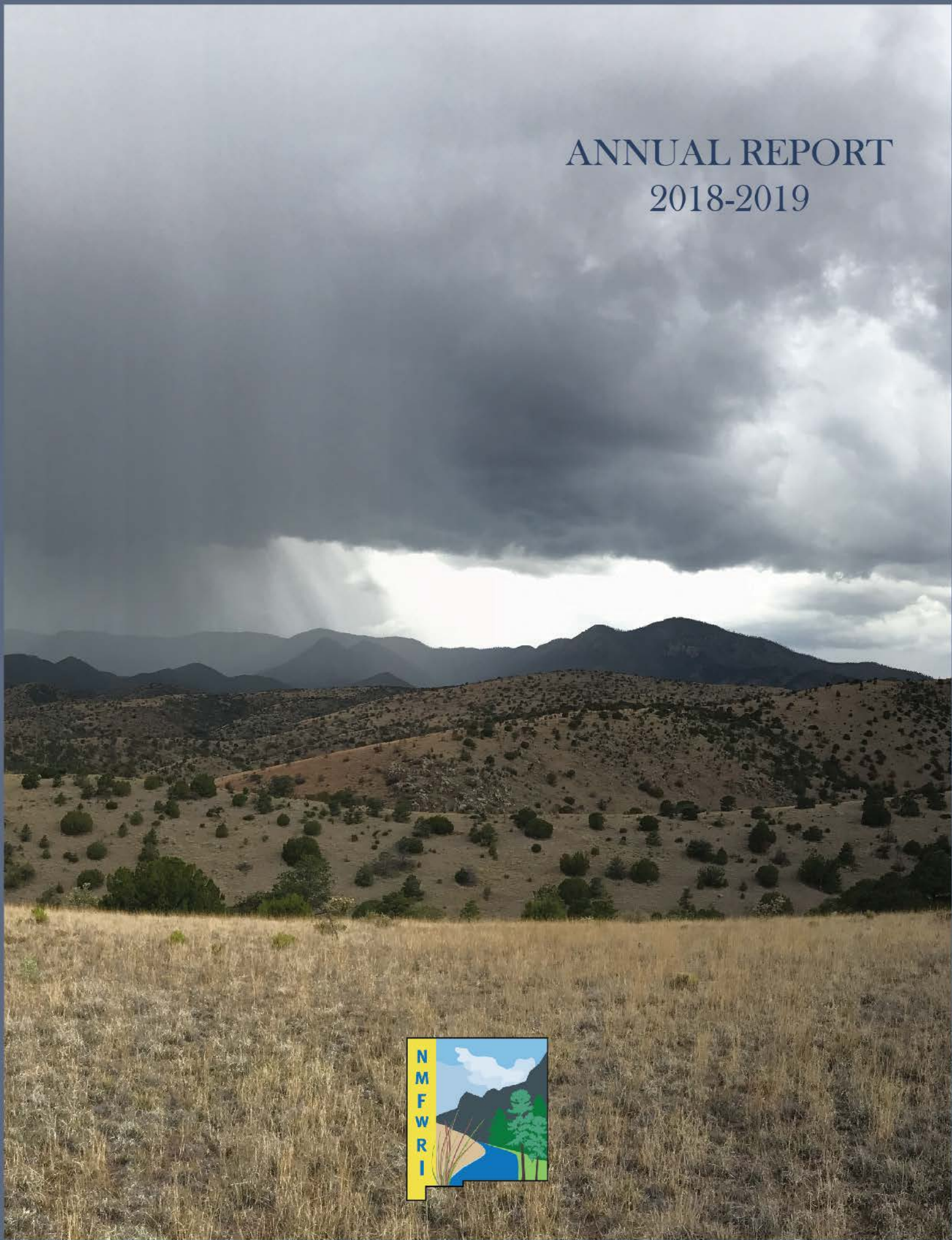
ANNUAL REPORT
2018-2019



New Mexico Forest and Watershed Restoration Institute Annual Report 2018-2019

The New Mexico Forest and Watershed Restoration Institute (FWRI) exists to promote practices that reduce the risk of catastrophic wildfire and enhance ecosystem function. We pursue these objectives through four program areas:

- Protocols of restoration treatments, or outreach on which tree to cut and which to leave, with an emphasis on the need to reintroduce a more natural fire return interval;
- Support from geographic information systems (GIS) to field work by FWRI and our partners, which involves producing maps;
- Monitoring, or how to determine if treatments are effective, the subject which accounts for most of our partners' requests for technical assistance; and
- Collaboration, working together with individuals and groups toward a common goal.

This report is organized into the four broad areas mentioned above: technical assistance in restoration protocols, GIS, monitoring, and watershed restoration partnerships. These areas are further subdivided as needed. This report focuses on the period 1 January 2018 through 30 September 2019, with activities outside of that period mentioned as needed for context.

TECHNICAL ASSISTANCE IN RESTORATION PROTOCOLS

In order to both mitigate the potential for catastrophic wildfire and restore natural watershed functions, the NMFWRI provides technical assistance with fuel treatments and restoration prescriptions. These technical assistance efforts extend beyond individual land ownerships and jurisdictions.

Outreach in treatments and prescriptions

In recent years, the treatment emphasis of NMFWRI has been in ponderosa pine and dry mixed conifer, in accordance with the principles outlined in the Forest Service's General Technical Report (GTR) 310 and the New Mexico Forest Restoration Principles. The general consensus on restoration in these forest types – take enough, leave groups and openings, and burn it – has enabled us to turn more attention to other types that have less consensus. Much of our attention has been on piñon-juniper, or PJ, the plant community covering more than 7 million acres in New Mexico.

One of the major challenges with PJ is that even more than with other plant communities, a land manager needs to decide what is meant by PJ. More than 10 years ago, the same group that developed the NM Forest Restoration Principles for forest and timber lands began work on a complementary Piñon-Juniper Framework. The underlying driver of that Framework was soil depth, the related soil fertility, and how they relate to fire. When soils are deep, grass cover should be sufficient to carry a fire that kills most woody regeneration. On rocky soils, grass is not sufficient to carry fire, and PJ can survive and thrive. Using this Framework as a foundation, NMFWRI has developed a set of restoration protocols for various forms of PJ woodland.

The Framework identified five PJ types: PJ persistent woodland, PJ open woodland, PJ shrub woodland, PJ or juniper savanna, and grasslands. We added a sixth type, the transition zone between PJ and ponderosa pine. We presented restoration protocols for each type, with an overall understanding that the needs and vision of the local land managers will drive any decision. With the exception of persistent

woodland, the protocols call for reducing tree numbers and reintroducing regular low-intensity fire. The foundation draft Piñon-Juniper Framework from 2007, the Key to 5 PJ Types, and the new PJ Restoration Protocols are all available on our website at https://nmfwri.org/restoration-information/for-land-managers

Other Statewide Work

GTR-310 and Restoration Principles Comparison - In a close comparison of the recommendations from these two documents, we have found significant agreement and no conflict. The Forest Restoration Principles gives priority to collaboration, while GTR 310 only mentions collaboration in the biography of one of the authors. The Principles discuss at some length how to avoid cutting large trees, and GTR 310 discusses how to grow small trees into trees that can be cut or left when they grow to be large. A white paper on this comparison is under review, and is expected to be released in the first part of 2020.

RGWF Signatories and TNC RGWF monitoring – We continue to be a member of the large consortium supporting TNC's Rio Grande Water Fund. In addition to the meetings attended by the other signatories, we serve on one of the technical panels that reviews funding proposals. We also have an agreement with TNC to provide technical assistance to monitoring (see below), and to collect and analyze data on selected treatments.

State Forestry – We continue to work closely with State Forestry, especially the Forest and Watershed Health Office. We participate in quarterly meetings of the Consultative Group for the FWHO, and have worked with them to develop the revised Forest Action Plan and to Shared Stewardship.

Forest Restoration Triangle – The close collaboration among the Department of Natural Resources Management at Highlands, NMSU's John T Harrington Forestry Research Station at Mora, and FWRI – known as FoRT – has continued and been strengthened. In mid-2018, FoRT was invited to submit a proposal to the National Science Foundation program known as the Center of Research Excellence in Science and Technology, or CREST. The resulting proposal was written in three parts: the JTH FRC would investigate reforestation of burned areas; the DNRM and FWRI would research the effects of restoration practices on natural regeneration and fire regimes, and; the DNRM would look at large-scale planning activities that link the department with local communities. Since a major emphasis of the CREST program is to provide opportunities to students from historically under-served populations to pursue graduate research opportunities, students will play major roles in all three components. The proposal was submitted in early December 2018, and we answered two rounds of questions from NSF during 2019. (We were notified in early December 2019 that FoRT had been awarded the grant.)

GIS/SPATIAL DATA ANALYSIS

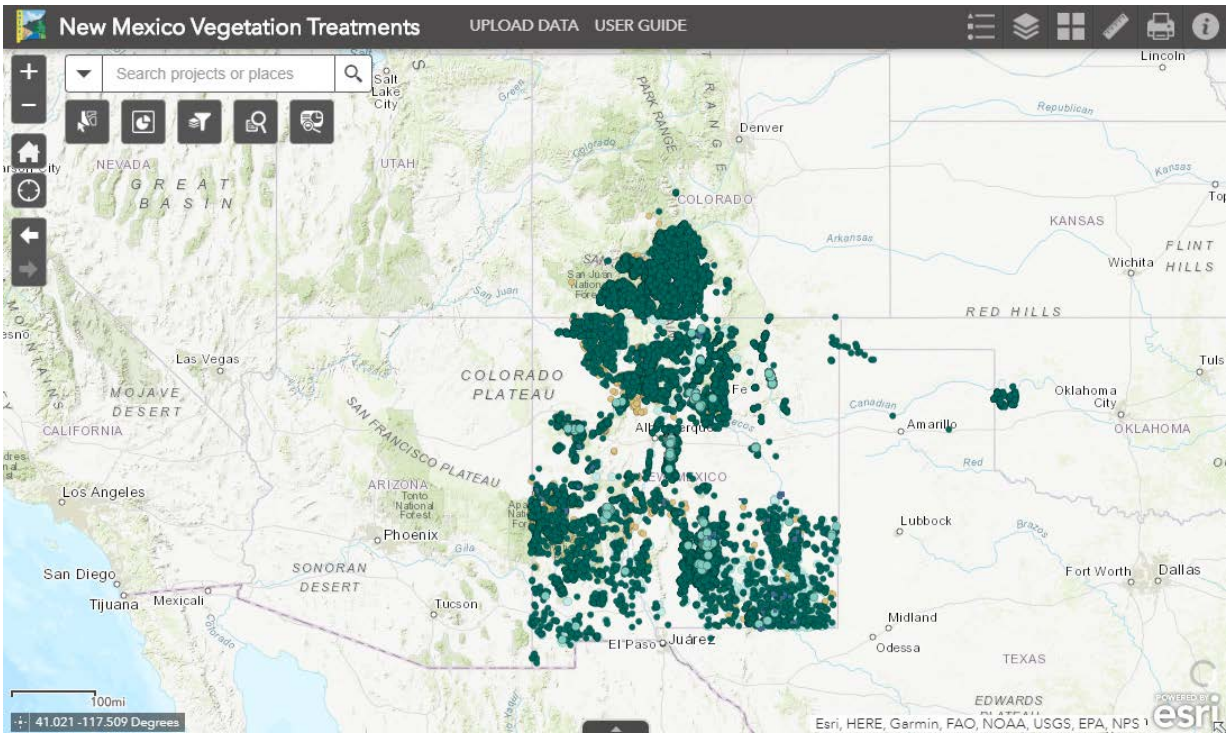
Highlands University is an important center of restoration-based GIS and GPS expertise in northern New Mexico. FWRI currently has two GIS specialists, Patti Dappen and Katie Withnall. We bring in other GIS help as needed, and our monitoring staff and students have strong GIS skills. We continue our mutually beneficial relationship with Joe Zebrowski, the head of the Geospatial Applications in Natural Sciences (GAINS) Laboratory.

Vegetation Treatment Database

FWRI continued to maintain the statewide geospatial database of planned, in progress, completed, and historical watershed treatments, identifying private, state, tribal, and federal forest and woodland projects for all of New Mexico.

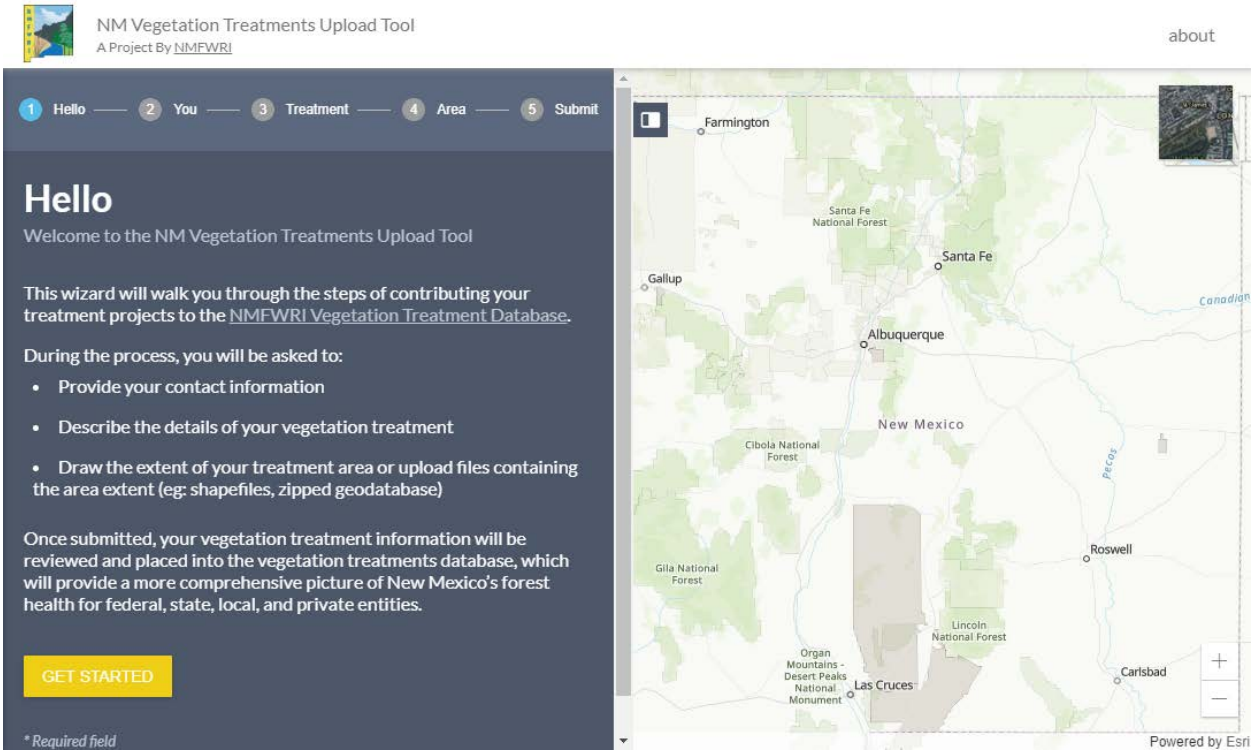
The continued maintenance of this database involved working collaboratively with and receiving data from NM State Forestry, USDA-Forest Service, BLM, Colorado State Forest Service, Greater Rio Grande Watershed Alliance, Greater Santa Fe Fireshed Coalition and a host of other agencies. The collected data populates an integrated database which is available as an interactive web application online. From December 2017 to December 2019, a total of 5,558 new projects have been added to the database including 2,860 projects added to the historical treatment projects feature layer and 2627 projects added to the completed treatment projects layer.

Regular distribution of quarterly updated versions of the geodatabase and the Web App associated with it occurred during this period. The Web App was further developed to include a number of tools including reporting and data download capabilities. Also during this period, a completeness survey was conducted to measure the completeness and accuracy of the data in the vegetation geodatabase. Based on that survey, our geodatabase contains 82% of all completed projects, and 94% of the total acres treated.



December 2019 Version of the NM Vegetation Treatments Web App

A major milestone was the development and completion of an Upload Tool, which enables users to contribute data to the geodatabase either by uploading a geospatial file, or by sketching the project boundary. The Upload Tool, which was developed based upon meetings and feedback with stakeholders, was completed in May 2018.



Upload Tool

A number of outreach efforts began in the Fall of 2017 to inform agencies and groups about the NM Vegetation Treatment geodatabase and Web App. In the Spring of 2018, outreach was expanded to focus on the Upload Tool. Outreach efforts included presentations and live demonstrations at many meetings around the state including the CFRP annual meeting, DHSEM preparedness area meetings, Santa Fe WUI Summit, CWPP planning meetings, and many others. In the spring of 2019 these efforts were expanded to include webinar demonstrations.

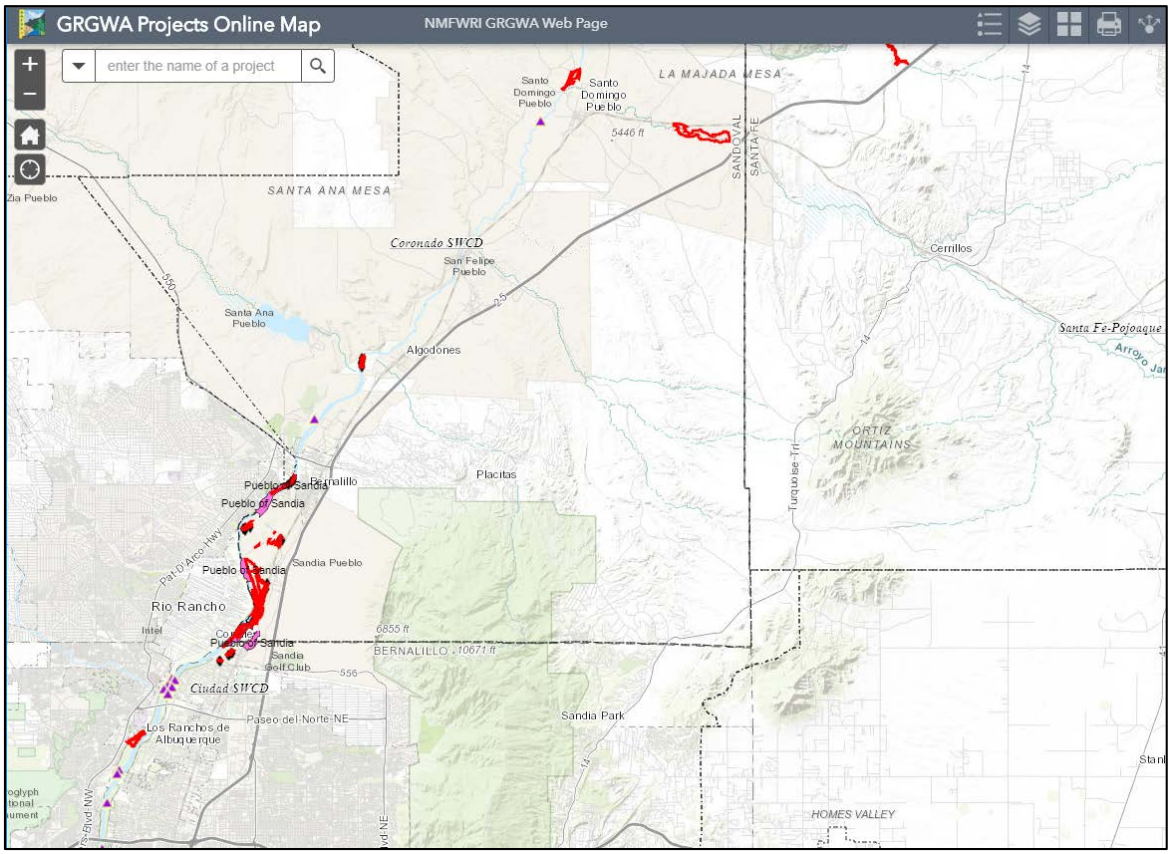
GIS Technical Assistance

eCognition and LiDAR based Vegetation Mapping for the Greater Rio Grande Watershed Alliance (GRGWA)

FWRI continued its Pre and Post-Treatment Monitoring Assessments using LiDAR and or NAIP imagery to characterize vegetation for monitoring reports. In areas without LiDAR, NDVI from NAIP imagery was use to characterize vegetation type. LiDAR, light detecting and ranging, elevation data were used to estimate vegetation height, canopy characteristics a supplement to field monitoring data for some GRGWA pre- and post-treatment project sites.

GRGWA – Web Mapping Application

To help get a better picture of the multi-year monitoring going on with the Greater Rio Grande Watershed Alliance projects, a web mapping application has been developed and continues to be maintained by FWRI. Data layers include project locations, photo point locations, base maps and imagery. Where available reports are linked to project boundaries and photographs are linked to photo point locations. This web map is located on our website: http://nmfwri.org/collaboration/greater-rio-grande-watershed-alliance/grgwa-projects-online-map.



GRGWA Projects Online Map

GIS Assistance to other Collaborative Groups

Web mapping applications, as well as hard copy maps, continue to be maintained and developed for four additional watershed collaborative groups and hosted on our NMFWRI.org website. New to this reporting year is Magdalena Collaborative website and web map.

- Magdalena Collaborative group website https://www.nmfwri.org/collaboration/magdalena-collaborative/magdalena-collaborative-web-map
- N Sacramento Working group website / http://nmfwri.org/collaboration/north-sacramento-mountains-working-group/nsacramento-watershed-map
- Mountainair Collaborative Group: http://nmfwri.org/collaboration/mountainair-collaborative/Mountainair-map

- Otero Working group website / http://nmfwri.org/collaboration/otero-county-working-group/watershed-map

In addition to the web mapping applications, we are hosting watershed group's meeting minutes and contact information on the NMFWRI.org website. These include; The Mountainair Collaborative, The Estancia Basin Monitoring, The North Sacramento Mountains Working Group, The Otero Working Group, Grant County Eco-Watershed Working Group, The Greater Rio Grande Watershed Alliance, and the Magdalena Collaborative.

Technical Training to Tribes and Agencies

At the request of the Taos Pueblo Department of Natural Resources, NMFWRI developed and conducted a one-day LiDAR and Forestry Applications workshop in February 2019. Topics of the hands-on workshop included learning to import LiDAR into ArcGIS Pro, displaying point clouds in 3D, generating DEMs and DSMs, and calculating above ground heights and vegetation density. Due to the positive feedback received after the workshop, FWRI repeated the workshop in April 2019 for natural resource GIS professionals from many different tribes and agencies.

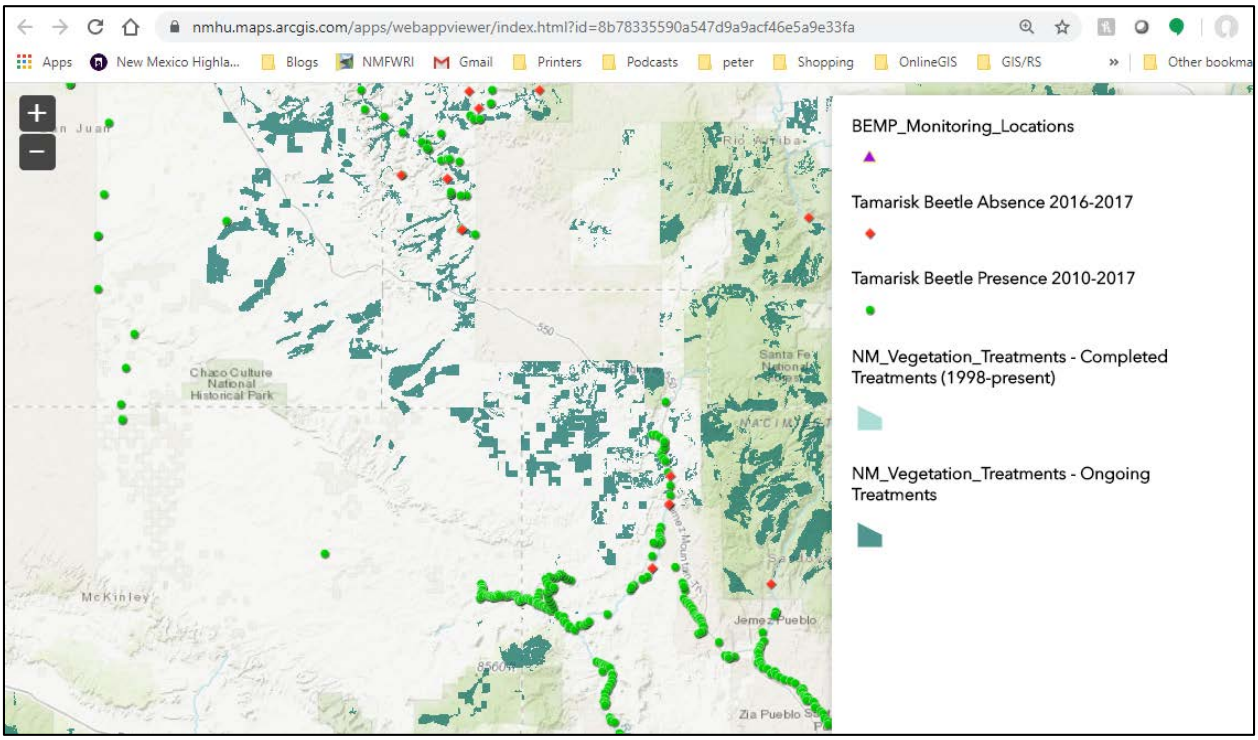
Gallinas Watershed Story Map

NMFWRI has helped the Hermit's Peak Watershed Alliance (HPWA) to develop a tour of the Upper Gallinas Watershed. A digital online tour, in the form of an ArcGIS Storymap, will be available for those who would like to explore the watershed online. The Storymap includes educational information about many locations in the watershed, watershed restoration and health educational information, history and more. NMFWRI has developed a template and content while HPWA will be finishing the story map some time in 2020.

Tamarisk Leaf Beetle Mapping

The Tamarisk Leaf Beetle (TLB) was first introduced in 2001, in an attempt to curb dense stands of salt cedar (tamarisk) that line southwestern rivers. The beetles spread quickly and now range from Montana to Mexico and California to Texas. While the TLB is a salt cedar obligate, meaning it only eats salt cedar leaves as both larvae and adult beetles, the intention behind the TLB introduction was not to entirely wipe out salt cedar, but to eliminate some of the population to allow regrowth of the native riparian plants like willows and cottonwoods. In order to monitor the spread of the TLB, a web mapping application was developed and linked on our web page. https://www.nmfwri.org/restoration-information/tamarisk-leaf-beetle

TLB Monitoring data was obtained and provided by Rivers Edge West and Bosque Ecosystems Monitoring (UNM). Our web mapping applications includes the New Mexico Vegetation Treatment geodatabase so Tamarisk Beetle locations can be seen in relationship to completed and ongoing vegetation treatments.



Tamarisk Leaf Beetle Mapping Application

MONITORING

Field work

FWRI's 2018 field crew included ecological monitoring specialist Kathryn Mahan and monitoring and data technicians Carmen Briones and Ernesto Sandoval. NMHU student interns on the 2018 summer field crew were Anna Medina, Alex Perea-Angles, Leon Lujan, and Raymundo Melendez. Raymundo joined the NMFWRI staff at the end of the 2018 field season as a monitoring and data technician. Amina Sena joined as Restoration Monitoring Program Manager at the end of the 2018 field season, and departed in 2019. NMHU student interns Louis Rymalowicz and Dorian Miranda joined NMFWRI monitoring department staff on the 2019 summer field crew.

Measured projects included several CFRP projects at 5-years and 10-years post-treatment, two pre-treatment CFRP projects, and the San Antonio Common Study and Mt Taylor Piñon-Juniper projects. One of our largest efforts was the pre-treatment Upper Mora Walker Flats CFRP. This work was completed as part of a planning CFRP with Adelante RC&D and the Santa Fe NF. Our monitoring crew completed a road inventory and vegetation analysis on 2282 acres in the Walker Flats area, the priority area for the Las Vegas/Pecos District in the much larger Upper Mora NEPA Planning Project. The area we worked in is largely roadless and much of it is very steep; access was difficult to the point that on many days, a crew could collect only a single plot. However, 156 plots were completed over several months of work. As this work took up most of the 2018 season, the San Antonio Common Study was monitored the summer of 2019, using RMRS funding.

Table 1: Sites monitored between Jan 2018 and September 2019 (21)

Site name (Project affiliation)	Acres	Forest vegetation type(s)	No. Plots
25-11 Talking Talons	363	PJ	35
03-09 Bluewater Utilization (Post Office Flats)	80	PP	18
06-11 Building Workforce (Oak Springs)	452	PJ, PP	50
06-10 & 09-08 Black Lake I & II	342 (300 to 360)	PP, MC	34
16-07 Santa Cruz Embudo CFRP re-measure (Cejita Mesa, Chamisal, & BLM Boy Scout)	717	PJ, PP	38
22-04 Gallinas Tierra y Montes CFRP re-measure (Area 1, 2, 3)	270	PP, MC	31
22-07 Johnson Mesa/Barela CFRP re-measure	144	MC	31
28-07 Santo Domingo Forest to Farm CFRP re-measure	29	R	6
29-07 Ocate State Lands "A" CFRP re-measure	103	PP	35
28-10 Griegos Logging/Las Vegas Watershed CFRP re-measure (Units 1, 2, 4, 5, 6)	207	PP	22
Bull Springs	440	MC, PP	32 (included fuels-only and new plots)
16-12 Upper Mora Walker Flats CFRP	2282	PP, MC	156
Upper Mora Capulin CFRP 2B	2777	PP, MC	119
21-12 Calf Canyon CFRP re-measure	172	MC	9
Kuykendall Unit 6 CFRP re-measure	70	PP, PJ	8
La Jara Unit 1, 2, 3 CFRP re-measure	165	MC	16
Jemez Common Study	738 (est.)	PP	15
Mt Taylor Piñon Study Site	1024 (est., various units)	PJ	47
Rowe Mesa CFRP re-measure	522	PJ/savanna	28
Maestas/Northridge CFRP re-measure	34	MC	5
McGaffey CFRP	30179 total	PP, MC, PJ	40 planned, 14 collected (stratified based on veg type; crew access shut down by fire & impassable roads)

Collaboration with Groups providing other Funding

GRGWA

The Greater Rio Grande Watershed Alliance is a collection of soil and water conservation districts, Pueblos, agencies, and other stakeholders in the watershed for the Middle Rio Grande working on landscape-scale watershed restoration, with a focus on non-native phreatophyte removal from the bosque. They use a variety of techniques including extraction, mastication, aerial, basal, foliar, and cut-stump herbicide applications, and planting grass, trees, and shrubs. They follow community, statewide, and national management and conservation plans, and also seek to monitor the effectiveness of their restoration efforts. Our involvement with GRGWA has been supported with non-Forest Service funds.

We do most of the pre-treatment and post-treatment project monitoring, including publishing a monitoring guide (http://nmfwri.org/collaboration/greater-rio-grande-watershed-alliance/other-docs) and reports arranged by Soil and Water Conservation District (http://nmfwri.org/collaboration/greater-rio-grande-watershed-alliance/monitoring-reports). Our website hosts an extensive collection of reports and repeat photographs (http://nmfwri.org/collaboration/greater-rio-grande-watershed-alliance/monitoring-reports/grgwa-resources), as well as a GRGWA Projects online map (http://nmfwri.org/collaboration/greater-rio-grande-watershed-alliance/grgwa-projects-online-map).

In 2018, GRGWA did not receive Water Trust Board Funding, so NMFWRI's efforts focused on reporting and development of revised effectiveness monitoring protocols.

NMRAM

Related to the GRGWA work is the New Mexico Rapid Assessment Method, or NMRAM, a monitoring protocol developed by the Surface Water Quality Bureau and NM Natural Heritage. It was developed to pick up over time significant biotic and abiotic changes in riverine wetlands and riparian areas. We use it for a good deal of the GRGWA monitoring, and other situations where the stakeholder requests it.

RGWF Roving Monitoring Team

Our involvement with the Rio Grande Water Fund has led to an agreement with TNC to monitor a representative group of treatments. Under this agreement, our crew is known as "the Roving Monitoring Team." In 2018, NMFWRI measured pre-treatment and post-firewood-harvest plots in the Bull Springs area on the Carson National Forest. We also worked with TNC to conduct training for Rocky Mountain Youth Corps crews to expand capacity in the region for this kind of work. Our monitoring specialist provided technical support for the RMYC crews as they took over post-treatment monitoring of RGWF projects previously monitored by NMFWRI in the Chama area.

In 2019, the NMFWRI monitoring department also provided first aid, safety, and forest monitoring protocol training to NMHU ARMAS and AMP students working at the Rio Mora National Wildlife Refuge.

Rio Mora Geomorphology Workshop and Survey

In 2018 and 2019, professional staff at the New Mexico Forest and Watershed Restoration Institute completed fieldwork to inform future river restoration planning and implementation along the Rio Mora at the Rio Mora Wildlife Refuge. This included a longitudinal profile survey, seven cross sections and

pebble counts. A geomorphological workshop in July 2019 allowed students and interns from NM Highlands the chance for a hands-on learning lab. This was a collaborative effort with the Denver Zoological Foundation, Inc. and the Rio Mora Wildlife Refuge.

Fuel Loading Photo Series

We completed and published a fuel loading photo series to allow managers to estimate tons per acre of woody debris with visual without completing Brown's transects. The photo series was compiled by NMFWRI to show different wood fuels residues specifically in Southwest mixed conifer, ponderosa pine, and piñon-juniper. Since 2007, NMFWRI has taken data on nearly 1600 FFI/FIREMON plots across New Mexico. Beginning in 2008, Brown's transects were included in monitoring which allowed the assessment of surface fuels levels (litter, duff, 1-hour, 10-hour, 100-hour, and 1,000-hour fuels). The photos associated with these Brown's transects have been compiled into series. While NMFWRI does conduct monitoring on riparian sites, most of our work has been on tribal lands and most photos are confidential. The finished series is available on our website: https://www.nmfwri.org/restoration-information/southwest-fuels-guide-photo-series

For mixed conifer, ponderosa and PJ forest types, we have set up two fuels series. One is ordered based on the tons/acres of 1000-hour fuels only (more likely what would be found in a "natural" setting) and the other is ordered based on the total tons/ acre (1-hour to 1,000 hour fuels) which reflect higher levels of slash associated with thinning or other management practices. Amounts of fuels recorded are provided for all photos, as well the location in and date on which they were taken. Litter and duff are not reported because they are not identifiable in photographs, nor are stumps included in fuels estimates. The photo guide can be used for rapid estimation of surface fuel loading for managers in the Southwest lacking the time or budget to perform more intensive assessments. A quantitative estimate can be obtained by simply finding the photo or photos that mostly closely match the characteristics seen in the field.

CFRP Ecological Analysis

We completed a detail analysis of the ecological impact of the CFRP up through 2018. We looked at results from pre-treatment, immediate post-treatment, 5- and 10-years-post-treatment monitoring in piñon-juniper, ponderosa pine, dry mixed-conifer and wet mixed-conifer forest types. We compared the monitoring metrics to the program objectives laid out in the source legislation. A thesis was published in May 2019, and an outreach report is expected in 2020.

Database Management

We have been investigating options to manage our extensive fieldwork databases. At present we use FEAT/FIREMON's FFI but are interested in databases that would allow us to query across projects, more easily share files with other agencies, and access to models. We have been in discussion with external specialists about Access and FVS but have not yet found a consultant who can complete our scope of work.

WATERSHED RESTORATION PARTNERSHIPS

Over the past two decades, New Mexico forest owners, managers and stakeholders have shifted the focus in forest management from timber production to restoring forest health and resiliency. Their primary concern has been reducing the risk of large-scale forest disturbances, especially high-intensity wildfires that have the potential to consume thousands of acres of forest in a relatively short time. Restoration requires management approaches that encompass large landscapes, crossing property and political boundaries and incorporating various interests. Setting management priorities and making management decisions on large landscapes requires cooperation and collaboration among all owners, managers and stakeholders.

In the 21st century, federal, state, tribal and local government agencies, private landowners and interest groups increasingly have formed partnerships and collaborative groups to coordinate large-landscape forest management, and to share responsibility for the work that is necessary to restore forest health and reduce the risk of forest disturbances. However, collaborative groups typically are voluntary efforts, and partners in these groups face constraints of time, money and capacity in accomplishing restoration goals. The overarching goal of the FWRI Collaboration Program is to assist collaborative groups to reduce the burdens imposed by these constraints.

The NMFWRI Collaboration Program

In 2015, the FWRI initiated the Collaboration Program to assist landowners, managers and stakeholders in processes of collaboration, and hired Dr. Alan Barton to manage this program. The Collaboration Program assists collaborative groups in capacity building, partnering, facilitation, documentation, communications and organizational concerns, and coordinates support for collaborative groups through networking. Since 2015, the FWRI has worked with about 20 forestry and watershed collaboratives in New Mexico in a variety of capacities, facilitating group meetings, drafting documents, connecting groups to resources, coordinating statewide and regional efforts to build collaborative capacity, and attending dozens of meetings each year to maintain communication between the FWRI and forestry collaboratives. The FWRI has also promoted New Mexico collaboratives with presentations at conferences and media reports, and he has taught forest law and policy to forestry majors at New Mexico Highlands University.

Networks of Collaborative Groups

In 2018 and 2019, the FWRI has increased its leadership role in networking collaborative groups in New Mexico, the Southwest, and the Rocky Mountain region. One initiative, spearheaded by the Center for Collaborative Conservation at Colorado State University, held workshops in February 2018 and February 2019, which brought together collaboration practitioners from seven states in the Rocky Mountains and Southwest. The group has organized as the Western Collaborative Conservation Network (WCCN). The FWRI participates actively in the WCCN, serving as New Mexico's representative on the Steering Committee for this organization as well as on the Leadership Team and the Public Policy Working Group. These committees have been planning a large conference, to be held in March 2020, to bring together leaders from collaborative groups across the seven-state region for training and coordination.

A second initiative, in coordination with partners in Arizona, Utah and Colorado, is bringing together collaborative leaders to build leadership and capacity in community-based collaborative groups in the Southwest. The FWRI has coordinated meetings for the past year, organizing a needs assessment

workshop that will take place in February 2020. We will build on this through 2020 to create opportunities for collaborative capacity building.

In a third initiative, the FWRI has taken a leadership role in bringing together collaborative facilitators in several western states to create and link statewide story maps of collaborative organizations, so that basic information on all forestry and watershed collaborative organizations is available through a network of story maps.

This latter project builds on a story map that the FWRI's Collaboration Program and GIS Program have created, which identifies forestry and watershed collaborative organizations in New Mexico, along with information on each group.

As part of the networking effort, the FWRI has worked to coordinate a network of collaborative leaders in the Santa Fe area. This is the first step in building similar networks statewide that will facilitate capacity building among collaboratives. The NMFWRI is applying for an Americorps VISTA volunteer to assist with networking collaborative organizations.

Support for Collaborative Groups

Santa Fe National Forest: The FWRI has worked closely with the Greater Santa Fe Fireshed Coalition (GSFFC) since its inception. The GSFFC is a collaborative group that coordinates forest restoration in the Sangre de Cristo Mountains to the east of the City of Santa Fe. Dr. Barton has coordinated the Communications Committee for the GSFFC, which has developed publicity materials for the collaborative, coordinates a website and social media presence on Facebook and Twitter, and organizes public meetings and visits to inform residents of Santa Fe and the Fireshed communities about steps they can take to increase resiliency on their lands and in their communities.

Cibola National Forest: The FWRI has participated in four collaborative groups associated with the Cibola National Forest. The Collaboration Program offered technical assistance in starting up the Mountainair Collaborative, and has participated in building this organization. The FWRI also worked with the Sandia Collaborative, serving on two committees in the collaborative's first year.

In 2018, the FWRI participated in the first meeting of the Magdalena Collaborative. Thereafter, Dr. Barton has served as facilitator for this group, organizing quarterly general meetings and leading meetings of ad hoc committees. The FWRI coordinated drafting the operating principles for the Magdalena Collaborative, and has worked closely with the District Ranger to build this group. In addition, the FWRI participates in the Cibola Shared Stewardship Collaborative, representing the Magdalena Collaborative.

Lincoln National Forest: Community leaders in Ruidoso initiated a new collaborative to support the Forest Service in recreation and transportation planning. The FWRI played a key role in starting the Smokey Bear Collaborative, and coordinated communications for the collaborative as it made it through its first year. FWRI representatives attended all meetings of this group, and contributed technical support as the organization coalesced into a functioning collaborative.

Leaders in Ruidoso also organized the Sacramento Mountains Wood Summit in 2018. The FWRI participated in planning for this event, which drew participants from around the state and presenters from around the Western U.S.

The FWRI has also participated actively in the Otero Working Group (OWG) in Cloudcroft, and has coordinated the OWG's website.

Carson NF: The FWRI has participated in two Carson NF collaboratives. The 2-3-2 Cohesive Strategy Partnership brings together representatives from collaborative groups and conservation organizations to coordinate projects in Northern New Mexico and Southern Colorado. The Cimarron Watershed Alliance brings together landowners, NGOs and agencies to improve watersheds and water quality along the eastern slopes of the Sangre de Cristo mountains.

CFRPs: The Forest Service sponsors the Collaborative Forest Restoration Program (CFRP) to provide three years of financial support for collaborative restoration projects. The FWRI has supported CFRP projects in a variety of ways over the years. In 2018 and 2019, the FWRI played a key role in planning the Rio Puerco Headwaters CFRP project, which was awarded a 2018 grant. The FWRI also participated in the Statewide Fire CFRP multiparty monitoring, which included projects in the Cibola, Santa Fe and Carson National Forests, and collaborated with the Colorado Forest Restoration Institute (CFRI) to prepare a poster describing this project which will be on display at the SWERI Cross-Boundary Workshop in 2020.

Collaborative Case Studies

Understanding the unique characteristics and experiences of individual collaborative groups can provide lessons and suggest practices to other groups. The FWRI has undertaken systematic studies of two groups to produce a history and evaluation of each group.

The Estancia Basin Watershed Health, Restoration, and Monitoring Committee (EBC) was formed nearly 20 years ago as one of the first community-based conservation collaborative (CBCC) organizations in the state. The partners in the EBC have set a high standard for managing projects to reduce the risk of wildfires and to protect watersheds in the Manzano Mountains. The EBC has successfully raised funds and distributed these to carry out fuel reduction treatments on both public and private land, and to provide technical assistance in forest restoration treatments. Over the past two years, Dr. Barton has conducted a series of interviews and document review, and is working on a final case study report on this committee, which is expected in early 2020.

In 2019, the FWRI initiated a project to prepare a history and evaluation of the Greater Santa Fe Fireshed Coalition. This is an ongoing project that should be completed in 2021.

Training and Workshops

The FWRI has sent Dr. Barton to participate in several workshops and symposia in 2018 and 2019, to keep abreast of current events and to maintain collaborative skills. In January 2018, he participated in a workshop organized by the Santa Fe National Forest, the U.S. Forest Service's Washington Office, and the National Forest Foundation on the topic of Conservation Finance. Participants discussed various alternative finance mechanisms for fuel reduction projects. He participated in the Southwest All Lands Peer Exchange, convened by the Rural Voices for Conservation Coalition in December 2018, and in the

C4C Workshop in Durango, Colorado, in May 2018. He attends the WUI Summit hosted by the New Mexico Association of Counties each year, as well as the Alternative Dispute Resolution Symposium hosted by the New Mexico General Services Department.

National Forest Plan Revision

The five national forests in New Mexico have been actively engaged in revising their forest plans in 2018 and 2019. The FWRI has taken part in plan revision on the Santa Fe, Cibola and Gila National Forests, attending meetings and helping to coordinate plan revision interactions between forest planners and collaborative members. The FWRI has been a cooperating partner in the Santa Fe National Forest plan revision process. FWRI representatives have participated in several plan revision meetings, and have coordinated the participation of Cibola National Forest collaboratives in plan revision.

Presentations and Media

Donald Griego and Alan Barton. "Forest Restoration on the I-25 Corridor." Published in various newspapers around New Mexico (e.g., Albuquerque Journal, Santa Fe New Mexican, Taos News, Farmington Daily Times, Silver City Sun News) and on the USA Today website. Jan. 23 to Feb. 3, 2018.

Alan Barton. "Partnering to Manage the Wildfire Risk Across Large Landscapes: Why Forest Managers and Stakeholders are Collaborating More Than Ever." Journey Santa Fe, June 3, 2018. At Collected Works Bookstore in Santa Fe, and broadcast on KSFR radio.

Alan Barton. "Strategies for Collaborative Forest Restoration in New Mexico's South-Central Mountains." Presented at the International Symposium on Society and Resource Management, Snowbird, Utah, June 18, 2018.

Alan Barton. "Collaborative Forest Restoration in the Estancia Basin, New Mexico." Presented at the Annual Meeting of the Rural Sociological Society, Portland, Oregon, July 28, 2018.

Alan Barton. "Collaboration to Restore Forests and Watersheds: An Opportunity for Alternative Dispute Resolution in Rural Areas." Presented at the Annual Meeting of the Rural Sociological Society, Richmond, Virginia, August 9, 2019.

Alan Barton, Tahnee Robertson, and Patti Dappen. "Regional Networking of Forestry and Watershed Collaborative Groups in the Rocky Mountains and Southwest." Poster Presented at the Annual Meeting of the Rural Sociological Society, Richmond, Virginia, August 8, 2019.

Alan Barton and Debarashmi Mitra. "Rethinking Pluralism in the Context of Political Participation, Policy and Social Change." Presented at the Annual Meeting of the Society for the Study of Social Problems, New York, New York, August 10, 2019.

SUPPORT TO NM HIGHLANDS UNIVERSITY

FWRI also assists the Natural Resources Department at New Mexico Highlands University with teaching graduate and undergraduate level courses related to Forestry and Natural Resources Management.

Courses Taught by FWRI Staff

The following courses were taught during the 2018-2019 semesters by NMFWRI staff:

- FOR 415/515 Remote Sensing and Analysis, Fall 2018 Semester and Fall 2019 Semester (Dappen)
- Helped develop the online class GEOL 235: Introduction to Geospatial Technologies (Withnall / Dappen)
- FOR 330 Natural Resource Law & Policy, Fall 2018 Semester (Barton)
- FORS 3300 Natural Resource Law & Policy, Fall 2019 Semester (Barton)
- Guest Lecture, FOR 417/517 Watershed Management, Spring 2018 Semester (Barton)
- Guest Lectures, FOR 589 Applied Ecology & Environmental Restoration, Fall 2018 Semester (Barton)
- Guest Lecture, FOR 417/517 Watershed Management, Spring 2019 Semester (Barton)

Student Mentoring

Mentoring of students by NMFWRI staff included:

- Mentoring Graduate Student – Kathryn Ottmers for her project: *Remote sensing approaches for planning adaptive multi-paddock grazing*. Developing an automated workflow for forage assessments utilizing publicly available satellite imagery, coupled with a ground truthing. Training was provided in the use of Planet Satellite data, Sensefly Drone training, eMotion and ArcGIS Pro software training.
- Mentoring student interns Louis Rymalowicz and Dorian Miranda (Summer 2019). They worked in the field doing common stand exams and surface fuels transects. They also assisted in data entry using FFI software. This was excellent real world work experience for these students.

FWRI Funding

Core Forest Service – FWRI receives annual core funding from the Forest Service, tied to an annual work plan. The three SWERIs share this common funding, which comes from the Washington Office of the Forest Service via the Region 3 Office. We received significant increases in this funding for both FY18 and FY19.

NM State Legislature – We receive significant funding from the New Mexico Legislature via NM Highlands University, our home organization.

South Central Mountain RC&D – In mid-2018, we reached an agreement to do work associated with a statewide prescribed fire CFRP. That work will be performed by the Collaboration Program Manager and a report released in 2020.

Forest Service RMRS – We received FY18 funding from the Rocky Mountain Research Station to work with Dr. Keith Moser on a Common Study to examine the effect of restoration treatments on forest structure and function. Additional funding was received from the Santa Fe National Forest in August 2019 to support this work on the Jemez District.

Greater Rio Grande Watershed Alliance (GRGWA) – For several years, FWRI has received a steady stream of funding to carry out monitoring of the restoration projects implemented by GRGWA. GRGWA is focused principally on riparian areas along the Rio Grande and its tributaries north of Bernardo, and is managed by the Claunch-Pinto Soil and Water Conservation District.

FWRI Staff

Staff are listed below in alphabetical order. This period was one of moderate staff turnover for the Institute. In addition to the full-time staff, we employ Highlands' students as work-studies and to assist with summer field work.

Cesar Alvizo – Budget and Office Manager (began March 2020).

Alan Barton – Collaboration Program Manager, responsible for partnerships and facilitation.

Carmen Briones – Monitoring Field Crew Supervisor.

Patti Dappen – GIS Program Manager, lead staffer on eCognition and general GIS questions.

Josie Lujan – Administrative Associate, retired in May 2019.

Kathryn Mahan – Monitoring Specialist, responsible for database and monitoring logistics.

Angelique Mares – Administrative Associate (Temporary) – July 2019-January 2020.

Raymundo Melendez – Monitoring Field Crew Supervisor.

Kent Reid – Director, handles the bureaucracy.

Amina Sena – Restoration Monitoring Program Manager, August 2018-August 2019.

Katie Withnall – GIS Specialist, lead for the Vegetation Treatment database and Opportunity Mapping.