science Advisory Panel for the southern California greenprint effort led by TNC
- Peer reviewed manuscripts for Ecology and Natural Areas Journal
- Served on the Research and Conservation Committee for the Santa Barbara Botanic Garden
- Member of the Society for Ecology Restoration
- Served on the Science Advisory Panel for the California Forest Management Task Force
- 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
- Partnered with UC Davis and USFS Western Wildland Environmental Threat Assessment Center (WWETAC) to:
    - Develop EcoServe Tool for quantifying ecosystem services across southern California
    - Measure chaparral biomass recovery following wildfire (funded by CalFire)

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)
        - Engaged with Environment for the Americas, NASA JPL, and Cal Poly Pomona to provide final report review
        - Engaged with Pacific SW Research Station and UC Davis to develop monitoring plan for *Phytophthora* focused field and greenhouse study
- 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
    - Established monitoring to evaluate NFWF-funded PReP tool products
        - Contributed to manuscript focusing on PReP tool and field data
    - Develop monitoring for reforestation efforts in partnership with ANF forester and NFF
    - Presented findings and future direction at May board of directors (BOD) meeting
- Participated in Powerhouse Fire field trips and conference calls to discuss restoration needs and prioritize field sampling locations

Vegetation, Fire and Fuels

- Shared chaparral and forest vegetation and fuels monitoring protocols with resource staff officer and botanist

Climate Change

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

Cleveland National Forest

Vegetation, Fire and Fuels

- Participated in project to evaluate the effects of seasonal prescribed fire on black oak performance
    - Reviewed supplemental information report (SIR) to amend current Mt Laguna Place NEPA
    - Consulted with fire ecologists and oak specialists on project
    - Developed and implemented monitoring protocol
- Developed a Research Natural Area and fire briefing paper
- Participated in field trip to discuss opportunities for vegetation management of oak woodlands in areas of high GSOB mortality
- Mapped bigcone Douglas fir stands using Google Earth Imagery within the Holy Fire footprint
- Participated in Holy Fire research symposium

Inventory and Monitoring

- Established 30 vegetation and fuel monitoring plots in support of 'prescribed fire on black oak' project. Drought stress of trees was also evaluated.
- Produced briefing paper for proposed oak restoration project on DRD

Los Padres National Forest

Ecological Restoration

- 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 RFP
    - Served on selection committee for grant awards and reviewed veg and fuels related proposals
    - Worked with grantees to develop projects, including identification of important questions and exploration of methodologies
    - Served as person of contact for seven grantees and participated in kickoff meetings for new grantees
- Collaborated with UCSB on chaparral restoration within the Piru Fire scar
- Worked with scientists at UCSB, UC ANR and Reed College to conduct a bigcone Douglas-fir spatial analysis and reforestation project in the Zaca Fire scar
- Provided estimates for ecosystem service losses as part of the resource damage assessment for the Thomas Fire

- Provided maps and literature to OGC in support of cost recovery efforts

Vegetation, Fire and Fuels

- Worked with UC Santa Barbara through agreement funding to collect seed, grow natives and deepen understanding of fuelbreak restoration
- Evaluated the effect of sheep grazing on fuels reduction on neighboring county lands, Montecito, CA
- Participated as a READ on Dolan Fire. Visited Cone Peak Gradient RNA to determine fire effects

Forest Planning/NEPA

- Provided support for forest-wide non-native invasive plant removal NEPA document and contributed to the list of target non-native species
- Conducted categorical exclusion (CE) analysis for restoration project on East Camino Cielo
- Provided support during scoping period for Reyes Peak NEPA review
- Reviewed proposals for PGE forest-wide fuels reduction and Mt Pinos forest health planning efforts

Inventory and Monitoring

- Developed report for grazing effects on vegetation, including blue oak seedlings and saplings, on the Happy Canyon grazing allotment
- Mapped the extent of Limber Pine and established monitoring plots to inform forest health planning for Mt Pinos Summit Botanical Species Interest Area

Other Activities

- Provided narrative, maps and imagery on fire ecology and pathogen impact for signage at the Sespe and Big Sur Rivers
- Engaged with Fish and Wildlife Service concerning monarch butterfly overwintering sites
- Participated in the move of the Supervisor's Office from Goleta to Solvang
- Acting Ecosystem and Fuels Staff Officer during October 2019 and September 2020

San Bernardino National Forest

Vegetation, Fire and Fuels

- Provided plot data for inform prescribed fire outcomes at Bluff Mesa
- Summarized Vegetation Type Mapping data for the vicinity of North Big Bear

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

Inventory and Monitoring

- Revisited monitoring plots that experienced Rx fire to evaluate whether objectives were met
- Established new monitoring sites in South Big Bear in preparation for prescribed fire
    - Developed fuels monitoring protocol to estimate downed woody fuels in areas with chips

Climate Change

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

Browns transects at Bluff Mesa to measure fuels with local fire staff. Mountaintop RD, San Bernardino NF

Undergraduate planting day through partnership with UC Santa Barbara to enhance native species on fuelbreaks. Santa Barbara RD, Los Padres NF

Province ecologist visiting the Cone Peak Gradient RNA while working as a Resource Advisor on the Dolan Fire. Monterey District, Los Padres NF

Field Visit to Laguna Mt with natural resource and fire staff to establish burn unit boundaries to understand the effects of fire seasonality on black oak, Descanso RD, Cleveland NF

Southern CA ecology crew and acting assistant ecologist sample roots of black oak sapling. The root material will be used as baseline data to understand the effects of drought and fire on carbon stores. Laguna Mt, Descanso RD, Cleveland NF

SOUTHERN SIERRA PROVINCE

Provincewide

Ecological Restoration

- Provided ongoing support to PSW for collaborative ecological research at Teakettle Experimental Forest (SNF)
- Served as PIs for reforestation tool project funded by the USDA southwestern climate hub program (R5 Ecology, PSW, USDA ARS)
    - Presented reforestation tool summary to over 150 USFS staff and partners on the First Friday All Climate Change Talks (FFACCTs) webinar
- Prior to restoration, conducted baseline monitoring in 6 meadows for Wildlife Conservation Board grant in partnership with Trout Unlimited and UC Merced.
- Rough Fire Plantation Restoration – attended field tour on the Sequoia National Forest and provided ecological insights. Reviewed assessment document.

Vegetation, Fire and Fuels

- Served as co-PI for JFSP-funded project entitled Post-fire restoration to avert novel conditions in Sierra Nevada Forests (PSW, R5 Ecology, UC Davis) https://www.firescience.gov/JFSP_advanced_search_results_detail.cfm?jdbid=%24%26JO9V%40%20%20%0A
    - Lead editor for post-fire restoration strategy for national forests in Region 5
- 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) https://www.firescience.gov/JFSP_advanced_search_results_detail.cfm?jdbid=%24%26JK4V%40%20%20%0A
- Served on California Fire Science Consortium (CFSC) Sierra Nevada section
    - Gave technical presentations on forest management and restoration at the Biology Colloquium of California State University, Northridge
- Coauthored (with N. Molinari) USFS International Programs report on fire and restoration in Mediterranean ecosystems in the Western Cape Province, South Africa.
- Participated in a workshop at the 8th World Conference on Ecological Restoration to identify best practices for ecological restoration and pre and post-fire management of Mediterranean shrublands, including participants from Chile, South Africa, Australia, Spain, Portugal, and California.
- Organized Natural Areas Conference Symposium on drought management in the forests and rangelands of California

- Presented work on drought mortality to a local Society of American Foresters Chapter, a tribal forum meeting, a UC Merced climate change conference and to two interdisciplinary team meetings on the Sierra and Sequoia
- Presented reforestation information and relevant findings to the Sierra NF Forest Leadership Team
- Advised on local ecological information on the Merced River Canyon to Mariposa County officials and CAL POLY landscape architecture students for their planning of a trail through the Merced River corridor with fall 2019 and fall 2020 groups
- Partnered with Pacific Southwest Research Station to monitor long-term tree mortality plots assessing fall-rates and ongoing mortality on the Sequoia and Sierra National Forests
- Assisted UC Davis researchers select sites for post-mortality management monitoring on the Sierra and Sequoia National Forests
- Authored report disseminating results from our monitoring of Nelder Grove sequoia monarch mortality after the Railroad Fire. Report is being used in U.S. Prosecuting Attorney's mitigation case with defendants while seeking cost recovery funds. Pulled together documents related to Nelder for mediated settlement
- Coordinated with University of Washington to ground truth LiDAR data collected on the Sierra National Forest for CCI grants

Forest Planning/NEPA

- Served on Forest Plan Revision core team as the planning ecologist for the Inyo, 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
    - Assisted with integration of fisher and California conservation strategy recommendations in the revised forest plans
- Provided technical review of forest assessment templates for Northwest Forest Plan
- Assisted with revision of the red fir and subalpine NRV assessment for the Northwest bioregion (R5 ecology, PSW)
- Developed four monitoring guides for the Inyo NF

Inventory and Monitoring

- Drought/Beetle Pine Mortality Project: Studied the effect of past prescribed burning and forest thinning treatments on recent drought and beetle related mortality patterns and

the subsequent regeneration in mixed conifer forests, ecologists in the Central Sierra Province and the Southern Sierra Province are collaborating with University of California, Davis researchers with funding from the Pacific Southwest Region State and Private Forestry.

- Whitebark Pine Monitoring: Analyzed monitoring data and drafted a technical report summarizing whitebark pine forest composition, structure, and health throughout California. Report was submitted to the California whitebark pine conservation strategy team and represented a collaborative effort between the R5 Ecology Program and R5 Remote Sensing Lab.
- Reforestation Spatial Prioritization Tool: Served as principal investigators for reforestation tool in tree mortality landscapes project funded by the USDA climate hub (R5 Ecology, PSW, UC Berkeley). Developed a reforestation web-based tool to guide managers in where to prioritize reforestation after the drought-mortality using grant money from the USDA Climate Hub. (toolkit link)
- Forest Resilience Treatment Tool: Provided feedback on resilience treatment tool, a tool being developed by the Conservation Biology Institute and the R5 Regional Office to guide long-term response of ecosystems after forest management and how that relates to wildlife habitat.
- Giant Sequoia Survival and Regeneration after High Severity Wildfire: In 2017, two giant sequoia groves on the Sierra and Sequoia National Forests experienced high-severity wildfire resulting in high mortality of monarch sequoias. In collaboration with the Save the Redwoods League and University of California, Davis, we are monitoring monarch mortality, pre-fire stand structure and sequoia seedling regeneration. In 2019 and 2020, we completed plots that evaluated the 1) mortality and fire effects on monarch sequoias, 2) the pre-fire stand structure, 3) regeneration densities surrounding monarchs, and 4) long-term regeneration plots in Nelder Grove. UC Davis monitored similar attributes in Black Mountain Grove and we are sharing data.

Climate Change

- Co-authored the Climate Change Trend Assessment Summaries for the Sierra, Sequoia and Inyo National Forests. Did Sierra Nevada literature review and document development as part of a team, and then tailored three summaries for each of the forests in the Southern Sierra. Final document merged and reviews being conducted.
- Identified as Climate Change Coordinator for the Sierra NF for FY21

Other Activities

- Mentored two Presidential Management Fellow ecologists on US Forest Service career paths.

- Administered grants and agreements for R5 Ecology Program. Created three modifications to existing UC Davis agreements. Developed one new agreement with UC Davis and the US Forest Service Ecology Program. Managed payments, monitoring reports and agreement closures for R5 Ecology Program agreements
- Point of contact between the R5 Ecology Program and the Region 5 budget analyst
- The Associate Ecologist detailed to the NE Oregon Ecology program for four months

Presentations

- Molinari, N. and M.D. Meyer (co-presenters). 2019. Connecting Fire and Ecosystem Restoration in California Shrublands and Forests: New Tools and Strategies. Presented at the 8th World Conference on Ecological Restoration (Cape Town, South Africa).
- Meyer, M.D. [with 18 coauthors].2019. A Framework for Restoring Post-fire Landscapes in California's National Forests. Presented at the 8th International Fire Ecology and Management Congress.
- Meyer, M.D. 2020. Forest Mortality, Restoration, and Recovery in the Southern Sierra Nevada. Presented at the Dinkey Forest Landscape Restoration Project 2nd Science Symposium.
- Meyer, M.D. [with 18 coauthors]. 2020. Framework for post-fire restoration in California's national forests. Presented at the USDA Forest Service First Friday All Climate Change Talks (FFACCTs) national webinar focused on climate-wise reforestation.
- Wuenschel, A., and M. Meyer. 2020. Natural regeneration and reforestation on the Sierra National Forest. Presented to the Forest Leadership Team on the Sierra National Forest.

Inyo National Forest

Ecological Restoration

- Inyo National Forest Eastern Sierra Fire Restoration and Maintenance Project: Served on interdisciplinary team and provided technical advice related to terrestrial vegetation, fire ecology, forest restoration prioritization, and monitoring
- Bi-State Sage-Grouse Advisory Committee: Represented the Inyo NF on the Bi-State sage-grouse technical advisory committee meeting

Forest Planning/NEPA

- Inyo Forest Plan Monitoring Guide: Provided technical review and assisted with revision of guide for the revised Inyo Forest Plan.
- Forest-wide Prescribed Burn Project: Provided technical review of the Inyo NF Eastern Sierra fire restoration and maintenance project

Inventory and Monitoring

- Aspen Monitoring: Conducted ecological monitoring of aspen stands in the Valentine Reserve in coordination with University of California and International Forestry Fellows Program intern
- Indiana Summit RNA
    - Collected and analyzed rapid assessment monitoring data following 2016 Clark Fire
- Post-fire Jeffrey Pine Regeneration: Inventoried post-fire conifer regeneration (both natural and artificial) in several fires across the Inyo NF to evaluate potential conifer regeneration failure
- Pinyon Monitoring Strategy: In collaboration with R5 Remote Sensing Lab, Forest Health and Protection, the Bishop BLM Field Office and Inyo National Forest Staff we are developing a pinyon pine monitoring strategy.

Climate Change

- Climate Change Trend Assessment – Inyo National Forest: co-authored Sierra Nevada wide climate change literature review – will analyze specific climate and hydrological trends for Inyo NF.

Sequoia National Forest

Ecological Restoration

- Giant Sequoia Restoration Planning: Participated in multi-stakeholder giant sequoia restoration planning meeting on the Sequoia National Forest

Forest Planning/NEPA

- Forest Plan Revision: Provided ongoing support to Forest Plan Revision ID team on the Sequoia National Forest

Inventory and Monitoring

- Black Mountain Sequoia Grove: Initiated fire effects monitoring in Black Mountain Grove following the 2017 Pier Fire (with Save the Redwoods League and University of California, Davis).
    - Monitored mature giant sequoia survival, pre-fire stand structure and post-fire regeneration
- Piute Cypress Monitoring Coordinated with the Sequoia National Forest and the San Diego Botanic Garden to monitor Piute cypress, a rare species only occurring in the southern tip of the Sierra Nevada. The species faces immaturity risk as its experiencing

frequent fire from human ignitions and fire in these stands is usually severe and stand-replacing. Developed protocol to map grove composition, structure ages, fire history and regeneration. Performed monitoring in 5 of the cypress groves.

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.

Climate Change

- Climate Change Trend Assessment – Sequoia National Forest: co-authored Sierra Nevada wide climate change literature review – will analyze specific climate and hydrological trends for Sequoia NF.

Sierra National Forest

Ecological Restoration

- Dinkey Collaborative Forest Landscape Restoration Project (CFLRP): Served as the collaborative monitoring coordinator.
    - A primary organizer of the 2020 Dinkey Science Symposium (~60+ attendees) wherein researchers and federal land managers from a variety of institutions and agencies discussed relevant science to future land management on the collaborative landscape.
    - Primary writer and lead for Dinkey CFLRP Extension Proposal which competed successfully at two tiered levels was recommended by Federal Advisory Committee and approved by USDA Secretary, Sonny Perdue. If funded in full, will add up to $16 million in funding for the collaborative over 8 years
    - Wrote Dinkey Ecological Indicators Report which is required by the USFS CFLR program and reported to congress.
    - Gave tree mortality monitoring presentation at the 2020 Dinkey Science Symposium
- Sierra Nevada Meadow Restoration: Assisted develop successful grant application to the Wildlife Conservation Board. Studying the baseline condition of eight Sierra Nevada meadows prior to restoration work. Monitoring focused on plant composition, soil and hydrological components of meadow. First stage of monitoring implemented in July 2020.

Vegetation, Fire and Fuels

- Lead author on report disseminating results from our monitoring of Nelder Grove sequoia monarch mortality after the Railroad Fire. Report is being used in U.S. Prosecuting Attorney's mitigation case with defendants while seeking cost recovery funds. Pulled together documents related to Nelder for mediated settlement.

Forest Planning/NEPA

- Forest-wide Prescribed Fire Project: Provided technical review of the Sierra NF proposed action and appendix of the forest-wide prescribed fire project
- Forest Plant Revision: Provided ongoing support to Forest Plan Revision ID team on the Sierra National Forest
- MOTOR Programmatic NEPA: Contributing to two-National Forest planning effort (MOTOR) for programmatic NEPA as a Sierra National Forest Discussion Partner and extended interdisciplinary team member.

Inventory and Monitoring

- Greenhouse Gas Reduction Fund Monitoring: Assisted develop successful grant application to CAL FIRE. Ecological monitoring of project work related to reducing catastrophic wildfire risk and creating future carbon stores in areas at risk of deforestation (i.e., large high severity patches). Monitoring includes pre- and post-mechanical thinning treatment forest structure and fuels measurements near Huntington Lake, monitoring natural regeneration in post-drought wildfires (French and Aspen fires) and after prescribed burning (in the Dinkey Landscape).
- Teakettle Experimental Fores: Provided ongoing support to PSW for collaborative ecological research at Teakettle Experimental Forest (SNF)
    - Provided technical feedback on analysis of tree mortality data
    - Collected preliminary data on large pine tree raking study
- Nelder Giant Sequoia Grove
    - Monitored giant sequoia mortality and pre-fire stand structure following the 2017 Railroad Fire
    - Monitored seedling regeneration density in belt transects and in long-term monitoring plots set-up to follow seedling survival over time
    - Advised Bass Lake Ranger District on hazard tree removal project in the Nelder Grove
- High Elevation Forest Recovery after Fire: In response to the request of fire and fuels staff, designed and implemented monitoring of high-elevation fires which have an underlying mosaic of fire histories to better understand post-fire recovery, fuel loads and stand structure following differing numbers of fire entry and fire severities.

Other Activities

- Acted as Sierra NF Ecosystem Staff Officer for a month in starting in mid-March during an onset of COVID-19. Attended daily FLT meetings. Coordinated with timber, botany, range, hydrology, wildlife, soils and geology staffs to implement protective COVID-19 practices. Coordinated filling a detail position.
- Regularly attending member of Safety Team. Distributed weekly safety messages in June/July. Updated the safety handbook as part of a team.
- Served as the 2020 Bass Lake Ranger District Housing Coordinator. Coordinated with supervisors on housing and protocols with temporaries in housing with respect to COVID. Cleaned three employee houses. Coordinated housing checks by supervisors and work orders for fixing broken items.

Climate Change

- California Climate Investment Grant: Assisted develop successful grant application to CAL FIRE. Collaborated with the Sierra National Forest, University of California, Davis, University of Washington, Madera and Fresno Counties and various local agencies to apply for forest restoration funding from California State. Designed sampling protocols in 2020, but field monitoring was put on hold due to the Creek Fire.
- Climate Change Coordinator: Point of contact for the Sierra NF starting FY21
- Climate Change Trend Assessment – Sierra National Forest: co-authored Sierra Nevada wide climate change literature review – will analyze specific climate and hydrological trends for Sierra NF.

Meadow monitoring, Sierra NF

Conducting post-fire tree regeneration inventory in the Indiana Summit Research Natural Area, Inyo NF

Meadow monitoring, Sierra NF

Conducting post-fire tree regeneration inventory of eastside Jeffrey pine stands on the Inyo NF

Sequoia regeneration monitoring, Sierra NF

ECOLOGY PROGRAM INTERNATIONAL SUPPORT

Commented [WL-F8]: Hugh, should I remove this section for this year? If not, add in or send Laura photos.

Forest and fuels inventory support to Parque Nacional Sierra de San Pedro Mártir, Mexico

Postfire restoration technical assistance, Cascais, Portugal

International Climate Change and Nat Resource Mgt Seminar, Lake Tahoe Basin

Postfire restoration workshop for Mediterranean Climate Regions, Cape Town, South Africa

Mandela-Washington fellowship field trip, Lake Tahoe

Technical assistance to N. Rangelands Trust, Kenya

R5 ECOLOGY PROGRAM EXTERNAL PARTNERS (2020)

Commented [WL-F9]: Laura needs to get projects from ecologists. Hugh, add in RO partners/projects or send Laura a list – look at list below from 2019 and copy over anything still relevant

- **American Forests** (Camp Fire post-fire restoration)
- **American Rivers** (Comparison of Meadow Assessment Protocols)
- **Butte County Resource Conservation District** (Camp Fire post-fire restoration)
- **CalFire** (California Fire Science Consortium, California fire perimeter database, prescribed fire monitoring)
- **California Academy of Sciences** (landscape-scale restoration)
- **California Fire Science Consortium**
- **California Polytechnic State University**, San Luis Obispo
- **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)
- **California Trout, Inc.** (June Mountain whitebark pine monitoring)
- **Conway Conservation** (landscape-scale restoration)
- **Desert Research Institute** (Comparison of Meadow Assessment Protocols, remote sensing applications)
- **Dinkey Collaborative** (Collaborative Forest Landscape Restoration Project)
- **EcoAdapt** (Northern California climate change adaptation project)
- **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** (Bucks Lake Wilderness citizen science wilderness monitoring program, fire restoration in the Ishi Wilderness workshop)
- **Giant Sequoia Working Group**
- **Humboldt State University** (Teakettle Experimental Forest restoration project)
- **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)
- **Klamath Meadows Partnership** (Conservation and restoration of meadows)
- **Lassen National Park** (Red fir forest and natural fire regimes inventory)

- **Mariposa County**
- **Mooretown Rancheria** (Storrie Fire Serpentine and Clustered Lady Slipper Fire Restoration Project)
- **Northern California Prescribed Fire Council** (Promote, protect, and expand use of prescribed fire in Northern California fire-adapted landscapes)
- **Northern Arizona University** (Changing wildfire management strategies project)
- **Northern Research Station** (Changing wildfire management strategies project)
- **Pacific Northwest Research Station** (NWFP Forest Planning science synthesis; NWFP Bioregional Assessment data resolution; Potential Natural Vegetation map expansion)
- **Pacific Southwest Research Station** (Post-fire restoration framework GTR, Teakettle Experimental Forest restoration project, reforestation decision support tool, Indiana Summit Research Natural Area post-fire ecological monitoring, Camp Fire post-fire restoration, meadow research and monitoring, NWFP science synthesis, Klamath Mts: fire severity study)
- **Plumas Audubon Society** (Moonlight Fire Aspen Restoration Project)
- **Region 5 Remote Sensing Lab** (Post-fire restoration framework GTR, LiDAR applications and development, remote sensing applications, landscape-scale restoration, monitoring)
- **Rocky Mountain Research Station** (Changing wildfire management strategies project)
- **San Diego Botanic Garden**
- **San Francisco Estuary Institute** (Comparison of Meadow Assessment Protocols)
- **Save the Redwoods League** (Giant sequoia grove post-fire monitoring)
- **Sequoia and Kings Canyon National Parks** (Red fir forest and natural fire regimes inventory)
- **Sierra Forest Legacy** (fire restoration in the Ishi Wilderness workshop)
- **Sierra Institute** (Bucks Lake Wilderness citizen science wilderness monitoring program)
- **Sierra Nevada Aquatic Research Laboratory, University of California Santa Barbara** (Valentine Reserve forest thinning project aspen monitoring)
- **Sierra Nevada Conservancy** (Grant Grove & Hume Lake forest resilience project, landscape-scale restoration)
- **South Yuba River Citizen League (SYRCL)** (landscape-scale restoration, aspen and meadow restoration and monitoring)
- **Tahoe Regional Planning Agency** (landscape-scale restoration, riparian and meadow monitoring and research, regulatory evaluation and monitoring)
- **The Nature Conservancy** (Northern and Southern Sierra Partnership climate change adaptation planning, ecological forestry, North Yuba Partnership, Tahoe-Central Sierra Initiative)
- **Trout Unlimited**

- **University of California, Davis** (Camp Fire post-fire restoration)
- **University of California, Davis, Center for Watershed Sciences** (Pilot effort to map meadows in the Klamath Mountains)
- **University of California, Berkeley** (Joint Fire Science project)
- **University of California, Merced**
- **University of California-Riverside** (Powerhouse Fire restoration)
- **University of California-Santa Barbara** (ecological and monitoring support to S. California national forests, fuel-break restoration methods study)
- **University of Massachusetts** (landscape-scale restoration, research and monitoring)
- **University of Nevada Cooperative Extension** (Comparison of Meadow Assessment Protocols)
- **University of New Mexico** (Teakettle Experimental Forest restoration project)
- **University of Washington** (Southern Sierra LiDAR-based forest monitoring)
- **US Fish and Wildlife Service** (Comparison of Meadow Assessment Protocols)
- **USDA Forest Service Forest Health and Protection** (Tree mortality monitoring project)
- **USDA California Climate HUB** (reforestation decision support tool)
- **Western Klamath Restoration Partnership** (Ecological restoration of landscape fire)
- **Yosemite National Park** (Red fir forest and natural fire regimes inventory)

R5 ECOLOGY PROGRAM EXTERNAL PARTNERS (2019)

Commented [WL-F10]: List from 2019 – Once Laura has all project from provinces, will copy over. Hugh, identify which RO projects to copy over

- **Amador-Calaveras Consensus Group** (landscape-scale restoration)
- **Audubon Society** (Moonlight aspen restoration project)
- **Bureau of Land Management** (Southern Nevada Public Lands Management Act funded projects)
- **California Academy of Sciences** (Caples restoration project)
- **California Department of Fish and Wildlife** (Rare plants monitoring, statewide vegetation mapping and classification standards, State vegetation plots database, Black Backed Woodpecker working group)
- **California Native Plant Society** (Statewide vegetation mapping standards, State vegetation plots database, chapter presentations)
- **California Polytechnical University-San Luis Obispo** (analysis of fire effects to meadow vegetation)
- **California State Parks** (LTBMU: meadow condition and trend monitoring and Emerald Point old growth inventory)
- **California State University-Bakersfield** (Chaparral management and monitoring)

- **CalTrout** (Whitebark pine monitoring)
- **Chico State University Herbarium** (meadow ecology field seminars)
- **CONAFOR-Mexican Forest Service** (Baja California fire management working group)
- **CONANP-Mexican Park Service** (Baja California fire management working group, General Land Office forest structure validation study, fire severity monitoring)
- **Conservation Biology Institute** (California Spotted Owl conservation assessment, Pacific Fisher conservation assessment and strategy, vegetation and fire modeling under future climate change scenarios)
- **Conservation Science Partners** (Cal LCC-funded meadow project)
- **Desert Research Institute** (Cal LCC-funded meadow project, ClimateEngine, Natural Areas Conference planning)
- **EcoAdapt** (Northwestern California climate change adaptation project)
- **Giant Sequoia Working Group**
- **Humboldt State University/Department of Biological Sciences** (Northern Province inventory and monitoring; Sims Fire monitoring; Sugar Creek RNA, Klamath NF)
- **Institute for Bird Populations** (Black Backed Woodpecker working group)
- **Joint Fire Sciences Program** (California Fire Science Consortium; fire-dependent cypress species study, Plumas and Klamath NFs; Beaver Creek Pinery prescribed fire study, Lassen NF; vegetation and succession after repeat wildfires)
- **Lassen National Park** (red fir forest health monitoring)
- **Michigan State University** (Santa Clara River ecosystem services assessment)
- **Mooretown Rancheria** (hand thinning treatments in Storrie Fire)
- **National Aeronautics and Space Administration** (DEVELOP National Program, Ames Research Center; fire effects on watersheds and snowpack)
- **Natural Areas Association** (National NAA board, climate change adaptation conference)
- **National Forest Foundation** (Treasured Landscapes Initiative; climate change adaptation conference, forest restoration projects)
- **National Park Service/Santa Monica Mountains NRA** (California Fire Science Consortium)
- **National Park Service/Sequoia NP** (Southern Sierra Parks resource planning)
- **National Park Service/Yosemite NP** (Rim Fire monitoring, General Land Office forest structure validation study, red fir forest health in fire-adapted landscapes ecological inventory)
- **National Park Service/Western Pacific Region** (California Fire Science Consortium, S. Sierra Nevada Fire Science Integration Working Gp)
- **Northern Arizona University** (Changing wildfire management strategies in the Southwest)
- **Northern California Prescribed Fire Council**
- **Pennsylvania State University** (Rim Fire restoration)

- **Point Blue Conservation Science** (science advisory committee; Black Backed Woodpecker working group; bird and bat monitoring projects)
- **PNW-Research Station (PNW)** (Science Synthesis for NWFP Forest planning; NWFP: fuel treatment needs in eastside pine; PNV map expansion)
- **PSW-Research Station (PSW)** (Forest Planning science syntheses, Regional Research Natural Area Program, California Fire Science Consortium, Black Backed Woodpecker working group, GLORIA climate change monitoring, red fir forest health ecological inventory, Caples Creek project, Lake Tahoe West, Tahoe-Central Sierra Initiative, North Yuba partnership)
- **Rancho Santa Ana Botanical Garden** (southern California revegetation, chaparral restoration)
- **Rocky Mountain Elk Foundation** (Regional aspen initiative, Project level: Klamath NF, Lassen NF, Shasta-Trinity NF)
- **Rocky Mountain Research Station (RMRS)** (Santa Clara River watershed ecosystem services assessment, study of fire severity and relationship to postfire avian fauna; Black Backed Woodpecker working group; assessment of socioeconomic vulnerability to climate change)
- **Santa Barbara Botanical Garden** (research and conservation committee)
- **Save The Redwoods League** (Giant sequoia inventory and monitoring)
- **Sequoia and Kings Canyon National Parks** (red fir forest health monitoring; Leaf to Landscape project)
- **Sierra Forest Legacy** (Sierra Nevada forest management; southern Sierra Nevada prescribed fire council; negotiations with EPA, Cal EPA, etc., re. smoke emissions from Rx fire)
- **Sierra Nevada Conservancy** (fire management and watershed restoration in the southern Sierra Nevada, fire severity trends in Sierra Nevada study, North Yuba Partnership, Tahoe NF managed wildfire forest plan amendment, Tahoe-Central Sierra Initiative, fire and climate change outreach events)
- **Sonoma State University** (*Living With Fire* symposium)
- **Southern Sierra Conservation Cooperative** (fire management and watershed restoration in the southern Sierra Nevada)
- **Sierra Meadow Partnership** (Sierra Nevada meadow conservation)
- **South Fork of the American River (SOFAR) Cohesive Strategy Collaborative** (Landscape scale restoration)
- **Southern Sierra Conservation Cooperative**
- **Southern Sierra Fire Science Working Group** (fire science symposium focused on federal lands in the southern Sierra Nevada; ecoregional federal fire management plan assessment)
- **Southern Sierra Prescribed Fire Council** (fire management in the southern Sierra Nevada)

- **Tahoe Regional Planning Agency** (Healthy Vegetation and Hazardous Fuels desired conditions and monitoring protocols; LTBMU meadow management plan; GLORIA climate change monitoring; Threshold monitoring)
- **TerraPeninsular** (Baja California fire management working group)
- **The Wilderness Society** (Wildland Fire Use policies; Sierra Nevada management under climate change; ecological monitoring of the Dinkey Collaborative Forest Landscape Restoration Project)
- **University of Barcelona, Spain** (postfire restoration decision support tool)
- **University of California- Berkeley/Department of Environmental Science, Policy and Management** (California Fire Science Consortium, Sagehen Reserve projects, postfire regeneration prediction tool, King Fire studies)
- **University of California-Berkeley, Center for Fire Research and Outreach** (CFRO advisory committee)
- **University of California-Davis/Department of Environmental Science and Policy** (California Fire Science Consortium, UCB forestry field camp, Ecology Program cost-share position, red fir treatment monitoring, study of grazing and productivity effects on annual grassland composition, summer field crew coordination)
- **University of California-Davis/Department of Plant Pathology** (Sudden Oak Death impacts on fire severity and forest fuels)
- **University of California-Davis/Department of Plant Sciences** (study of fire and climate change effects on Sierra Nevada oaks, climate change study of serpentine and nonserpentine chaparral, postfire tree regeneration inventory, study of climate effects on forest regeneration)
- **University of California-Davis/Information Center for the Environment** (Santa Clara River watershed ecosystem services assessment; International Climate Change and Resource Management Seminar; FRID mapping; biomass estimations in California shrub communities)
- **University of California Extension** (California Fire Science Consortium, southern Sierra Nevada prescribed fire council; Sierra Nevada Adaptive Management Project, Tahoe Wildfire Summit, forest and fire ecology outreach)
- **University of California-Merced** (study of fire impacts on forest mycorrhizae)
- **University of Massachusetts** (historical range of variation assessments, North Yuba landscape design)
- **University of Nevada-Reno** (Natural Areas Conference planning, whitebark pine monitoring)
- **University of New Mexico** (Teakettle Experimental Forest carbon study)
- **University of Washington** (various LiDAR-based forest restoration projects)
- **US Department of Agriculture California Climate Hub**

- **US Fish and Wildlife Service** (California fisher climate impact assessment; Black Backed Woodpecker working group)
- **US Forest Service Forest Health and Protection**
- **US Forest Service International Programs** (Baja California fire management working group; Mediterranean ecosystem management initiative; International Climate Change and Resource Management Seminar; various international missions)
- **US Forest Service Region 5 Remote Sensing Lab** (whitebark pine monitoring, North Yuba Landscape Design Strategy, eDART evaluation, postfire restoration strategy, LiDAR validation, FRID mapping)
- **US Geological Survey/Biological Resources Division** (Santa Clara River watershed ecosystem services assessment, California Fire Science Consortium, Sierra Nevada: climate change science program; S. California: multiple hazards mapping project; fire severity in chaparral fires)
- **US Geological Survey Southwest Climate Adaptation and Science Center**
  - **Western Klamath Restoration Partnership**
  - **Yale University** (Rim fire conifer regeneration monitoring)
  - **Yosemite National Park**
  - **Yosemite Stanislaus Solutions Group** (Landscape scale restoration)