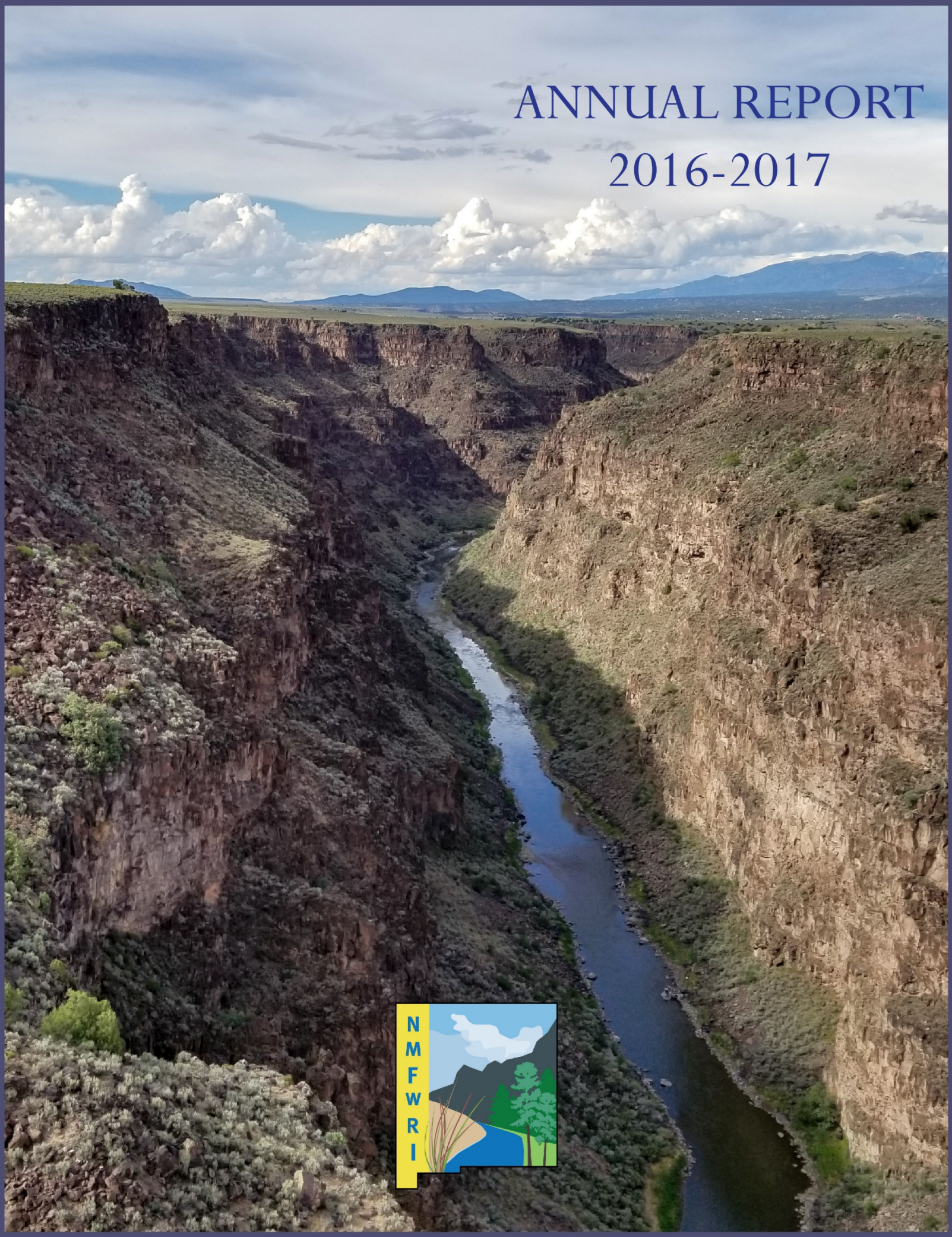
ANNUAL REPORT
2016-2017



New Mexico Forest and Watershed Restoration Institute
Annual Report 2016-2017

TECHNICAL ASSISTANCE IN RESTORATION PROTOCOLS 3

OUTREACH IN TREATMENTS AND PRESCRIPTIONS 3
Desired Conditions Workshops 3
OTHER STATEWIDE WORK 5
PRESENTATIONS AND PARTICIPATION 6

GIS/SPATIAL DATA ANALYSIS 6

Vegetation Treatment Database 6
GIS TECHNICAL ASSISTANCE 9
eCognition and LiDAR based Vegetation Mapping for the Greater Rio Grande Watershed Alliance (GRGWA) ... 9
GRGWA – Web Mapping Application 11
GIS Assistance to other Collaborative Groups 11

MONITORING 12

FIELD WORK 12
COLLABORATION/FUNDING 14
GRGWA 14
NMRAM 14
..... 15
RGWF Roving Monitoring Team 15
Luera TREX 15
BLM Final Performance Report Monitoring / Vegetation Mapping 16

WATERSHED RESTORATION PARTNERSHIPS 17

GREATER SANTA FE FIRESHED COALITION COMMUNICATIONS PLAN 17
OTERO WORKING GROUP STRATEGY DOCUMENT 17
NORTH SACRAMENTO MOUNTAINS WORKING GROUP STRATEGY DOCUMENT 17
TECHNICAL ASSISTANCE 18

SUPPORT TO NEW MEXICO HIGHLANDS UNIVERSITY 19

COURSES TAUGHT BY FWRI STAFF 19
STUDENT MENTORING 19

PUBLICATIONS BY FWRI STAFF 19

FWRI FUNDING 20

FWRI STAFF 20

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:

- the protocols of restoration treatments, or outreach on which tree to cut and which to leave, with an emphasis on the need to burn treated areas with prescribed fire;
- 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 October 2016 through 30 September 2017, with activities outside of that period mentioned as needed for context. This period was one of moderate staff turnover for the Institute. Adrienne Miller, the GIS Specialist and lead for the Vegetation Treatment database, left in December, and was replaced at the beginning of January by Katie Withnall. Rob Strahan, the Restoration Monitoring Program Manager, left in late February, and a search for his replacement is underway. In addition to the full-time staff, we employ Highlands' students as work-studies and to assist with summer field work.

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

Desired Conditions Workshops

In March 2016, NMFWRI joined with agencies operating in the Sacramento Mountains to begin planning workshops to explain and discuss the Forest Service's Desired Conditions as outlined in the RMRS publication GTR-310, *Restoring Composition and Structure in Southwstern Frequent-Fire Forests*. Planning partners included the City of Ruidoso, State Forestry-Capitan, ENMU-Ruidoso, the Lincoln National Forest, the South Central Mountain RC&D, and Mescalero Apache Reservation. The Lincoln National Forest saw these workshops as fitting in with their on-going Forest Plan Revision, and became the major partner in the planning. Since the guidelines can be applied to any ownership, the workshops were open to all, including private landowners.

Planning continued throughout the summer and early fall, and two workshops were held in late October 2016. The two workshops covered the same material and visited the same forest stands. The first workshop emphasized the landscape-level benefits of forest restoration, and the second emphasized stand-level protocols for workers in the woods. Each workshop started with a half-day of indoor presentation of background information, then moved outdoors. Presenters were from the Forest Service, Ecological Restoration Institute (ERI), FWRI, and the Fish and Wildlife Service. The afternoon of the first day was around Ruidoso, including dwarf mistletoe rehabilitation on the Mescalero Reservation. The second day was east and south of Cloudcroft. Some of the presentations for these workshops are posted at http://nmfwri.org/restoration-information/Desired-Conditions/restoration-workshops-resources. A total of 42 participants and 11 planners and presenters attended one or both sessions.

The success of the Sacramento workshops led to an invitation by the Gila National Forest to replicate the workshops there, in support of their forest plan revision. Because of the geographic extent of the Gila, these workshops were organized by area, with one in Reserve and one in Silver City. The inside sessions were similar, but the field trips visited different locations. Presentations were by the Forest Service, FWRI, the University of New Mexico, the Rocky Mountain Research Station, and the Fish and Wildlife Service. These workshops were held the first week of August, with Reserve going first. The handout for these workshops is posted at https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd555245.pdf. A total of 32 different participants and at least 9 planners and presenters and attended the sessions.



Restoration thinning, Reserve Ranger District, Gila National Forest

Other Statewide Work

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, 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 implement the agreement with NM Homeland Security. The additional funding we received this year from the Forest Service was also routed through State Forestry.

Forest Restoration Triangle – One of the more significant developments of the last year has been a closer collaboration among the Department of Natural Resources Management at Highlands, NMSU's John T Harrington Forestry Research Station at Mora, and FWRI. A Memorandum of Understanding between the academic Department and FWRI was signed in June 2017; this MOU describes how we will exchange information and leverage resources. As a result of the Department and FWRI collaborating more closely, FWRI and the JTH Station have been drawn together; these two offices do not overlap in their mission, but together we address almost all the forestry issues in New Mexico. In late July, at the first meeting of a newly formed advisory board for the JTH Station, the participants realized that all would benefit from a shared board that would advise the three offices. The first meeting of that shared board was in late January 2017. The collaboration has taken on the name the Forest Restoration Triangle, or FoRT, and has begun exploring ways to work together.

Philmont Training – FWRI is a partner in a CFRP grant, *Collaborative Restoration of Frequent Fire Ecosystems in the Ponil Creek Watershed*, awarded to the Cimarron Watershed Alliance (CWA) in 2016. This grant funds planning on the Valle Vidal Unit of the Carson NF, with Philmont Scout Ranch having responsibility to carry out the stand exams. In early March, we trained the field crews in how to take the plots, using the Carson-approved protocol.

Wood chain CFRP – One of the more interesting CFRP grants of the past few years is *Adding Value to NM Wood through Branding and Chain-of-Custody*. This project seeks to recognize the rigorous environmental review undergone by wood sourced from federal land, and linking that wood supply to local builders wishing to build green. Because of the strong connection between potential markets and sufficient funding for treatments, this recognition is essential for long-term forest health. FWRI has been a collaborator in this project since the proposal stage. More information can be found at https://www.svgoodwood.com/.

State Hazard Mitigation, DHSEM – FWRI became involved with the NM Department of Homeland Security and Emergency Management though our agreement that funded the public upload tool for the Vegetation Treatment database. As a result of that, we were named as a subject matter expert to the planning team for the new Natural Hazard Mitigation Plan, attending meetings and reviewing documents throughout the year.

Presentations and Participation

The Director was a member of an invited panel presentation at the 61st Annual NM Water Conference, sponsored by NMSU's Water Resources Research Institute, held at Western NM University in Silver City on 4-7 October 2016. The panel addressed "Can vegetation management increase yield from forest and rangeland watersheds?"

We participated in the Tree Farm field trip and ceremony naming Hart and Utilia Allex as the 2015 NM Tree Farmer of the Year, in Peñasco on 15 October 2016.

The Director presented an overview of FWRI work at the annual meeting of the NM Flood Plain Managers Association on 14 April at Isleta Pueblo. The presentation was one of the first mentions of how to publicly access the Vegetation Treatment database.

The Director was a member of an invited panel discussion organized by the Rio Mora/ Denver Zoo on "The realities of conservation in 2017." The discussion was held on the evening of 15 May on the NMHU campus, with an audience of NMHU students and students and faculty from the Community College of Denver. The emphasis was on career opportunities and educational preparation.

GIS/SPATIAL DATA ANALYSIS

Highlands University is a center of restoration-based GIS and GPS expertise in northern New Mexico. FWRI currently has two part-time GIS specialists, brings 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.

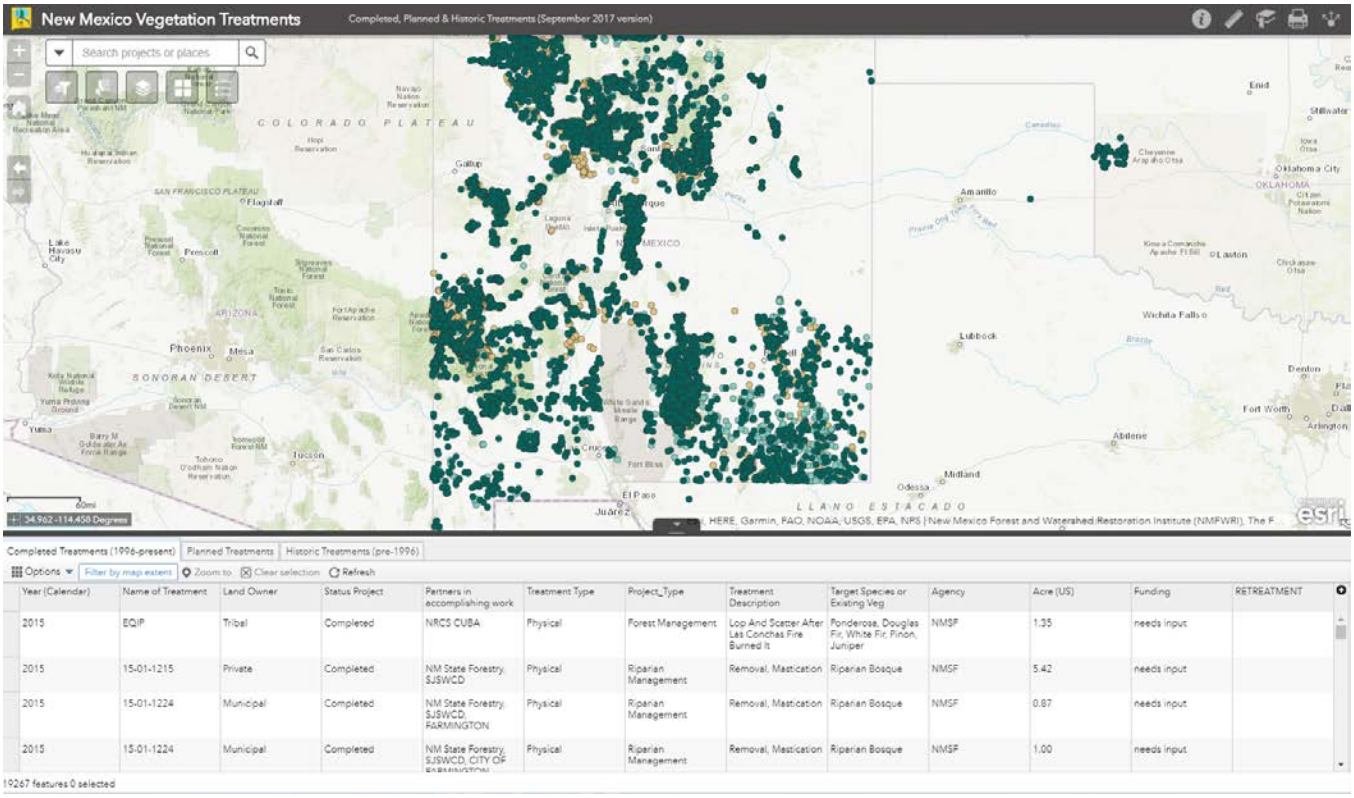
Vegetation Treatment Database

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

In December 2016, Adrienne Miller left FWRI and was replaced by Katie Withnall to lead the NM Vegetation Treatment geodatabase. Beginning in January 2017, FWRI made some significant changes to the statewide geospatial database of vegetation treatments. The geodatabase was reorganized into three feature classes (or layers): Completed (treatments completed within the past 20 years), Historical (treatments completed more than 20 years ago) and Planned. Extensive work was done on the database including identifying and deleting duplicate projects, finding and entering missing attribute data, and restructuring the project attributes. New attributes were added to the database to distinguish retreatment or re-entry over many years and project type (forest, rangeland, riparian, noxious weed, planting). Additionally, the spatial extent of the geodatabase was expanded to include the headwaters of the Rio Grande and the San Juan watersheds in Southern Colorado. Many thousands of new projects were added to the geodatabase during the late winter and spring of 2017. These updates, the majority which were from the USFS Region 3, NM State Forestry, and BLM, were mostly projects completed in

2015, 2016, and 2017, thus bringing the geodatabase current with the present day. 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, and a host of other agencies. The collected data populates an integrated database.

The major milestone that occurred for this project was the distribution of versions of the geodatabase and the Web App associated with it. Versions of the database were published quarterly (March, July and September 2017) to ArcGIS Online, each improved version replacing the previous. Update notices were emailed to our FWRI contact list when each version was published, notifying the contacts about additions to the database and improved functionality of the Web App. A new web map was created and published using ArcGIS Online Web App Builder which allows for increased functionality, interactivity, and analysis tools to be added to the web mapping application. By September 2017 several features were added to the Web App including the attribute table which allows users to view all information for the projects in the geodatabase, a select tool which allows users to select projects and print maps of those selected projects, a group filter tool which allows users to filter all the layers (completed, historical and planned) by a single attribute such as the agency, vegetation species, year, or project type, and a search bar which allows users to search for projects by name.

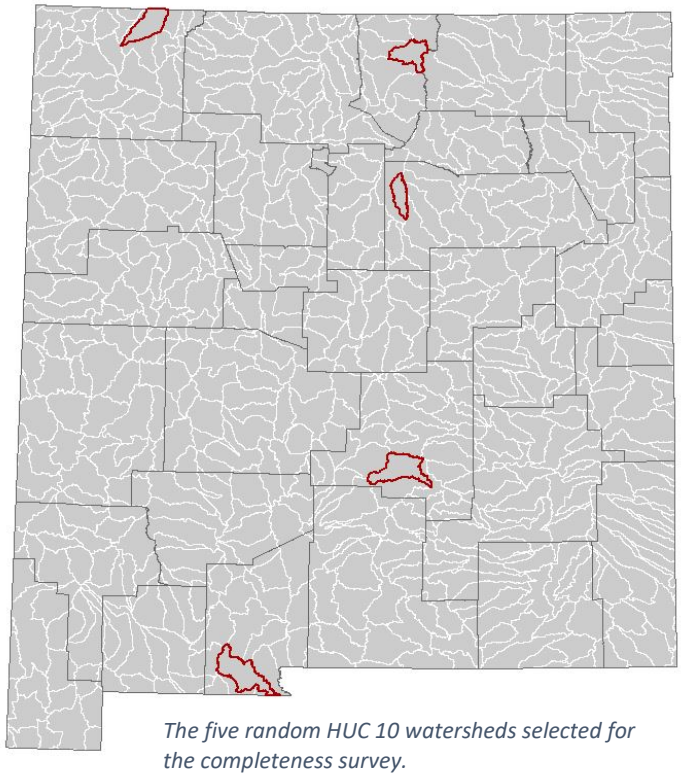


September 2017 Version of the NM Vegetation Treatments Web App

Based upon meetings with stakeholders and feedback from agencies it became necessary to develop an Upload Tool which would allow agencies, or individuals to easily contribute their geospatial data to the NM Vegetation Treatments geodatabase. In July 2017, FWRI began to pursue this project by hiring a contractor, Melodi King, and meeting with her to discuss the general concept and design with a goal of completing the project by May 2018.

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 late September, FWRI attended the 2-3-2 Partnership meeting in Pagosa Springs, CO and presented the Opportunity Map and Vegetation Treatment geodatabase to approximately 35 attendees from various agencies including The Nature Conservancy, Trout Unlimited, Colorado State Forest Service, Chama Peak Land Alliance, US Forest Service, and Firewise.

An important question is the completeness of the data set, meaning complete in terms of including all projects which ought to be included. A study for completeness was incorporated into our federal FY17 work plan. In July 2017, FWRI staff met to design the completeness survey. Five random HUC 10 watersheds were selected: Cow Creek (1306000101), Red River (1302010103), Rio Bonito (1306000802), City of Farmington - Animas River (1408010410), and Kilbourne Hole (1303010210). Agencies and organizations that could possibly have completed restoration work were identified within these watersheds and plans were made to contact and interview them to compare the vegetation treatment projects these groups completed to what existed in the September 2017 version of the NM Vegetation Treatment geodatabase. NMFWRI generally acquires spatial treatment data from the regional or state office of the agencies in the geodatabase; for this survey, the local district or field offices would be interviewed in order to capture any projects that went unreported. The survey was to focus on projects completed within the five year period between January 1, 2012 and December 31, 2016. The interviews for the completeness survey began in October 2017.



The five random HUC 10 watersheds selected for the completeness survey.

GIS Technical Assistance

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

Pre-Treatment Monitoring Assessments include using LiDAR to characterize vegetation before treatments would take place for pre-treatment monitoring reports. In areas without LiDAR, NDVI was use to characterize vegetation type. LiDAR, light detecting and ranging, elevation data were used to estimate vegetation height and canopy characteristics a supplement to field monitoring data for some GRGWA pre-treatment project sites.

GRGWA Pre-Treatment LiDAR/eCognition Vegetation Mapping Projects include:

16_07- Ojo Caliente	16_16_Ojo Caliente	17_15 San Rafael 2
16_11 San Cristobal Riparian	18_18 Rio Abajo North	17_16 Pueblo of Acoma
16_20 Grants	17_14_Grants POA	

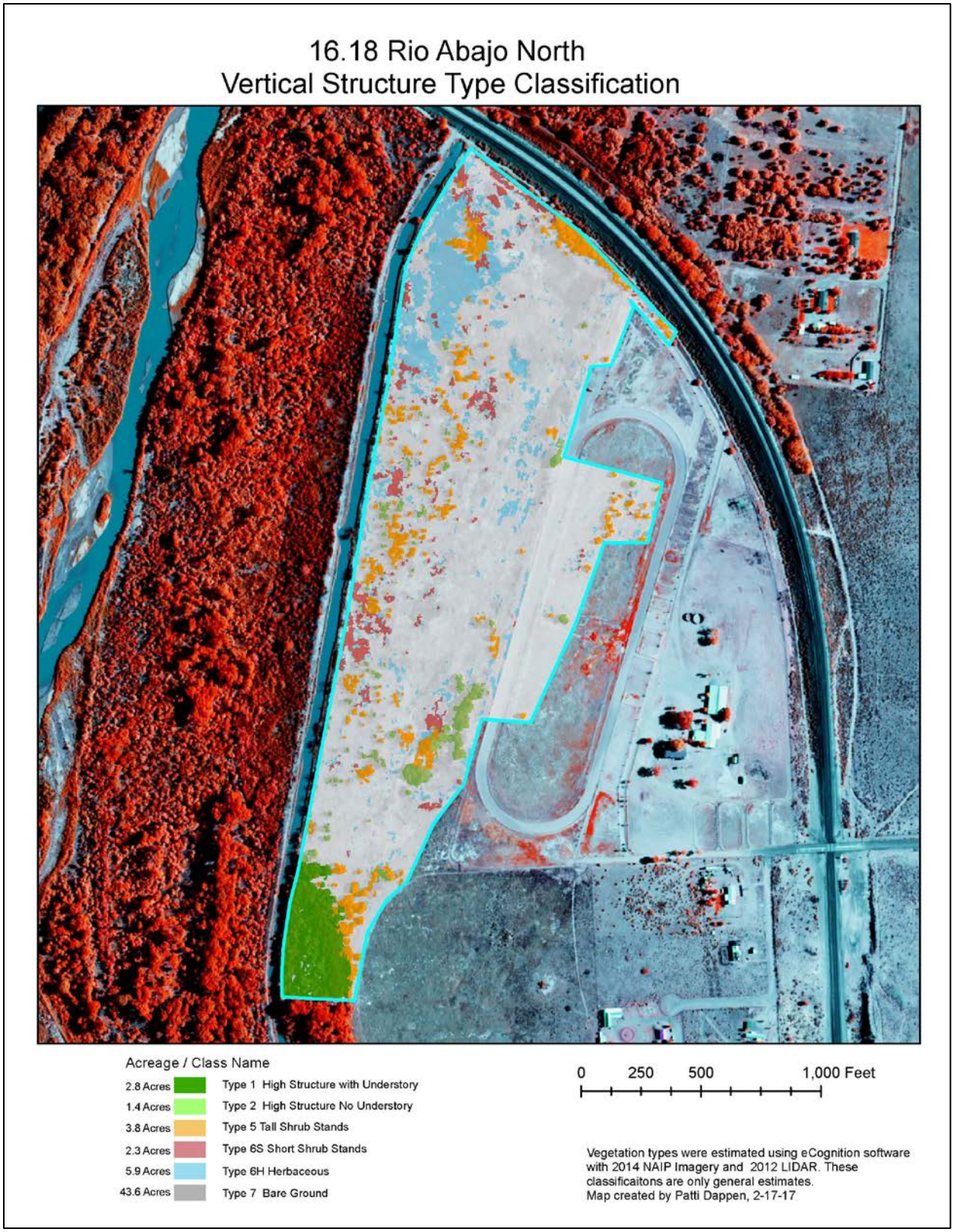
To perform the analysis, two datasets were used depending on the location of the study area. For those areas in Santa Fe County, 2014 Santa Fe County LIDAR was provided was used (flown in March, 2014) and one foot 2016 NAIP (National Agriculture Imagery Program) imagery was acquired to get an estimate of vegetation extent.

In areas along the Rio Grande, 2012 LiDAR obtained from the Bureau of Reclamation (flown in February) was used. For these areas, one foot 2014 NAIP (National Agriculture Imagery Program) imagery was acquired to get an estimate of vegetation extent. In order to classify vegetation, the LIDAR point cloud was filtered to isolate first returns and then LIDAR elevations were calculated to represent height above ground level (AGL). Next, the AGL point cloud was exported by height categories that correlate with the Hink and Ohmart height classes as modified for use in the NMRAM (2.0). These separate point clouds were then converted into separate digital surface models and exported as GeoTiffs.

Similar methods were used from the 2016 vegetation classification for the 2017 work. Understory vegetation was classified first. Understory vegetation were classified using first returns of LIDAR elevations less than 15ft and 1 foot 2014 4- band ortho-imagery within eCognition. eCognition software is an object based image classification system that allows for a semi-automated analysis of high resolution images.

Image segmentation within eCognition was based on elevation surface models created from LiDAR. NDVI (Normalized Difference Vegetation Index) from the ortho-imagery was calculated and incorporated as a threshold to determine vegetation from dead or non-vegetative areas. The resulting classifications were combined into one image representing total understory vegetation.

The understory vegetation layer was then used as an input in the multiple story community classifications (Types 1 and 2). A digital surface model for all heights above ground was used to classify single-story Communities (Types 5, 6S, 6H, and 7). This classification incorporated height classes as well as NDVI to identify active vegetation. Once the vegetation was classified by height, the understory vegetation layer was used to identify whether each class had understory vegetation or not and was then classified accordingly. Total acreage were calculated for each vegetation class and hard copy maps were created for the GRGWA reports. An example of the mapping results are found on the following page:

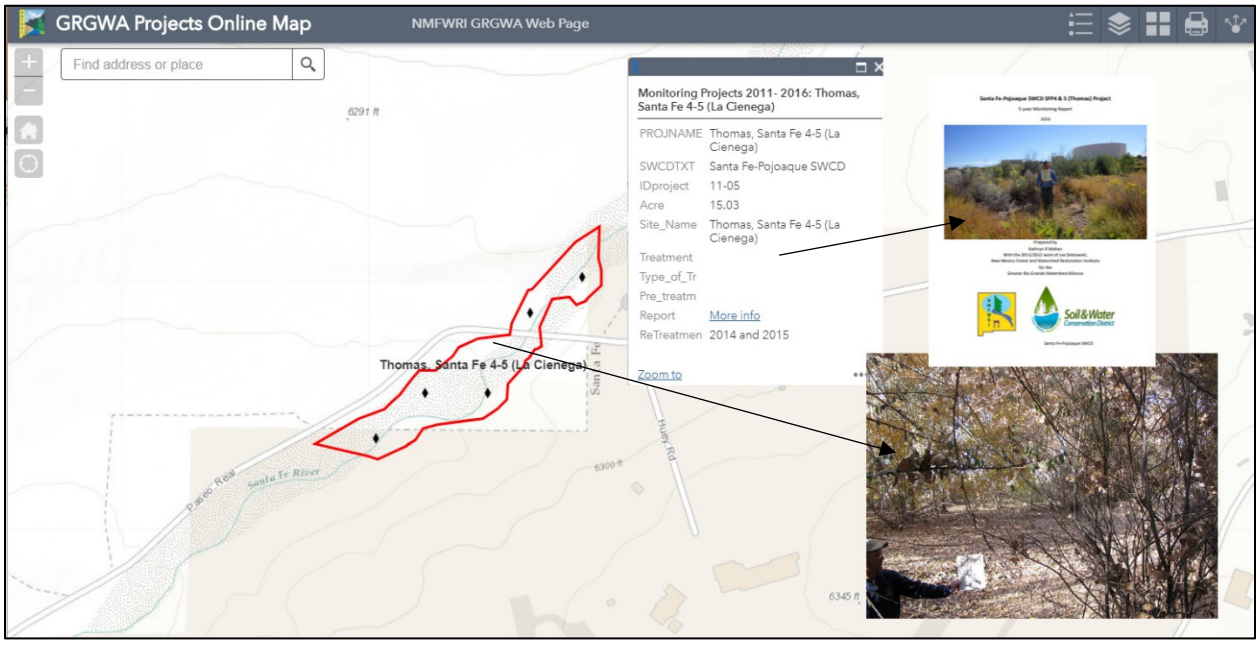


Example of Vegetation Classification by Vertical Structure - GRGWA Project 16.18 Rio Abajo North

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 was developed by FWRI. This web map is located on our website: http://nmfwri.org/collaboration/greater-rio-grande-watershed-alliance/grgwa-projects-online-map.

With the web map, one can view the full extent of all of the GRGWA projects and then zoom in to find more detail specific projects. We have also linked, where available, monitoring photographs and summary reports for pre and post monitoring work. This interface allows for a greater understanding of the scope of the projects as well as allowing stakeholder access to the reports and monitoring data.



GRGWA Projects Online Web Map Example

GIS Assistance to other Collaborative Groups

Web mapping applications, as well as hard copy maps, were developed for three other watershed collaborative groups and hosted on our NMFWRI.org website:

- 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 North Sacramento Mountains Working Group, and The Otero Working Group,Grant County Eco-Watershed Working Group,

MONITORING



Reconnaissance at the Upper Mora CFRP, fall 2017

Field work

FWRI's 2017 field crew included Kathryn Mahan, Ernesto Sandoval, Daniel Hernandez, and three NMHU students. Measured projects included three 10-year post-treatment visits on CFRPs, plus a pre-treatment CFRP inventory in Santa Fe National Forest, the Bluewater Showcase in the Cibola National Forest, work for the BLM in the Questa area, and work funded by the Rio Grande Water Fund (through CPLA and various National Forests) across the state (see Table 1).

Other projects during this year included vegetation monitoring at the Rio Mora National Wildlife Refuge, providing monitoring training for staff at the Philmont Scout Ranch, participating in the STEM Showdown at the Rio Mora National Wildlife Refuge, receiving training in the New Mexico Environment Department (NMED)'s Playa New Mexico Rapid Assessment Method (NMRAM), and providing training in the New Mexico Environment Department (NMED)'s Riverine Montane New Mexico Rapid Assessment Method (NMRAM).



Playa NMRAM Training in Clovis, September 2017

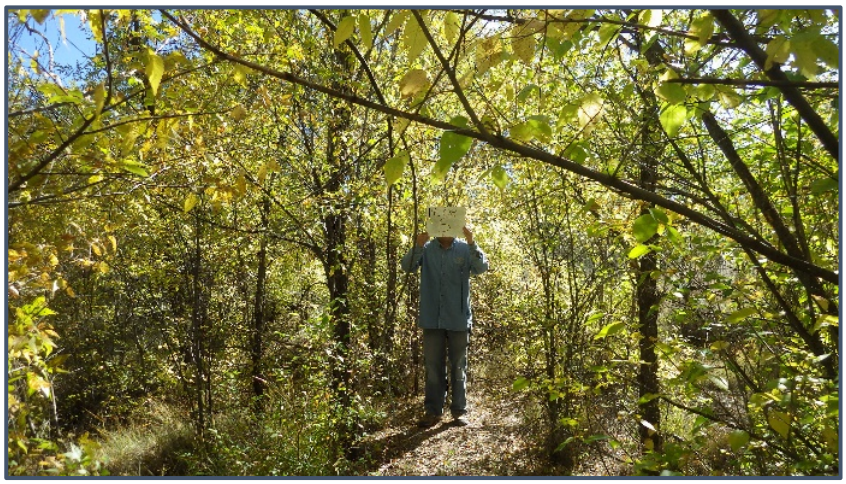
Table 1: Sites monitored between October 2016 and September 2017 (excluding GRGWA)

Site name (Project affiliation)	Acres	Forest vegetation type(s)	No. Plots
Binkley (TNC/CPLA)	20	Mixed conifer/aspen	3
Isleta II (TNC/USFS)	141	Ponderosa pine/PJ	14
Banded Peak – Muddy Bear Unit (TNC/CPLA)	200	Mixed conifer/aspen	10
Catspaw	60	Mixed conifer	6
Blanco Basin – Thom (ABCWUA/TNC/CPLA)	20	Mixed conifer	2
Blanco Basin – Dillinger (ABCWUA/TNC/CPLA)	20	Mixed conifer	2
Blanco Basin – Rio Blanco (ABCWUA/TNC/CPLA)	36	Mixed conifer	3
Rancho Lobo (TNC/CPLA)	250	Mixed conifer/aspen, ponderosa	6
El Salto (TNC/CPLA)	40	Ponderosa pine/PJ/mixed conifer	2
Sulphur Canyon A (Cibola NF/TNC)	290	Ponderosa pine/PJ	29
Bull Springs (Carson NF/TNC)	574	Mixed conifer/aspen	25
Bluewater Showcase (Cibola NF)	265	Ponderosa pine	20
Ruidoso Schools (CFRP: Lincoln NF)	39	Ponderosa pine	13
Santa Ana Juniper II (CFRP: Santa Ana Pueblo)	453	Piñon juniper	46
Thunderbird (CFRP: Cibola NF)	106	Ponderosa pine/PJ	12
Upper Mora Watershed: Walker Flats (CFRP: Santa Fe NF)	2280	Mixed conifer	19
Cerro de la Olla (BLM)	256	Piñon juniper	28
Cerro del Aire (BLM)	138	Piñon juniper	14
TOTAL			254

Collaboration/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.



Monitoring in dense Siberian elms at GRGWA Project 17-08 Tijeras Creek, October 2017

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 2016, we provided pre-treatment monitoring on 15 new projects, as well as 5-year re-visit monitoring on 11 projects and re-visit photopoints on one project. In 2017, we provided pre-treatment monitoring on 14 new projects, and re-visit photopoints on 20 projects.

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 gave a training session at Rio Mora NWR on 11 March 2017 to a group of stakeholders representing a cross-section of groups interested in riparian restoration

monitoring. We are considering making this training a regular event, as protocol updates are confirmed by NMED.



Monitoring at Bull Springs (funded by RGWF/TNC), July 2017

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." Our crew carried out pre- and post-treatment monitoring for TNC in four focal landscapes: Taos, Isleta, Sulphur Canyon, and Chama Peak/Navajo/Blanco Basin. This was broken out into 11 separate projects. Our monitoring work resulted in: i) spatial layers showing monitoring plot locations and treatment areas; ii) spreadsheet(s) of summarized/analyzed pre- and post-treatment monitoring data; and iii) surface fuel parameters for modeling fire behavior in FLAMAP for all plots established in the four focal landscapes, and a set of guidelines to the number of plots needed within treatment areas (i.e. sampling intensity) to adequately characterize the effect of fuels treatments on forest composition and structure. We intend to work with TNC to train Rocky Mountain Youth Corps crews for the 2018 to expand capacity in the region for this kind of work.

Luera TREX

Our monitoring crew took advantage of an opportunity provided by a CFRP project to participate in a prescribed fire training exchange (TREX) in the Luera Mountains, west of Socorro. We sent our Ecological Monitoring Specialist, our Monitoring and Data Technician, and our three 2017 student interns to the two-week training held 30 May through 10 June.

The fire ecologist on the Forestry faculty at Highlands also participated. Prior to attending, everyone became certified as Firefighter Type 2 at minimum after coordination with The Fire Learning Network, The Nature Conservancy, and our local New Mexico State Forestry office. . During the training, one of the interns as well as our Ecological Monitoring Specialist worked on Firefighter Type 1 Position

Taskbooks; both our Monitoring Specialist and NMHU's Fire Ecologist worked on Position Taskbooks for Fire Effects Monitor (FEMO).



Figure 1Pile Burning at Luera TREX May/June 2017

All participants gained intensive, hands-on experience in planning, conducting, and monitoring prescribed fire with a variety of techniques in multiple fuels types..



NMFWRI 2017 Field Crew at Luera TREX, May/June 2017

Their experience also strengthened their understanding of the importance of the data they collect during their usual work

BLM Final Performance Report Monitoring / Vegetation Mapping

New Mexico Forest and Woodlands Inventory and Monitoring, Final Performance Report, BLM Award Number L11AC20181, was submitted in December of 2016. This cumulative report covered work undertaken by NMFWRI for the BLM over the years 2010-2015. The report covers two phases. Technical approach phase 1 was vegetation classification and technical approach phase 2 was forest inventory and monitoring. A link to the report can be found here: http://nmfwri.org/projects/forest-monitoring-resources/new-mexico-forest-and-woodlands-inventory-and-monitoring-final-performance-report-blm-award-number-l11ac20181/view

WATERSHED RESTORATION PARTNERSHIPS

The emphasis placed on forest health and resiliency these days requires landowners to collaborate, working across property boundaries to restore forests and watersheds to conditions similar to those that existed before the strong emphasis during the twentieth century on harvesting timber and suppressing wildfires. FWRI is engaged directly with a variety of collaborative groups, some well-established and brand new. Dr. Alan Barton carries out this program for FWRI.

Greater Santa Fe Fireshed Coalition communications plan

The final version of the communications plan for the Greater Santa Fe Fireshed Coalition (GSFFC) was completed on September 17, 2017. This plan included a comprehensive set of values and norms to guide the GSFFC Communications Team, as well as functions, desired outcomes (goals and objectives), and means (strategies and tactics) in four areas: (1) internal communications, (2) public relations and education, (3) tribal relations, and (4) communications with other collaborative organizations. The package also included a separate strategy document summarizing the communications plan, as well as a vision and mission statement and a set of operating principles for the GSFFC.

Otero Working Group strategy document

The strategy document for the Otero Working Group (OWG) was completed in March, 2017. The OWG organized a signing ceremony to roll out this document to the public on August 23, 2017. The document was signed by the Supervisor of the Lincoln National Forest; the Capitan District Forester with New Mexico State Forestry Division; the Sacramento District Ranger with the Lincoln National Forest; the Superintendent of the Mescalero Agency with the Bureau of Indian Affairs; the Mayor of Cloudcroft, NM; the State Land Commissioner; the Manager of the Otero Soil & Water Conservation District; the President of the Mescalero-Apache Tribe; the City Manager for Alamogordo, NM; the Vice-Chairperson of the Otero County Board of Commissioners; the District Fire Management Officer of the Bureau of Land Management; the Director of the New Mexico Forest & Watershed Restoration Institute; the Chairman of the South Central Mountains RC&D; and representatives from the National Wild Turkey Federation and the Apache Point Observatory.

North Sacramento Mountains Working Group strategy document

The strategy document for the North Sacramento Mountains Working Group was on-going at the end of the fiscal year. The group initially planned to meet six times, and has met five times with one meeting pending. During this period, the group identified the project area and treatment areas within the project area, expanded the number of partners involved in the project, and developed an outline for the strategy document. A draft of the plan should be completed in early 2017.

Technical Assistance

The Collaboration Program Manager offered technical assistance to several collaborative groups during the fiscal year.

- Dr. Barton continued to chair the Greater Santa Fe Fireshed Coalition's (GSFFC) Communications Team, and worked actively in promoting the GSFFC's activities in the Greater Santa Fe Fireshed. The GSFFC held a public meeting in Santa Fe on September 22, 2017, organized by Dr. Barton and the Communications Team.
- Dr. Barton worked closely with the Otero Working Group (OWG), and in addition to completing the group's strategy document, Dr. Barton attended all meetings and assisted the group's facilitator in coordination and planning.
- The Cibola National Forest began the process of transitioning its landscape teams to community-based collaboratives this fiscal year, and Dr. Barton worked with both the Sandia Collaborative and the Mountainair Collaborative on these efforts. Dr. Barton assisted the Mountainair Collaborative facilitator in planning and recording meetings and developing organizational documents for the group.
- The La Jara (Sandoval County) Water Users Association has expressed on on-going concern about the conditions in the watershed above their water treatment facility, and Dr. Barton met with leaders in the area to coordinate development of an independent forestry collaborative for the area. The team agreed to work towards submitting a Collaborative Forest Restoration Program (CFRP) proposal in the next cycle.
- Dr. Barton attended meetings of the Cimarron Watershed Alliance, the Southwest Jemez Mountains Collaborative, and the Estancia Basin Watershed Health, Restoration and Monitoring Committee, and contributed to discussions during meetings of these collaborative groups. In the latter case, Dr. Barton initiated discussions for an upcoming project to work on a case study of the group. Dr. Barton also regularly attended meetings of the New Mexico State Forestry Division's Forest Health Coordinating Committee, representing the NMFWRI.
- Along with others at the NMFWRI and in the local areas, Dr. Barton assisted in planning and implementing the Sacramento Mountains Desired Conditions Workshops, held from October 25–28, 2016, and the Gila Desired Conditions Workshops, held from August 1–4, 2017. These four workshops drew a good, diverse and interested group of participants who attended discussions on forest restoration topics as well as field tours that highlighted restoration work in the Lincoln National Forest, the Mescalero-Apache Reservation, and the Gila National Forest.
- Dr. Barton participated in Forest Plan Revision meetings and field visits on the Gila, Sandia, Santa Fe National Forests, as well as a follow-up field trip to the Dog Head Fire on May 16, 2017.

Support to New Mexico 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 2016-2017 semesters by NMFWRI staff:

- FOR 402: Silviculture. Spring 2016. Dr. Robert Strahan
- FOR 330: Natural Resource Law and Policy. Spring 2017. Dr. Alan Barton.
- FOR 412/512: Introduction to Surveying and Geographic Information Systems. Spring 2016, Fall 2016 and Spring 2017. Patti Dappen, M.Sc.

In addition, NMFWRI staff were guest lecturers for a number of other courses during this period including: FOR 417-517, Watershed Management; FOR 589, Applied Ecology; and FOR/GEOL/BIOL 650, Graduate Seminar.

Student Mentoring

Mentoring of students by NMFWRI staff included:

- Mentoring Graduate Student – Benhaz Yekkeh for her project: Relationship between Tree Canopy Cover and Discharge of Gallinas River through Time (From 1939 to 2015) in Las Vegas, NM: Using eCognition to estimate tree canopy from historic aerial photography. This study uses aerial photography and GIS techniques to determine the percentage of tree canopy cover in upper Gallinas watershed from 1939 to 2015. Training was provided on Erdas Imagine and eCognition software used to automate canopy cover extraction.
- Mentoring student interns Carly Drobnick, Jordan Martinez, and Rich Pratt (Summer 2017). 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.

Publications by FWRI Staff

- Barton, A.W. 2016. From Parks to Partnerships: National Heritage Areas and the Path to Collaborative Participation in the National Park Service's First 100 Years, *Natural Resources Journal* 56(1): 23–54.
- Barton, A.W. 2016. Who Controls Western Forests? The Rise and Fall of New Mexico's Senate Bill 1. Presentation at the Annual Meeting of the Rural Sociological Society, Toronto. The paper was based on a court case involving the Lincoln National Forest, and included a discussion of NMFWRI's collaboration with the Otero Working Group.
- Strahan, Robert T., Sanchez Meador, Andrew J., Huffman, David W., Laughlin, Daniel C. 2016. Shifts in community-level traits and functional diversity in a mixed conifer forest: A legacy of land-use change. *Journal of Applied Ecology* 53(6):1755-1765.

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.

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

Forest Service Washington Office – To support the expansion of the Vegetation Treatment database into the Rio Grande headwaters in Colorado, and to support basin-wide efforts to fund on-the-ground treatment opportunities, the Washington Office, through the National Partnership Office located at Region 8, funded those activities during 2015-2017.

NM Department of Homeland Security and Emergency Management – We received funding from the NMDHSEM though State Forestry, to support the development, quality control, and outreach associated with the upload tool for the Vegetation Treatment database.

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.

Additional funding from Forest Service – SWERI received a significant increase in Forest Service funding for FY 2017. We learned of this increase during a visit to the Washington Office in March; FWRI's portion of the increase was $200,000. Because of the source in the Forest Service budget (Cooperative Fire), that money is coming to us through State Forestry. That funding became available to FWRI in early September 2017.

FWRI Staff

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

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

Josie Lujan – Administrative Associate, handles the office.

Kathryn Mahan – Monitoring Specialist, responsible for monitoring in general and riparian monitoring in particular.

Kent Reid – Director, handles the bureaucracy.

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