



NATIONAL
CONSERVATION
LANDS

Rio Grande del Norte

National Monument

New Mexico – Taos Field Office
Science Plan 2019



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SECTION 1: INTRODUCTION AND SCIENTIFIC MISSION

1.1 Purpose of National Conservation Lands Science Plans

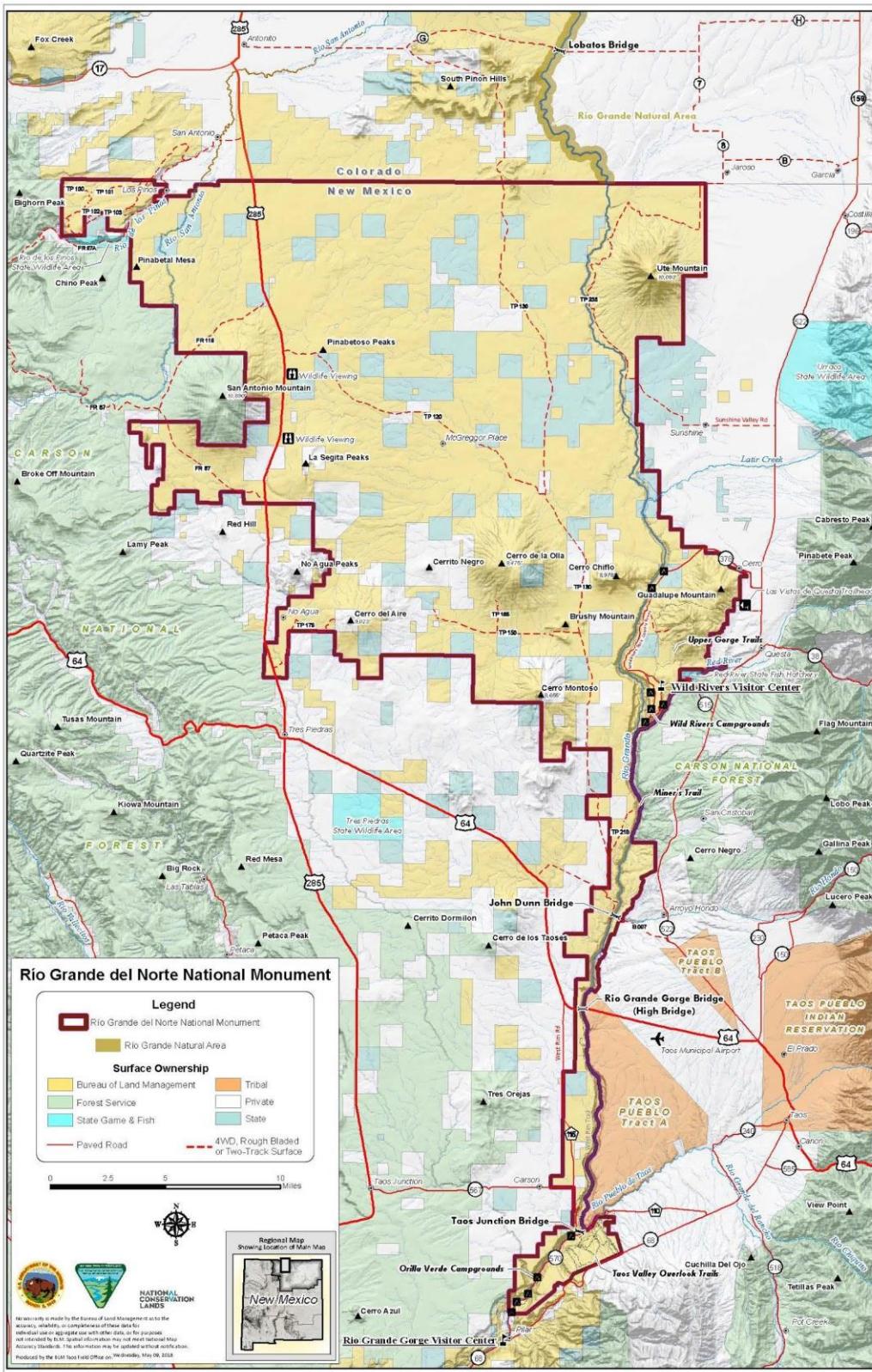
- The National Conservation Lands was administratively established in 2000 and legislatively codified in the Omnibus Public Land Management Act of 2009 (PL 111-11). This system encompasses nearly 900 units spread across approximately 27 million acres of public lands managed by the Bureau of Land Management (BLM). The BLM is mandated to conserve, protect and restore the outstanding cultural, ecological, and scientific values of NLCS units.
- Scientific investigation can aid in the conservation, protection, and restoration of these lands, and therefore, science is strategically planned and organized within National Conservation Lands units. Within National Conservation Lands units there is an expectation for ‘identifying science needed to address management issues, communicating those needs to science providers, and incorporating the results into the decision making process’ (BLM 2007).
- The objectives of National Conservation Lands units’ science plans are to:
 - Identify the scientific mission of the unit;
 - Summarize past scientific efforts in the unit, i.e. the scientific background of the unit;
 - Identify the priority needs and management issues within the unit that can be addressed by scientific inquiry;
 - Define a strategy for accomplishing the scientific goals of the unit;
 - Develop science protocols to, for example, ensure that scientific inquiry does not negatively impact the long term sustainability of the unit and its resources;
 - Create a system to organize scientific reports; and,
 - Help and promote the integration of science into management.
- The science plans of National Conservation Lands units are considered ‘living’ documents and should be revised and updated frequently (e.g. 3-5 years). Scientific needs that emerge during the course of implementing a science plan

may be added to the plan on an as-needed basis to meet the unit's scientific mission.

1.2. Unit and geographic area description

- Located in northern New Mexico, and including the Taos Plateau and the Rio Grande, the Rio Grande del Norte National Monument (RGDN) was designated by Presidential Proclamation owing to the area's stunning geology and "extraordinary array of scientific and historic resources."
- Significant ecological diversity occurs within the boundary of the RGDN. Vast sagebrush plains dominate the lower elevations of the southern portion of the Monument. Winterfat, a subshrub which is very palatable to big game species, dominates much of the northern portion of the Monument. A series of volcanic cones rise from the plateau and are occupied by woodland communities, with piñon-juniper woodlands occurring on the lower slopes and scattered ponderosa, spruce, Douglas fir and aspen occupying higher elevations. Well-developed riparian vegetation, including willows and cottonwoods, occurs along the Rio Grande.
- These reserved federal lands and interests in lands encompass approximately 242,555 acres, which is the smallest area compatible with the proper care and management of the objects to be protected; as described in Proclamation 8946 found in Section 10.

Figure 1. Map of Rio Grande del Norte National Monument.



- The RGDN was created on March 25, 2013 by Presidential Proclamation (#8946) to preserve its cultural, prehistoric, and historic legacy and maintain its diverse array of natural and scientific resources, ensuring that the historic and scientific values of this area remain for the benefit of all Americans (see Section 10). This includes the protection of “cultural resources, geologic resources, wildlife, and ecological diversity” (BLM 2013).
- The Resource Management Plan (RMP) for RGDN is currently in draft by the BLM Taos Field Office. It is anticipated that the draft alternative matrix will be finalized and shared with the public for review within the 2019 calendar year. The RMP for RGDN will seek to articulate the intent of the Proclamation and the objects identified therein. The objects identified by the RMP are cultural, geologic, wildlife, and ecological diversity (BLM, 2014, pg. 5):
 - CULTURAL RESOURCES
 - The vestiges of human use demonstrated by archeological sites and artifacts are found in abundance in the Monument. It is a unique cultural landscape that has remained minimally changed over time.
 - GEOLOGIC RESOURCES
 - Geologic resources include The Taos Plateau Volcanic Field (upon which the Monument is almost entirely located), the Rio Grande Gorge (which cut through the plateau), and the springs in the gorge (which provide the majority of the river flow during low flow periods).
 - WILDLIFE
 - The Monument provides habitat for a wide variety of fish and wildlife species both seasonally and year-round
 - ECOLOGICAL DIVERSITY
 - Ecological Diversity can be understood to include the health, resilience, and diversity of organisms and ecosystems. Within the Monument a diversity of habitat types exists, including cottonwood and willows along the Río Grande riparian corridor, expansive

sagebrush plains above the gorge and the dominant piñon-juniper woodlands throughout Taos Plateau; and interspersed ponderosa, Douglas fir, aspen, and spruce, predominantly in higher elevations.

1.3. Scientific Mission

Science in BLM's National Conservation Lands units is defined broadly as 'including basic and applied research in natural and social science, as well as inventory and monitoring initiatives' (BLM 2007). In addition, within National Conservation Lands units there is an expectation for 'identifying science needed to address management issues, communicating those needs to science providers, and incorporating the results into the decision making process' (BLM 2007).

Science has been defined within the BLM several times (e.g. BLM 2007), but is essentially the study of natural and social phenomena using repeatable observations or experiments. In the context of land management, scientific data are collected, analyzed, or synthesized to increase knowledge and support decision-making.

This Science Plan will be used as the basis for conducting science in RGDN. Scientific efforts within RGDN should support the objects and resources identified in the designating language including: geology, ecological diversity, wildlife (while allowing for traditional uses such as grazing permits and leases), annual traditional fuelwood harvesting, and piñon nut collection; so long as those uses are consistent with the purposes of the Proclamation of the Monument. RGDN is a special designation area to be managed in accordance with NLCS guidance. Scientific studies on the RGDN can provide information to managers and help ensure that the authorized uses do not negatively impact RGDN's conservation mission or the objects of value for which the Monument was named.

- Specifically, it is the scientific mission of RGDN to:
 - Allow and encourage pertinent science that can:

- inform management decisions and evaluate management methods within RGDN;
 - improve and maintain ecosystem resiliency, function, and land health;
 - maintain diversity and viability of plant and animal populations; and,
 - preserve and understand socio-cultural and paleontological sites.
- Allow and encourage long term and short term investigations.
 - Allow scientific inquiry across diverse disciplines, as appropriate within RGDN.
 - Serve as a model system for surrounding areas, so that scientific findings can be exported to other federal and non-federal lands.

SECTION 2: SCIENTIFIC BACKGROUND OF THE NATIONAL CONSERVATION LANDS UNIT

2.1. Monument Objects and Scientific Understanding

- Completed and ongoing research in the RGDN covers a diverse array of topics, including cultural resources, soils, ecological diversity, geology, wildlife and fisheries, and fire (see Table 1). Studies include site or species-specific analyses to landscape-scale analyses. The following is a brief review of subjects, topics, and areas of research that pertain to the RGDN. To date, there remains a lack of scientific information specific to the RGDN. This plan seeks to summarize existing research and in so doing help to identify where future scientific studies are most needed.

Cultural Resources

Integrity of the Unit (see BLM-Argonne Labs 2016a; BLM-Argonne Labs 2016b; Dicks et al. 2017)

The setting of the Unit is largely unencumbered or encroached upon by modern human developments. Modern developments are largely restricted to the extant

network of unimproved roads and range improvements. Cultural landscapes, including those associated with the Prehistoric and Early Historic periods are very well preserved, in contrast to surrounding areas within the valley where modern alterations to viewsheds and direct physical effects have compromised the setting and condition of cultural landscapes and individual cultural resources. Individual cultural resources tend to be well-preserved because of the low intensity of current uses within the area.

Threats to Cultural Resources (see BLM-Argonne Labs 2016a; BLM-Argonne Labs 2016b; Dicks et al. 2017):

Site Specific:

- a. Unauthorized removal or collection of artifacts and other archaeological material remains.
- b. Unauthorized off-road vehicle use.
- c. Vandalism, such as tagging or otherwise altering petroglyphs, standing historic structures, and ruins.
- d. Alteration, in the form of modern developments or implementation of landscape scale treatments, including the compartmentalization of the landscape through the building of fences, roads, and other restrictive features within the attendant setting of individual cultural resources that detract from the extant condition of that setting relative to the resources period of significance.

Cultural Landscape(s):

- a. Modern developments in the form of view shed and auditory intrusions that profoundly modify and detract from the natural setting and appearance of the National Monument landscape where its present condition is attendant to and compatible with the periods of significance for specific or composite cultural landscapes.

Río Grande Gorge Cultural Resources Project

Principal Investigator: Dr. Severin Fowles, Department of Anthropology, Barnard College, Columbia University.

This project is an ongoing investigation that began in 2007 and is permitted, but not directly funded, by the BLM. A National Science Foundation grant award funded the 2013 effort and carried into 2015. Field work is conducted annually by undergraduate and graduate students in areas that are now included within the Monument. The project is particularly focused on the identification, recording, evaluation, and analysis of archaeological remains located in the Río Grande Gorge environment. Moreover, the research is landscape-oriented regarding how the remains of different ethnic groups over time are manifested within the Gorge environment. A number of student research projects, professional papers, theses, and dissertations have been produced or are in progress as a component output of the project. The BLM benefits directly from this work in receiving data, as well as interpretative information on the cultural resources located within the Monument.

Nomadic Indian Presence in the Upper Rio Grande

Principal Investigator: Dr. Lindsay M. Montgomery, Stanford University.

Dr. Montgomery, who began her research in the National Monument as an undergraduate under Dr. Fowles, just completed her own research and dissertation in 2015 and received her doctorate from Stanford University. Her topic was focused upon the nomadic Indian presence in the Upper Rio Grande during the Spanish Colonial Period. Much of her field work was conducted in the Rio Grande gorge and in playa lake settings within the National Monument. Dr. Fowles and Dr. Montgomery plan to continue their research and expand upon their previous work within the Monument in 2019.

Ecological Diversity

Soil Maps and Ecological Site Descriptions

The NRCS is currently updating Soil Map Units for the RGDN. Field work for this effort began in 2017 and is ongoing. The updated soil maps will form the basis for development of Ecological Site Descriptions. The Ecological Site Descriptions will incorporate both historical and current quantitative datasets, and local stakeholder knowledge. This project is anticipated to be completed in 2021.

Range Program and NRCS

The range program has ongoing monitoring studies on grazing allotments that date back to the 1950s. These studies consist of photo plots and vegetation surveys that can be used in conjunction with AIM data to determine trends and changes in ecological diversity in the Taos Field Office.

Assessment, Inventory and Monitoring (AIM) Terrestrial Program

The terrestrial AIM program has been conducting sampling on the Monument since 2014. The AIM sampling program provides a standardized process for data collection on the status, condition, trend, amount, location, and spatial pattern of resources on BLM lands. The AIM protocol is based on a set of core and supplementary methods implemented across a statistically valid sampling design. In the Taos Field Office, methods include plot characterization, line-point intercept, vegetation height, gap intercept, soil aggregate stability, species richness, as well as a number of supplemental methods including belt transect, tree density, shrub density, Describing/Interpreting Indicators of Rangeland Health (D/IIRH), and pollinator habitat assessment. The AIM strategy is further described in Herrick et al, 2009. AIM core methods can be used to analyze the status and trend of the RGDN Resources, Objects, and Values (ROVs).

Riparian and Aquatic Habitat Assessment and Monitoring

- *AIM National Aquatic Monitoring Framework*

The National Aquatic AIM strategy is designed to promote integrated cross-program resource inventory, assessment and monitoring at multiple scales of management. The Aquatic AIM strategy is used to collect consistent, comparable and quantitative monitoring data to understand conditions and trends of renewable resources. An introduction to the framework and indicators for lotic systems can be found in BLM Technical Reference 1735-1 (BLM 2015) and the field protocol is described in the AIM National Aquatic Monitoring Framework Field Protocol (BLM 2017).

- *Proper Functioning Condition (PFC)*

The PFC assessment protocol or method (BLM Technical Reference 1737-15 - 2015) refers to a consistent approach for considering hydrologic, vegetative, and geomorphic attributes and processes to assess the condition of riparian areas. A goal of BLM RMPs is to manage lotic systems at Proper Functioning Condition (PFC) or moving towards it (i.e. Functioning-at-Risk Upward Trend).

Vegetation Treatment Monitoring as a part of the AIM Program (report last updated 2018; additional updates forthcoming).

Principal Investigator: Taos Field Office, BLM, NM

In 2014 an effort was initiated to monitor vegetation treatment projects carried out by the Taos Field Office within the RGN using the AIM program. AIM plots were established within treatment areas with plots established outside of treatment areas serving as a control. This monitoring effort is ongoing with additional plots being established within vegetation treatment areas each year. Established plots will be revisited allowing for long-term trends in data to emerge. Summary reports are updated annually as new data is gathered. Results from the monitoring effort are intended to help guide appropriate adaptive management strategies related to vegetation treatments (i.e., thinning, Rx fire, discing, brush hogging, drill seeding, etc.) on the Monument.

Rare Plant Monitoring

Principal Investigator: Taos Field Office, BLM, NM.

Demographic monitoring plots for two BLM Sensitive plant species found in the RGDN, Taos spring parsley (*Cymopterus spellenbergii*) and Ripley's milkvetch (*Astragalus ripleyi*), were installed in 2017. Plots were primarily established on Guadalupe Mountain. Annual monitoring of these plots may provide information on overall population health and demographics. Monitoring may also investigate and record indicators where rare plant locations occur throughout the RGDN, to include precipitation and temperature regimes. Outside of the vegetation treatments, other demographic plots will inform overall population trends. The field office and partners will continue to document new individual occurrences of all special status plants. More information is needed for Rare Plant Monitoring within the RDNM.

Weeds Mapping

Principal Investigator: Taos Field Office, BLM, NM.

In 2017, using a newly developed program in ArcGIS which is accessed on portable tablets, the locations and size of noxious weed infestations, as well as areas that have been treated for noxious weeds on the Monument, are captured in a digital format. The program was built to be compatible with National Invasive Inventory and Monitoring System (NISMS) and all data collected in the program is "pushed" to NISMS at the end of each fiscal year. The purpose of the weed mapping project is (1) track the presence and potential spread of noxious weeds on the Monument (as well as other areas within the Taos Field Office) (2) guide treatment efforts and planning (3) help to monitor the effectiveness of noxious weed treatments.

Tree-ring fire history of the Rio Grande del Norte Monument

Principal Investigator: E.Q. Margolis, USGS NM Landscapes Field Station.

The goal of this study is to use tree rings to reconstruct a preliminary, multi-century fire history at multiple sites within the RGNM. Fire regime reconstruction includes fire frequency, seasonality, synchrony between sites (to infer fire spread, or not), and fire-climate relationships. It was funded by the BLM NM State Office in 2017 and the results are intended to inform fire and vegetation management. Preliminary collections indicate historically frequent, low-severity fire (as indicated by tree-ring fire scars) in the upper elevation ponderosa pine forests of Cerro Montoso, Cerro de la Olla, Cerro del Aire, and the Guadalupe Mountains.

Geology

Geologic Quadrangle Mapping of Southern Taos County

Principal Investigator: Dr. Paul Bauer, New Mexico Bureau of Geology and Mineral Resources (NMBGMR) at New Mexico Tech.

This Project is an ongoing effort that began in 1997, and is funded by the NMBGMR and the U.S. Geological Survey under the STATEMAP Program. The first goal is to complete geologic maps of 7.5 minute quadrangles in the southern half of Taos County along the Río Grande corridor. Field work for the following quadrangles that contain Monument lands has been completed: Taos SW, Los Cordovas, Arroyo Hondo, Guadalupe Mountain, and Questa. The second goal, in cooperation with USGS colleagues, is to develop a seamless, ArcGIS-based geologic map compilation of all of southern Taos County. This work will be ongoing for at least one more year, and will ultimately provide the BLM and others with a modern, detailed, digital geologic map of the southern half of the Monument.

Geologic Investigations of the Southern San Luis Basin

Principal Investigator: Dr. Ren A. Thompson, USGS, Denver, CO.

This multi-year effort is part of a large interdisciplinary USGS project (Cenozoic Landscape Evolution of the Southern Rocky Mountains – R. Thompson & S.

Minor, Project Chiefs) funded by the FEDMAP component of USGS National Cooperative Geologic Mapping Program. This research includes geologic mapping and regional geologic synthesis investigations of the Taos Plateau region of the southern San Luis Basin area. Geologic mapping includes 1:24,000-scale mapping of northern Taos County. Mapping of the San Antonio Mountain area was completed and ongoing work in on the Montoso, Petaca Peak, Pinabetoso Peaks, La Segita Peaks NE, Cerro de la Olla, and La Segita Peaks quadrangles was conducted. Integration of USGS and NMBGMR geologic mapping will result in seamless 1:50,000 geologic map coverage of the Monument (coordinated with Paul Bauer, NMBGMR).

Geophysical Investigations of the San Luis Basin

Principal Investigator: Dr. V.J.S. Grauch, USGS, Denver, CO.

This multi-year effort is part of a large interdisciplinary USGS project (Cenozoic Landscape Evolution of the Southern Rocky Mountains - R. Thompson & S. Minor, Project Chiefs) funded by the FEDMAP component of the USGS National Cooperative Geologic Mapping Program. This research effort is focused on 1) development of a regional scale gravity model for the San Luis Basin and derivative basin depth and geometry determinations; and 2) aeromagnetic and ground magnetic modeling studies of the Taos Plateau region for identification of faults, stratigraphic correlations, and subsurface geologic characterizations. Integrated geologic/geophysical studies of the Embudo fault zone at the southern end of the monument have just been completed in collaboration with New Mexico Bureau of Geology and Mineral Resources, with a 2017 publication in the journal *Geosphere* and a NMBGMR open-file report.

Wildlife and Fisheries Resources

Bee Surveys

Principal Investigator: Olivia Messinger Carril, Institute for Applied Ecology.

New Mexico is estimated to harbor between 1,000 and 1,400 bee species, which, astonishingly, represents about 1/4 of all bees found in the United States.

However, specific documentation remains extremely poor. For example, there were only 28 species of bees recorded for Taos County. Limited collecting efforts hamper the ability to assess the status of pollinator health, bee species richness, and population dynamics in New Mexico as well as on the Monument. Funding for a comprehensive survey of the bees on the RGN was awarded in 2016.

Goals for the bee survey project include:

- 1) create a thorough inventory of this extremely understudied region, complete with plant associations and phenological records, annotated to include what is known from existing literature about nesting habits;
- 2) construct a robust protocol, and establish plot-locations, for long-term monitoring of the Rio Grande del Norte's bees;
- 3) contribute to the scant knowledge about the bees of New Mexico, through publications in relevant scientific publications; and
- 4) institute a culture of pollinator appreciation among visitors, by involving them in the collection, observation, and identification of the monument's bee species.

Sampling began in the fall of 2016. During the 2016 field season, 45 specimens were collected, representing only a handful of species. In 2017 collecting began in earnest, and a total of 123 species in 27 genera were recorded in Taos and Rio Arriba counties. Interestingly, owing to these collection efforts, the Halictidae family, which was previously undocumented in Taos County, is now represented by several species of *Lasioglossum*, *Halictus*, and *Agapostemon*. Additionally, species of *Melissodes* and *Exomalopsis*, not previously known to Taos County, were collected. During the 2018 season, an additional 17 species were recorded in Rio Grande del Norte, for a current total of 140 species. This number will likely grow as the remainder of the 2018 specimens are processed and identified. To supplement net collections, pan traps were deployed throughout the monument in 2017 and 2018 by the AIM Program, as well as in the standardized plots collected monthly by bee scientists. Results of the 2017 surveys are currently being completed and will be available January 2018.

The Rocky Mountain Youth Corps also spent a full week in August 2017 working with the Taos Field Office botanist and the state bee specialist collecting bees on

the Monument in connection with bee survey project. Collections were made at San Antonio Mountain as well as on the Rio Grande's Orilla Verde area. Students used nets and pan traps to capture bees, which they then brought back to the Taos Field Office for pinning and labelling.

Anasazi' Yuma Skipper (*Ochlodes yuma anasazi*) and Monarch Butterfly (*Danaus plexippus*) Studies at Wild Rivers

Principal Investigator: Steve Cary, Institute for Applied Ecology.

In 2017 the Natural Resource Institute, in collaborative planning with the Taos Field Office, conducted its second year of field studies on 'Anasazi' Yuma Skipper (*Ochlodes yuma anasazi*), a BLM Sensitive Species, and Monarch Butterfly (*Danaus plexippus*), under review for listing by the USFWS, at the Wild Rivers area of the Monument. Overarching goals were to document occurrences of both species within the Monument at Wild Rivers and fill data gaps for New Mexico. Mark/release/recapture studies were carried out on 'Anasazi' Yuma Skipper to assess if females that visit the flowers/nectar sources around the Wild Rivers camp loop are lost from the reproducing population or return to patches of its host plant, common reed (*Phragmites australis*), in the Gorge to lay eggs.

Big Game Migration/Movement Corridors/Winter Range

Of the 310,729 acres of BLM, private and state lands, 218,962 acres is designated critical winter range for big game. Along the New Mexico/Colorado State border from the San Juan Mountain Range to the Taos Plateau, the volcanic cones of Cerro de la Olla, Cerro del Aire, Cerro Montoso, Cerro Chiflo, and Ute Mountain to the Sangre de Cristos, and the Rio Grande corridor from the Colorado state line to the Lower Gorge recreation area, exist as big game migration corridors. These corridors provide habitat connectivity from the first heavy snowfall to spring green-up. The focus of these corridors is a landscape scale approach that examines connected geographic areas to more fully recognize natural resource conditions and trends, natural and human influences, and greater opportunities for resource conservation and restoration. Although movement corridors are largely unknown, research should focus on habitat

treatments and management actions that will keep big game movement corridors intact. As outlined in The Department of Interior Secretarial Order 3362, collaborate with the State of New Mexico and other partners to conserve or restore habitat necessary to sustain local and regional big-game populations through measures that may include one or more of the following:

- restoring degraded winter range and migration corridors by removing encroaching trees from sagebrush ecosystems, rehabilitating areas damaged by fire, or treating exotic/invasive vegetation to improve the quality and value of these areas to big game and other wildlife;
- working cooperatively with private landowners and State highway departments to achieve permissive fencing measures, including potentially modifying (via smooth wire), removing (if no longer necessary), or seasonally adapting (seasonal lay down) fencing if proven to impede movement of big game through migration corridors;
- avoiding development in the most crucial winter range or migration corridors during sensitive seasons;
- minimizing development that would fragment winter range and primary migration corridors;
- limiting disturbance of big game on winter range; and
- utilizing other proven actions necessary to conserve and/or restore the vital big-game winter range and migration corridors across the West.
- Past and current projects focus on vegetation treatments across the landscape for the benefit of wildlife, forest and rangeland health, wildland fire resiliency, modification of fences (for safe passage of big game during winter migration), and habitat connectivity research to inform adaptive management decisions.

Surveys for Nesting Pinyon Jays at Rio Grande del Norte National Monument

Principal Investigators: K. Johnson, N. Petersen, J. Smith, & G. Sadoti, University of New Mexico, Natural Heritage New Mexico.

In 2017, the Natural Heritage New Mexico surveyed for breeding Pinyon Jays, a BLM NM Sensitive Species, at the Rio Grande del Norte National Monument. In 2017 and 2018, surveys were conducted on North Guadalupe Mountain, Cerro

Chiflo, Cerro Montoso, Cerro de la Olla, North Guadalupe Mountain, South Guadalupe Mountain, and Ute Mountain. In 2018, 68 nests were documented at all sites: 22 new, 34 old, and 12 platforms that were called 'nest starts' or 'courtship nests'. These nests represent six definite colonies on five different mountains; five colonies were newly detected in 2018.

Bird Surveys at Rio Grande del Norte National Monument

Principal Investigators: N. Petersen, K. Johnson, G. Sadoti, and J. Smith.
University of New Mexico, Natural Heritage New Mexico.

In 2018, Natural Heritage New Mexico conducted bird point count surveys at the Rio Grande del Norte National Monument along transects in mixed conifer, piñon-juniper, riparian, sagebrush shrubland, and grassland habitats. Highest bird species richness was detected on the Pilar riparian transect, followed by the Guadalupe Mountain piñon-juniper transect, the Ute Mountain piñon-juniper transect, the Ute Mountain mixed conifer transect, the Ute Mountain sagebrush transect, and the Ute Mountain grassland transect. Species' densities were modeled using distance sampling. Pinyon Jay, Mountain Chickadee, Hermit Thrush, and American Robin dropped off the most-common list in at least one habitat in 2018, but several species appear to be maintaining their common status: Horned Lark in Ute grassland, Black-throated Gray Warbler in piñon-juniper and mixed conifer, Yellow-breasted Chat in riparian, Spotted Towhee in Ute piñon-juniper and sagebrush, Chipping Sparrow in Ute mixed conifer, Vesper Sparrow in Ute grassland, and Sagebrush Sparrow in Ute sagebrush. To allow assessment of changes in bird species richness, abundance, and populations, it was recommended that these monitoring surveys continue, preferably on an annual or biennial basis. These data are particularly important to assess potential and actual effects of climate change, vegetation treatments, and land use on native bird communities, including birds of conservation concern, and to inform planning.

Mule Deer Studies

Principal Investigator: Taos Field Office, BLM, NM.

Mule deer is a Species of Greatest Conservation Need (SGCN) as identified by the New Mexico Department of Game & Fish in much of New Mexico. Recent monitoring efforts by the BLM Taos Field Office include investigating mule deer home ranges by studying translocated deer, dietary analysis and the use of remote sensing information to characterize areas of study. Future projects will focus on investigating how habitat use influences nutritional condition to assist

management in identifying which resources are most important to mule deer in the Taos Plateau during the spring and fall, as well as a future resident mule deer capture/collaring effort to study migration routes.

Orilla Verde Riparian Recovery Study

Principal Investigator: Taos Field Office, BLM, NM.

Two transects were monitored in 2017, one for documenting occurrence of the tamarisk beetle (*Diorhabda* spp.), and the other for post-treatment effects for native riparian regeneration and non-native species occurrence. These transects were last monitored in 2014. To date, no tamarisk beetle has been detected in the study site. One year following removal of non-native species, the second transect revealed an understory composed mostly of weedy, introduced species such as perennial pepperweed (*Lepidium latifolium*), Canada thistle (*Cirsium arvense*), and smooth brome (*Bromus inermis*); please see the following URLs for more information:

<http://www.nmda.nmsu.edu/wp-content/uploads/2016/11/Weed-List-memo-and-weed-list-2016.pdf>;

<https://www.fs.fed.us/database/feis/plants/graminoid/broine/all.html>.

Total cover of these species decreased in FY16, while native species slender wheatgrass (*Elymus trachycaulus*) and triangle orache (*Atriplex prostrata*) increased. This is a positive trend, although the noxious weeds will continue to be monitored to determine if they spread, in which case control will be implemented. There was a small percentage of saltcedar (*Tamarix* spp.) detected in 2014, but this species was not found in plots in 2016. Presumably the removal of saltcedar allowed for the return of coyote willow although no pretreatment data is available to confirm that. The number of saltcedar re-sprouts was relatively high in 2014 but decreased by about half in 2016 (from 83.0 to 42.5 percent), another positive trend for the site.

Aquatic macroinvertebrate assemblages of the RGDN National Monument: Environmental and Anthropogenic Effects

Principal Investigator: Taos Field Office, BLM, NM.

Playas are shallow, closed-basin wetlands which have dynamic hydrological cycles consisting of periods of inundation from excessive snowmelt or heavy monsoonal rains and periods of dryness, sometimes remaining dry for many years. Ephemeral playa wetlands occur in many areas of New Mexico but have received less attention than perennial wetlands. Although playa wetlands have been examined in the eastern and southern parts of New Mexico, they have been largely overlooked within the Taos Plateau of the San Luis Valley. The purpose of this study is to (1) characterize invertebrate assemblages of playas and earthen tanks, (2) determine if there are differences in macroinvertebrate assemblages between four environmental and anthropogenic variables and (3) determine if earthen tanks and playa lakes provide comparable functions related to aquatic ecological communities and habitat (Besser 2018). 2017 was the third year of the study and included adding 35 Hobo water level loggers at playas to assess the inundation timing, hydroperiods, and water volume.

Fisheries and Aquatic Resources

The RGDN is home to diverse assemblages of aquatic organisms and includes perennial, intermittent and ephemeral aquatic resources. The boundary of the RGDN includes sections of the Rio Grande, Red River, Rio San Antonio, Los Pinos River, Rio Pueblo de Taos, and Rio Hondo as well as many lentic and lotic ephemeral wetlands.

The RGDN provides habitat for aquatic BLM Sensitive Species: Rio Grande Cutthroat Trout (*Onchorhynchus clarki virginalis*), Rio Grande Sucker (*Catostomus plebeius*), Rio Grande Chub (*Gila pandora*), and Northern Leopard Frog (*Lithobates pipiens*). Species of Greatest Conservation Need (SGCN) in the RGDN include Tiger Salamander (*Ambystoma mavortium*), American Beaver (*Castor canadensis*), Common Muskrat (*Ondatra zibethicus*), North American River Otter (*Lontra canadensis*), Beavertail Fairy Shrimp (*Thamnocephalus platyurus*), Tadpole Shrimp (*Triops longicaudatus*), and Great Plains Fairy

Shrimp (*Steptocephalus texanus*), and Stonefly (*Isoperla jewetti*). Other aquatic species of concern include the Longnose Dace (*Rhinichthys cataractae*), New Mexico Spadefoot Toad (*Spea multiplicata*), and Canyon Tree Frog (*Hyla arenicolor*).

Fish population surveys were conducted by the BLM Taos Fisheries and Aquatics Program in conjunction with the New Mexico Department of Game and Fish for the Red River (2002, 2004, 2006, 2009, 2015), Rio Hondo (2004, 2008, 2012, 2017), Rio Pueblo de Taos (2004, 2009, 2012), Rio San Antonio (2009, 2015), and rotating reaches of the Rio Grande (2003 to 2018). Data from the fish population surveys are available upon request.

Baseline surveys for aquatic invertebrates were completed for the Rio Grande (15 sites), Rio Hondo (1 site), Rio Pueblo de Taos (1 site), Red River (2 sites), Rio San Antonio (2 sites), and Los Pinos River (1 site) in 2016 through 2017 using the AIM National Aquatic Monitoring Framework protocol. Baseline surveys were completed for the playa lakes in 2015 and 2016. Monitoring should continue on a 5 year cycle. Crayfish surveys were conducted in 2008 and 2010 at 28 sites along the Rio Grande.

Baseline amphibian surveys were conducted for the Rio San Antonio, Rio Pueblo de Taos, Rio Hondo, Red River, Rio Grande and the ephemeral Cerro de los Taoses using visual estimation surveys and net sweeps in 2009 and 2010 (Besser and Gustina 2018, draft report available upon request). Baseline surveys for amphibians of the playa lakes were conducted in 2009 - 2017.

SECTION 3: MANAGEMENT DECISIONS AND SCIENCE NEEDS

3.1. Scientific Needs

- In general, research will:
 - Inform land management decisions in RGN;
 - Be designed around clearly articulated research/management questions;

- Be responsive to the National Conservation Lands 15-year Strategy, New Mexico BLM's National Conservation Lands Strategy, the BLM and National Conservation Lands Science Strategies, and RGDN's Science Plan and RMP.
- Management decisions RGDN expects to make in the next 5-10 years will generally be related to the following issues:
 - How to best to manage and restore habitat on a landscape scale;
 - How to best to manage the sagebrush shrublands on the Monument;
 - How best to manage to preserve and protect ecological diversity within the monument;
 - Livestock grazing management;
 - Updates to route designations (i.e. travel management);
 - Invasive species control;
 - Riparian area management;
 - Adjustments to recreation management (e.g., Special recreation permit management, etc.);
 - Management and protection of wilderness characteristics; and
 - Other decisions related to the protection, conservation, and interpretation of monument objects as needed (e.g., projects to improve wildlife habitat, protect unique plant habitats, protect archaeological and historical resources, interpreting geologic resources, etc.).
- As the management questions in RGDN continue to evolve, so do the science needs. Thus, the scientific needs will remain fluid and opportunities for research should remain open and inclusive.
- Science needs can be met with either primary research or by synthesizing existing research, and will be connected to the baseline and existing information identified in Section 2.

3.2. Specific ongoing and future science needs

- Specific ongoing and future science needs for RGDN are identified in two tables. Table 1 identifies the scientific research from Section 2 that is on-going in RGDN. Table 2 identifies potential future research. In general, scientific investigations

are related to the protection, conservation, and interpretation of monument objects.

3.3. Ranking of science needs

- Science needs are prioritized and ranked as 1-high, 2-medium, or 3-low. These are pragmatic decisions: even low priority science needs are important
 - (1) Research that is critical to inform management decisions on NCL units within 1-3 years;
 - (2) Research that is anticipated to be relevant to future management of NCL units;
 - (3) Research that will advance the scientific understanding of NCL units, but that is not immediately relevant for management decisions.
- Science needs are prioritized to reflect the following:
 - Level of threats and impacts to the integrity of monument objects;
 - Goals and objectives identified in the RGDN RMP;
 - Management and resource issues identified by BLM resource specialists, managers, partners, and the general public; and,
 - Science that can be applied on a landscape level versus localized research.

SECTION 4: MEETING SCIENCE NEEDS

4.1. Internal Organization

An effective internal organization is necessary to strategically identify and address science needs in RGDN. The Field Manager will serve as the overarching manager of scientific inquiries on the Monument. The Science Coordinator will work directly for the Field Manager to assist in this process, collaborating with appropriate BLM staff in the Taos Field Office, Farmington District, NM State Office (NMSO), and science partners. The roles of the science coordinator in relation to scientific inquiries on RGDN are:

- Serving as the point of contact for scientific inquiries, from both internal and external sources. Scientific inquiry proposals will be submitted in writing directly to the Field Manager with assistance from the Science Coordinator. Contact information for the science coordinator is listed in Section 11.
- Coordinating the processing of research permits for the Monument, working with resource specialists in the RGDN Taos Field Office, and NMSO to (if applicable): identifying the issues in conducting the research; ensuring appropriate planning and environmental reviews are in place; and appropriate mitigation measures and research permit stipulations are implemented. The RGDN Science Coordinator will also prepare the research permit for signature by the Taos Field Manager.
- Coordinating internal/external scientific inquiries with the Taos Field Manager.
- Coordinating internal/external inquiries with Taos Assistant Field Manager(s).
- Coordinating the inquiry process with the applicant and other scientific partner, if necessary.
- Coordinating all the inquiry process with the ID Team.
- When appropriate, coordinating the process of requesting, administering, and utilizing BLM funds for proposed inquiries.
- The Field Manager will select the Science Coordinator.

4.2. Collaboration and Partnerships

- Collaboration and open communication with existing and potential science partners is critical to the success of implementing of the Science Plan. This collaboration will ensure that research on RGDN is pertinent to the protection of Monument objects and future management decisions.
- Current Scientific Partnerships with RGDN:
 - Bureau of Reclamation

- Conservation Leaders for Tomorrow
- Conservation Legacy
- Hawks Aloft, Inc.
- Institute for Applied Ecology
- Jornada Long Term Ecological Research Station
- Mule Deer Foundation
- Mule Deer Working Group
- Natural Heritage New Mexico
- Natural Resource Conservation Service - Alamosa Service Station
- National Wildlife Turkey Federation
- New Mexico Department of Game & Fish
- New Mexico Bureau of Geology and Mineral Resources (NMBGMR) at New Mexico Institute of Mining and Technology
- New Mexico State University
- New Mexico Wildlife Federation
- Rocky Mountain Elk Foundation
- San Juan Wildlife Working Group
- Southern Rockies LCC
- Taos Pueblo
- Trout Unlimited
- Upper Rio Grande Wildlife Connectivity Collaborative Working Group
- United States Geological Survey
- U.S. Fish and Wildlife Service

SECTION 5: SCIENCE PROTOCOLS

5.1. General Science Guidelines

- Scientific inquiries will comply with current and relevant agency laws and regulations per the Bureau of Land Management

- Scientific research should not detrimentally impact the long term health or sustainability of Monument objects or other resources of RGDN.
- Scientists initiating research projects within RGDN must be aware of existing data within the BLM and should incorporate these data into projects whenever possible.
- Proposed research within the RGDN should comply with appropriate laws and regulations within local, state, and federal guidelines
- RGDN, when applicable, will encourage external science inquiries to adopt BLM data management strategies.
- Proposed research will follow the guidelines in the Department of the Interior's "Integrity of Scientific and Scholarly Activities" policy established in Departmental Manual Part 305 Chapter 3.
- External scientific projects, including UAV data collection, must apply for and receive a research permit from the Taos Field Manager in order to proceed (see section 5.2).
- All scientific proposals will be reviewed by the Interdisciplinary (ID) Team.

5.2. Authorization and tracking process

- Proposals will be submitted to the Field Manager with assistance from the science coordinator.
 - The proposal (not to exceed 3 pages) will include the following:
 - Contact information of the principal investigator;
 - Background information on the question being addressed (including any existing research);
 - Site locations, including any geospatial information;
 - Rationale for research;
 - Methods of conducting the research;
 - Timeline for field work;
 - Deliverables; and,
 - Outline of public outreach effort, if appropriate.
- The Science Coordinator, Assistant Field Manager(s) and ID Team will review the proposal for completeness and consult with the appropriate BLM resource

specialist to determine the scientific validity and integrity of the proposal, and potential impacts to resources and resource uses.

- The Science Coordinator will brief the Taos Field Manager upon receipt of request to conduct research. The Field Manager will determine whether the proposal:
 - Is consistent with this Science Plan;
 - Meets RGN's scientific mission;
 - Conforms with RGN's RMP; and,
 - Is consistent with other current and relevant agency laws and regulations.
 - In addition, for proposals from the Research and Stewardship Partnership, the Field Manager and Monument Manager will coordinate with the partnership to ensure it meets the goals and objectives of the partnership.
 - The Field Manager may delegate this authority to the Science Coordinator.
- If the proposal is not accepted, then the Field Manager will provide written notification and justification to the applicant, within a timely manner.
- If the proposal is accepted:
 - The Field Manager will determine what, if any, NEPA analysis is required to carry out the inquiry.
 - If a Categorical Exclusion or Environmental Assessment is needed, the Field Manager will assign an Interdisciplinary Team (including a team lead/project manager) comprised of appropriate resource specialists.
 - Resource specialists will review the proposal to determine what mitigation or stipulations need to be included in the authorization (i.e. research permit).
 - When appropriate, the Science Coordinator will prepare a research permit for the applicant to be approved by the Field Manager.
 - The research permit will be sent to the applicant for review and signature, and then the permit will be returned to the Field Manager for final signature and approval.

- Reporting for all scientific investigations will require:
 - Annual progress reports to be filed with the Monument Manager and appropriate BLM resource specialist.
 - A final report that includes an executive summary, research background, methods, and results; discussion illustrating results' relevance to RGDN management; and copies of published papers resulting from the scientific inquiry.
- If permit stipulations are not adhered to, the research permit can be canceled, in writing, by the Field Manager.

SECTION 6: ORGANIZATION AND COMMUNICATION OF COMPLETED SCIENCE

6.1 Scientific Background Needed for Updates

- Section 2 of this report provides a brief summary of the scientific background of the unit, and provides citations to the relevant reports in the bibliography (Section 9) of this science plan. At every revision of the science plan, these sections will be updated.

6.2. Internal Communications

- All reports described in Section 5 will be stored, organized, and shared on a share drive or sharepoint site, accessible to all staff in the Taos Field Office. The Science Coordinator should strive to organize periodic presentations of scientific results to Field Office staff, as well as keep NMSO updated on current and ongoing efforts.
- All internal communications will be shared with the ID team.

6.3. Communication to the Broader BLM Organization

- The Field Manager will comply, in a timely manner, with all requests for completed scientific investigations (e.g. reports, publications, etc.) from BLM Field, District, State, and Washington offices.
- Ongoing studies will be documented in the Monument annual report.

6.4. Communication of Scientific Results to the Public

- The Field Manager, in coordination with the Public Affairs Specialist, FDO, and Science Coordinator, will strive to make information on science projects within RGDN accessible to the general public. This includes posting updates on RGDN's website in formats such as written descriptions of scientific inquiries or citations of published research; press releases; using social media websites like Facebook or Twitter; brown bag lunch presentations; leading field tours; participating in community outreach events, etc. All public information will be approved by the Field Manager.

SECTION 7: INTEGRATING SCIENCE INTO MANAGEMENT

7.1. Communications

- Direct communication is critical among the District Manager, Field Manager, Science Coordinator, scientist, and ID Team.
- It is the responsibility of the Monument Manager to ensure that scientific findings are communicated to the Field Manager and the District Manager via methods outlined in Section 6. Subsequently, the managers will be able to use the scientific information, as appropriate, in management decisions related to RGDN.

7.2. Integration

- Integrating scientific findings into management decisions should not end scientific inquiry into a specific topic.

- Using science in the decision making process should provide an opportunity to identify future science needs to adaptively manage for certain objectives.

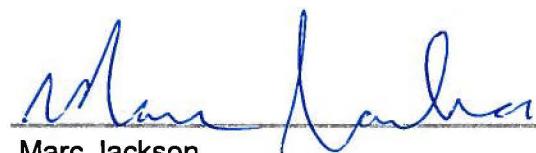
SECTION 8: SCIENCE PLAN REVIEW AND APPROVAL

SIGNATURE PAGE

I approve the 2019 Science Plan for the Rio Grande del Norte National Monument.

This plan will be used as the basis for conducting science in Rio Grande del Norte National Monument. "Science" is defined in Section 1 of this plan.

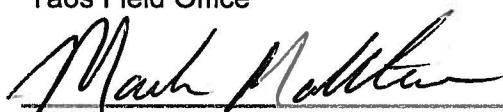
As a living document, this plan will be updated as needed. Scientific needs that emerge during the course of implementing this plan may be added to the plan on an as-needed basis to meet the needs of the Rio Grande del Norte National Monument, and the bureau of Land Management.



Marc Jackson
Field Manager
Taos Field Office

6-18-19

Date



Mark Matthews
District Manager
Farmington District Office

7-31-15

Date



McKinney Briske
New Mexico NLCS Lead
New Mexico State Office

9-10-19

Date

SECTION 9: BIBLIOGRAPHY

Besser R.M., and G. Gustina. 2018. [Draft] Amphibian Species Occurrence and Habitat Use on Bureau of Land Management, Taos Field Office Lands, Northern New Mexico. U.S. Department of the Interior, Bureau of Land Management, Taos Field Office, NM.

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National Landscape Conservation System Science Strategy 2007

Proclamation 8946 of March 25, 2013. Establishment of the Río Grande del Norte National Monument.

SECTION 10: UNIT'S LEGISLATION

Proclamations

Proc. 8946

Proclamation 8946 of March 25, 2013

Establishment of the Río Grande del Norte National Monument

*By the President of the United States
of America A Proclamation*

In far northern New Mexico, the Río Grande Wild and Scenic River flows through a deep gorge at the edge of the stark and sweeping expanse of the Taos Plateau. Volcanic cones, including the Cerro de la Olla, Cerro San Antonio, and Cerro del Yuta, jut up from this surrounding plateau. Canyons, volcanic cones, wild rivers, and native grasslands harbor vital wildlife habitat, unique geologic resources, and imprints of human passage through the landscape over the past 10,000 years. This extraordinary landscape of extreme beauty and daunting harshness is known as the Río Grande del Norte, and its extraordinary array of scientific and historic resources offer opportunities to develop our understanding of the forces that shaped northern New Mexico, including the diverse ecological systems and human cultures that remain present today.

For millennia, humans have seasonally passed through the Río Grande del Norte, gathering resources and finding spiritual meaning in its dramatic geologic features. Although few have attempted to live year-round in this harsh landscape, the images carved into the gorge's dark basalt cliffs and the artifacts scattered across the forested slopes of the volcanic cones bear ample testimony to the human use of the area.

The Río Grande gorge lies within the traditional area of the nearby Taos and Picuris Pueblos, as well as the Jicarilla Apache and Ute Tribes, and hosts a dazzling array of rock art. Carved into the boulders and cliffs are hundreds of images ranging from seemingly abstract swirls and dots to clear depictions of human and animal figures. Dense collections of petroglyphs are found near the hot springs that bubble up in the deep heart of the gorge, with some dating back to the Archaic Period (ca. 7,500 B.C.–500 A.D.). In addition to petroglyphs, these lands harbor small hunting blinds, pit houses, chipping stations, potsherds, tools and projectile points, as well as large ceramic vessels. The area is home to a rich array of archaeological resources that represent diverse cultural traditions. Archeological resources are found throughout the proposed monument, with its rugged terrain serving as the focal point for ongoing archaeological research. More recent artifacts and images mark

the passage of settlers and Hispanic explorers dating back to the early 18th century. Ongoing explorations and inquiries of this unique cultural landscape have resulted in continuous discoveries that further illuminate northern New Mexico's human history.

Separated from the Río Grande Wild and Scenic River by a broad swath of sagebrush and grassland, the Río San Antonio gorge is another area of concentrated artifact and petroglyph sites. People were drawn to this area by the flowing water, hunting opportunities, and nearby San Antonio Mountain, which is thought to have been a major regional source for the dacite used by nomadic peoples to create stone tools thousands of years ago. This corner of the Río Grande del Norte landscape was traversed by traders and other travelers during the 18th and 19th centuries, who traded furs and other goods and later brought woolen articles from New Mexico's sheep grazing communities to markets throughout the Southwest.

Between the Río Grande gorge and the Río San Antonio gorge stretches a sweeping and austere expanse of the Taos Plateau. The Río Grande del Norte landscape is a testament to the geologic past of New Mexico and the 70 million year tectonic history of the Río Grande Rift, one of the world's major rift systems. Composed of Servilleta lava basalts and rhyolites, the Taos Plateau has long been a center of research in geology and volcanology. Rising in stark contrast from the plateau's broad expanse, Cerro de la Olla, Cerro San Antonio, and other volcanic cones provide visible reminders of the area's volatile past. Cerro del Yuta, or Ute Mountain, the tallest of these extinct volcanoes, rises above the plateau to an elevation topping 10,000 feet. Springs within the Río Grande gorge have been measured emitting 6,000 gallons of water per minute into the river bed and are thought to be part of a flooded lava tube system.

This northern New Mexico landscape also exhibits significant ecological diversity in these different geologic areas. From the cottonwood and willows along the Río Grande corridor, to the expansive sagebrush plains above the gorge on the Taos Plateau, the pines at the base of Ute Mountain, and the spruce, aspen, and Douglas fir covering the mountain's northern slopes, the diversity of both ecosystems and species allows for, and has been the subject of, substantial scientific research.

The Río Grande gorge connects the northern reaches of the river's watershed with its middle and lower stretches. Deep within the gorge, beneath soaring cliffs that rise hundreds of feet above the river, stands of willow and cottonwood thrive in riparian and canyon ecosystems that have been present since the river first appeared in the Río Grande Rift Valley. The river provides habitat for fish such as the Río Grande cutthroat trout as well as the recently reintroduced North American river otter. The Río Grande del Norte is part of the Central Migratory Flyway, a vital migration corridor for birds such as Canada geese, herons, sandhill cranes, hummingbirds, and American avocets. Several species of bats make their home in the gorge, which also provides important nesting habitat for golden eagles and numerous other raptor species, as well as habitat for the endangered southwestern willow flycatcher.

Bald eagles roost above the river in winter and fly out over the Taos Plateau's sagebrush shrub habitat and native grasslands, which stretch for thousands of acres to the west. The vast plateau harbors a significant diversity of mammals and birds, from the eagles, hawks, falcons, and owls soaring above the plateau to the small mammals on which they prey. Many other bird species, including Merriam's turkey, scaled quail, mourning dove, mountain plover, and loggerhead shrike, can be seen or heard on the plateau. Large mammals, including the Rocky Mountain elk, mule deer, pronghorn, and Rocky Mountain bighorn sheep, find their winter homes on the plateau alongside a population of rare Gunnison's prairie dogs. The Río Grande del Norte also provides habitat for many species of predators, including the ringtail, black bear, coyote, red fox, cougar, and bobcat.

While diverse peoples have used this area intermittently for thousands of years, its challenging conditions make it inhospitable for permanent settlement. In an area near the forested slopes of Cerro Montoso, however, a group of eastern homesteaders attempted to make a living in the years immediately following World War I. The nearly forgotten story of this fleeting community, recently revealed through detailed historical research, is written on the landscape by the remnants of homes, root cellars, cistern-style water catchments, and cast metal toys. At one site, researchers have found several World War I brass uniform buttons, evidence of the veterans who once made their homes on this rugged land.

The protection of the Río Grande del Norte will preserve its cultural, prehistoric, and historic legacy and maintain its diverse array of natural and scientific resources, ensuring that the historic and scientific values of this area remain for the benefit of all Americans.

WHEREAS section 2 of the Act of June 8, 1906 (34 Stat. 225, 16 U.S.C. 431) (the "Antiquities Act"), authorizes the President, in his discretion, to declare by public proclamation historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest that are situated upon the lands owned or controlled by the Government of the United States to be national monuments, and to reserve as a part thereof parcels of land, the limits of which in all cases shall be confined to the smallest area compatible with the proper care and management of the objects to be protected;

WHEREAS it is in the public interest to preserve the objects of scientific and historic interest on the Río Grande del Norte lands;

NOW, THEREFORE, I, BARACK OBAMA, President of the United States of America, by the authority vested in me by section 2 of the Antiquities Act, hereby proclaim, set apart, and reserve as the Río Grande del Norte National Monument (monument), the objects identified above and all lands and interest in lands owned or controlled by the Government of the United States within the boundaries described on the accompanying map, which is attached to and forms a part of this proclamation. These reserved Federal lands and interests in lands encompass approximately 242,555 acres, which is the

smallest area compatible with the proper care and management of the objects to be protected.

All Federal lands and interests in lands within the boundaries of this monument are hereby appropriated and withdrawn from all forms of entry, location, selection, sale, leasing, or other disposition under the public land laws, including withdrawal from location, entry, and patent under the mining laws, and from disposition under all laws relating to mineral and geothermal leasing, other than by exchange that furthers the protective purposes of this proclamation.

The establishment of this monument is subject to valid existing rights. Lands and interests in lands within the monument's boundaries not owned or controlled by the United States shall be reserved as part of the monument upon acquisition of ownership or control by the United States.

The Secretary of the Interior (Secretary) shall manage the monument through the Bureau of Land Management (BLM) as a unit of the National Landscape Conservation System, pursuant to applicable legal authorities, including the Wild and Scenic Rivers Act (82 Stat. 906, 16 U.S.C. 1271 et seq.), to implement the purposes of this proclamation.

For purposes of protecting and restoring the objects identified above, the Secretary, through the BLM, shall prepare and maintain a management plan for the monument and shall provide for maximum public involvement in the development of that plan including, but not limited to, consultation with tribal, State, and local governments as well as community land grant and acequia associations.

Except for emergency or authorized administrative purposes, motorized vehicle use in the monument shall be permitted only on designated roads and non-motorized mechanized vehicle use shall be permitted only on designated roads and trails.

Nothing in this proclamation shall be construed to preclude the Secretary from renewing or authorizing the upgrading of existing utility line rights-of-way within the physical scope of each such right-of-way that exists on the date of this proclamation. Additional utility line rights-of-way or up-grades outside the existing utility line rights-of-way may only be authorized if consistent with the care and management of the objects identified above.

Nothing in this proclamation shall be deemed to enlarge or diminish the rights of any Indian tribe or pueblo. The Secretary shall, in consultation with Indian tribes, ensure the protection of religious and cultural sites in the monument and provide access to the sites by members of Indian tribes for traditional cultural and customary uses, consistent with the American Indian Religious Freedom Act (92 Stat. 469, 42 U.S.C. 1996) and Executive

Order 13007 of May 24, 1996 (Indian Sacred Sites).

Laws, regulations, and policies followed by the BLM in issuing and administering grazing permits or leases on lands under its

jurisdiction shall continue to apply with regard to the lands in the monument, consistent with the purposes of this proclamation.

Nothing in this proclamation shall be construed to alter or affect the Río Grande Compact between the States of Colorado, New Mexico, and Texas, or to create any reservation of water in the monument.

Nothing in this proclamation shall be deemed to enlarge or diminish the jurisdiction of the State of New Mexico with respect to fish and wildlife management.

Nothing in this proclamation shall be construed to preclude the traditional collection of firewood and piñon nuts in the monument for personal non-commercial use consistent with the purposes of this proclamation.

Nothing in this proclamation shall be deemed to revoke any existing withdrawal, reservation, or appropriation; however, the monument shall be the dominant reservation.

Warning is hereby given to all unauthorized persons not to appropriate, injure, destroy, or remove any feature of the monument and not to locate or settle upon any of the lands thereof.

IN WITNESS WHEREOF, I have hereunto set my hand this twenty-fifth day of March, in the year of our Lord two thousand thirteen, and of the Independence of the United States of America the two hundred and thirty-seventh.

BARACK OBAMA

SECTION 11: SCIENCE COORDINATORS CONTACT INFORMATION

	Name	Title	Phone	Address	Email
Authorized Officer	Marc Jackson	Field Manager	575-758-8851	226 Cruz Alta Rd., Taos, NM, 87571	majackson@blm.gov
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Olivia Messinger Carril	Institute for Applied Ecology
Steve Cary	Institute for Applied Ecology
Carlos Coontz	Realty Specialist, Taos Field Office, BLM
A.M. Dicks	Archeologist
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Marc Jackson	Field Manager, Taos Field Office, BLM
Ellis Q. Margolis	Research Ecologist, USGS
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Ivy Reed	GIS Specialist, Taos Field Office, BLM
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Planning and Environmental Coordinator, NM State Office, BLM

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Research Wildlife Biologist, USGS

SECTION 13: TABLES 1 & 2

Table 1. On-going research at Rio Grande del Norte National Monument

Monument Object/Issue	Research Topic/Question Description	Priority Level (1-High, 2-Medium, 3-Low)	Related Management Decision
Cultural/Historical Resources	<i>Rio Grande Gorge Cultural Resources Project</i>	The project is focused on the identification, recording, evaluation, and analysis of archaeological remains located in the Río Grande Gorge environment. Moreover, the research is landscape-oriented regarding how the remains of different ethnic groups over time are manifested within the Gorge environment.	3
	<i>Nomadic Indian Presence in the Upper Rio Grande</i>	The nomadic Indian presence in the Upper Rio Grande during the Spanish Colonial Period with field work conducted in the Rio Grande gorge and in playa lake settings within the National Monument.	2

Ecological Diversity	<i>Soil Maps and Ecological Site Descriptions:</i>	What are the Ecological Site Descriptions for the monument? The NRCS, in partnership with the Jornada, are presently developing ESDs for the Taos Field Office with an expected delivery date of 2021	1	Research that is critical to inform management decisions on NCL units within 1-3 years.
	<i>Assessment, Inventory and Monitoring (AIM) Terrestrial Program</i>	Collect quantitative data on the status, condition, trend, amount, location, and spatial pattern of natural resources using standardized monitoring methods	1	Important to continue baseline analysis and project specific monitoring
	<i>AIM National Aquatic Monitoring Framework</i>	Collect consistent, comparable and quantitative monitoring data to understand renewable resource condition and trend	2	Aquatic AIM will continue in 2022 for reassessment of sites
	<i>Vegetation Treatment Monitoring</i>	Monitor the effectiveness of vegetation manipulation projects.	1	Research that is critical to inform management decisions on NCL units within 1-3 years.
	<i>Rare Plant Monitoring</i>	Monitor sensitive plants including Taos spring parsley (<i>Cymopterus spellenbergii</i>) and Ripley's milkvetch (<i>Astragalus ripleyi</i>).	2	
	<i>Weeds Mapping</i>		1	Important for rapid response to weed treatment

Geology	<i>Geologic Quadrangle Mapping of Southern Taos County</i>	Complete geologic maps of 7.5 minute quadrangles in the southern half of Taos County along the Río Grande corridor. Field work for the following quadrangles that contain Monument lands has been completed. Develop a seamless, ArcGIS-based geologic map compilation of all of southern Taos County.	2
	<i>Geologic Investigations of the Southern San Luis Basin</i>	Geologic mapping and regional geologic synthesis investigations of the Taos Plateau region of the southern San Luis Basin area. Integration of USGS and NMBGMR geologic mapping will result in seamless 1:50,000 geologic map coverage of the Monument.	2
	<i>Geophysical Investigations of the San Luis Basin</i>	Development of a regional scale gravity model for the San Luis Basin and derivative basin depth and geometry determinations; and 2) aeromagnetic and ground magnetic modeling studies of the Taos Plateau region for identification of faults, stratigraphic correlations, and subsurface geologic characterizations.	1

Wildlife and Fisheries Resources	Bees Surveys	Assess the status of pollinator health, bee species richness, and population dynamics in New Mexico as well as on the Monument.	1
	<i>Anasazi' Yuma Skipper (Ochlodes yuma anasazi) and Monarch Butterfly (Danaus plexippus) Studies at Wild Rivers</i>	Document occurrences of both species within the Monument at Wild Rivers and fill data gaps for New Mexico. Conducted mark/release/recapture studies on 'Anasazi' Yuma Skipper to assess if the flowers/nectar sources around the Wild Rivers camp loop are lost from the reproducing population or return to patches of its host plant, common reed (<i>Phragmites australis</i>), in the Gorge to place eggs.	2
	<i>Migration/Movement Corridors</i>	Projects provide connectivity of habitat for big game migration corridors occurring from the first heavy snowfall to spring green-up.	1
	<i>Orilla Verde Riparian Recovery Study</i>	Monitoring the occurrence of the tamarisk beetle (<i>Diorhabda spp.</i>) and post-treatment effects of native regeneration and non-native species occurrence.	2

<i>Aquatic macroinvertebrate assemblages of the RGDN National Monument: Environmental and Anthropogenic Effects</i>	Characterize invertebrate assemblages of playas and earthen tanks; determine if there are differences in macroinvertebrate assemblages between five environmental and anthropogenic factors; and determine if earthen tanks and playa lakes provide comparable functions related to aquatic ecological communities and habitat. Hobo water level loggers were added at playas to assess the inundation timing, hydroperiods, and water volume	3	Initial baseline surveys are complete and resurveys will be around 2022. Water level loggers are in place.
Fisheries and Aquatic Resources	Conduct Fish population, aquatic invertebrates, and amphibian surveys at Red River, Rio Hondo, Rio Pueblo de Taos, ephemeral Cerro de los Taoses, Rio San Antonio, and rotating reaches of the Rio Grande.	2	Monitoring on a rotation every 3-5 years
<i>Big Game Species:</i>	Assess the effectiveness of habitat enhancement projects on BLM-managed lands within the recently-designated Rio Grande del Norte National Monument (RGDNM) in cooperation with the New Mexico Department of Game & Fish. Interagency	1	

	Agreement in place with USGS.	
	Fecal Analysis Study of Mule Deer to compliment Treatment Effectiveness Monitoring. Upcoming Spring of 2018. Fecal samples will be sent to Washington State University for analysis. Report received 2018. Continue studies (see Science Plan). Habitat Stamp Program projects. On-going: 2017, 2018, and 2019	2 1
	Habitat Connectivity/Migration Corridor research needs for deer, elk, and pronghorn as they travel seasonally between summer and winter ranges. Gather information on timing, routes and distances traveled.	2
<i>Piñon-juniper obligate species? or migratory/rare birds</i>	Work with Pinyon jay Multi-state Working Group on Strategy	2
<i>New Mexico meadow jumping mouse?</i>	Surveys contracted in 2019.	1

Ecosystem Landscape Management	<i>Grassland/Shrubland/Rangeland/Cropland:</i>	How long has the sagebrush shrubland been dominated by sagebrush?	1	(Note: funding to study this has been submitted through the BPSS project system and is currently ranked as top priority at the district level.)
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Geology <i>Mineral Resources:</i>				
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Paleontology	<i>Fossils:</i>			
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Fire Management	<i>Fuels:</i>			
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	Fire ecology:	Fire history of the uplands derived from tree rings. USGS NM Field Station project ongoing through 2019	1	

Table 2. Research needs at Rio Grande del Norte National Monument.

Monument Object/Issue	Research Topic/Question Description	PRIORITY LEVEL (1, 2, or 3)	Related Management Decision
		1) Research that is critical to inform management decisions on NCL units within 1-3 years. 2) Research that could be relevant to future management of NCL units. 3) Research that will advance the scientific understanding of NCL units, but that is not immediately relevant for management decisions.	
General	Special Status Species: What are the comprehensive distributions of BLM's Special Status Species on the monument?	1 (high) RB Besser (RB) recommendation	
Fisheries and Aquatic Resources/ Riparian Resources/ Water Resources	<i>Aquatic Resources General:</i> How can key large-scale ecological processes be identified, protected, and restored? What are the best methods to protect, restore, and enhance stream, wetland and lentic habitats? What strategies can be used to mitigate and/or manage the effects of the spread of aquatic invasive species and pathogens?	2 (medium) RB recommendation 2 (medium) RB recommendation 1 (high) RB recommendation	

	Community assemblage analysis of riparian and aquatic habitats throughout the RGDN?	2 (medium) RB recommendation
<i>Fisheries:</i>		
	Are there trends in the populations of Rio Grande Cutthroat Trout, Rio Grande Chub, and Rio Grande Sucker within the RGDN?	2 (medium) RB recommendation
	How can fishing gear and techniques be improved to minimize habitat damage?	2 (medium) RB recommendation
	Is aquatic habitat changing over time, and if so, how?	2 (medium) RB recommendation
	How can we re-establish the Rio Grande Sucker within the RGDN and remove the non-native White Sucker.	2 (medium) RB recommendation
	What are the best methods for removal of the Asian Carp?	2 (medium) RB recommendation
<i>Amphibians:</i>		
	What is the distribution of non-native American Bullfrog and what is the best strategy to decrease the population and distribution?	1 (high) RB recommendation

What is the best strategy to return the BLM Sensitive Northern Leopard Frog to its historic range within the RGDN?

2 (medium) RB recommendation

Where are the best breeding site refugium options for the Northern Leopard Frog reintroduction?

1 (high) RB recommendation

Are populations of ephemeral wetland species such as Spadefoot Toads and Tiger Salamanders increasing, decreasing, or stable within the RGDN?

2 (medium) RB recommendation

What is the distribution of Canyon Tree Frogs within the RGDN?

2 (medium) RB recommendation

Aquatic Mammals:

Are there trends in the populations of River Otter and American Beaver within the RGDN?

2 (medium) RB recommendation

What is the diet of River Otters within the various streams of the RGDN?

2 (medium) RB recommendation

<i>Aquatic Macroinvertebrates:</i>	Is the population and distribution of non-native crayfish and other aquatic invertebrate species increasing, decreasing, or stable within the RGDN?	1 (high) RB recommendation	
	Are there endemic species that inhabit the springs and seeps of the RGDN?	1 (high) RB recommendation	
	Are populations of Ephemeroptera, Plecoptera, and Tricoptera increasing, decreasing, or stable within the RGDN?	2 (medium) RB recommendation	Surveys will be done every 3-5 years next due 2022
	Are populations of aquatic macroinvertebrates of ephemeral systems (playa lakes, bedrock pools, etc.) increasing, decreasing, or stable in the RGDN?	2 (medium) RB recommendation	
<i>Riparian Areas:</i>	What is the full list of flora and fauna of the riparian areas of the RGDN?	1 (high) RB recommendation	
	What is the location and baseline physical, biological, human impacts on the springs and seeps of the RGDN?	1 (high) RB recommendation	

	What are the frequencies of inundation and hydro periods of the playa lakes of the RGDN?	2 (medium) RB recommendation
	What are the effects of various grazing strategies on the biotic and abiotic attributes of playa lake ecosystems and what is the best strategy to accomplish rangeland management goals and aquatic biological integrity?	2 (medium) RB recommendation
	Are there endemic riparian or aquatic plant species inhabit the riparian areas of the RGDN?	1 (high) RB recommendation
	What riparian areas are in need of restoration?	2 (medium) RB recommendation
<i>Water Resources:</i>	What is the minimum instream flow for all perennial streams in the RGDN related to water needs for riparian habitat, fisheries, aquatic habitat, and aquatic biotic viability?	1 (high) RB recommendation
	Are water quality results within state standards through time?	2 (medium) RB recommendation

	What are potential effects of new wells on springs along the Rio Grande (Abeyta settlement)?	1 (high) RB recommendation
	What are potential effects of climate change on aquatic and riparian ecosystems?	2 (medium) RB recommendation
<i>Hot springs:</i>	What are the socio-economic effects of hot spring visitation?	
	What are the ecological impacts of hot spring visitation?	2 (medium) RB recommendation
<i>Disturbance</i>	What prior disturbance, man-made and natural, occurred across the landscape? Prior to 1950s?	3 (low) RB recommendation
Ecosystem Landscape Management	<p><i>Forestry:</i></p> <p>What are current tree densities & size classes of current forested areas within the BLM?</p> <p>What are the effects of vegetation treatments on production (growth) of trees? Treated vs Un-treated?</p>	<p>1 (High, first priority within ranking)</p> <p>1 (High, 2nd priority within ranking)</p>

What are the optimal stocking rates for Pinyon-Juniper ecosystems and Ponderosa Pine/Douglas Fir Ecosystems, given current site conditions?	1 (High, 3rd priority within ranking)
What is the historical footprint of Pinyon-Juniper forests within the Monument and is it changing?	1 (High, 4th priority within ranking)
What were historical tree densities & size classes of forest resources?	1 (High, 5th priority within ranking)
What are the effects of vegetation treatments on special status species (plant and animals, treated vs. untreated)?	1 or 2 (High/Medium, depending on status of species)
How will changing climate impact pinyon and juniper seedling establishment, recruitment and survival, and what are the best management practices to ensure persistence of p-j woodlands on the Monument?	3 (Low)

	What is the maximum amount of fuelwood (cords) that may be extracted from the monument to allow for sustainability?	3 (Low)
<i>Landfill Waste:</i>	What are the effects of waste on monument resources?	3 (Low)
<i>Grazing:</i>	What was the structure and composition of the vegetation communities on the Monument pre-grazing? What was the grazing intensity on the Monument and what impact did this have?	3 (Low)
<i>Shrubland/Rangeland/Grasslands:</i>	How long has the sagebrush shrubland been dominated by sagebrush?	1 (High) (Note: funding to study this has been submitted through the BPSS project system and is currently ranked as top priority at the district level.)

Historically were there certain areas more dominated by grass than others?

1 (High)

(Note: funding to study this has been submitted through the BPSS project system and is currently ranked as top priority at the district level.)

How are rangeland and cropland defined and what are the effects of vegetation treatments on rangeland vs. cropland?

3 (Low)

What are the effects of forestry and fire management on Ripley's milkvetch?

1 (High)

What are the impacts of BLM initiated vegetation treatments on sagebrush shrublands and associated sage-obligate species?

1 (High) RB recommendation, we have a good opportunity to monitor for this along during cones project work

	What is the underlying reason for the domination of sagebrush in the southern portion of the monument and winterfat in the northern portion of the monument?	2 (Medium)
<i>Biocrusts:</i>	Baseline surveys - what species are present and where?	1 (High) RB recommendation
	What role might biocrust play in nutrient cycling on the Monument?	2 (Medium) RB recommendation
	What role might biocrusts play in seedling establishment and survival of native plants species on the monument (particularly sagebrush)?	2 (Medium) RB recommendation
	What role might biocrust play in stabilizing soils?	2 (Medium) RB recommendation
	Is there a unique assemblage of biocrusts in the sagebrush habitats of the Monument?	1 (High) RB recommendation

	How are biocrusts impacted by the various vegetation treatment methods implemented on the monument (discing, fire, chemical, shaving)?	1 (High) RB recommendation
Geology	<i>Mineral Resources:</i>	
	Are there valid mining claims on the monument?	3 (Low)
	What is the mineral potential?	3 (Low)
	What do State and Transition Models for soils look like for the Taos Plateau?	2 (Medium)
Paleontology	<i>Fossils:</i>	
	Are there fossil resources on the Monument, and if so, what and where are they?	3 (Low)
Fire Management	<i>Fuels:</i>	
	What are the impacts to old-growth trees on the Monument from fire and fuels management prescriptions?	3 (Low)

	Synthesize raw data taken for pre/post thinning and fuels treatments in regards to vegetation response.	2 (Medium)	
	What was the structure and composition of the vegetation communities on the Monument pre-fire suppression and historically? And, as a correlate, what was the fire regime for forested sites and for the sagebrush community?	1 (High, 1st priority within ranking)	
	Identification of areas for restoring degraded winter range and migration corridors through thinning of prescription fire.	2 (Medium)	see Wildlife section, Big Game Species:
<i>Fire Ecology:</i>	What are the effects of recent wildfires and managed fires on sage and PJ ecosystems?	2 (Medium)	
	What is the fire history of the sagebrush shrublands?	1 (High, 3rd priority within ranking)	

	What was the historical frequency, intensity, season, and size of burns on the Monument?	1 (High, 2nd priority within ranking)	
Archaeology	<i>Cultural Artifacts:</i>	Are there any relic sites within the Taos Plateau? How were they determined?	3 (Low)
Wildlife	<i>Big Game Species:</i>	Identify areas of disturbance for big game species	3 (Low)
		What management actions improve habitat for fish and wildlife?	3 (Low)
		Where are migration corridors and barriers for movement of big game (i.e., elk, mule deer, and pronghorn) on winter and summer ranges?	3 (Low)
		Identification of areas for restoring degraded winter range and migration corridors through thinning or prescription fire.	3 (Low)
			see Fire Management section.
	<i>Birds:</i>	Identify migration and habitat connectivity corridors for birds.	3 (Low)

	Investigating Gunnison Sage-Grouse habitat.	3 (Low)
	Songbird surveys/counts for inventory and monitoring.	3 (Low)
	Pinon Jay habitat requirements within the monument.	3 (Low)
<i>Non-Game Species:</i>	Monitoring habitat use of bats locally and nationally	3 (Low)
	Identifying important roost locations of bats, including hibernacula.	3 (Low)
	Monitoring for the presence of white-nose syndrome (WNS).	3 (Low)
	Investigating impacts of bats on forest and range insect pests.	3 (Low)
	Inventory of rodents and other small non-game mammals.	3 (Low)
	Meadow Jumping Mouse Assessment.	3 (Low)
<i>Herps:</i>	See Fisheries and Aquatic Resources for amphibian questions	3 (Low)

	Baseline surveys and monitoring of reptile species within the monument	2 (medium) RB recommendation
	What are the habitat requirements for reptile species within the monument?	2 (medium) RB recommendation
<i>Invertebrates:</i>	Survey for Tamarisk beetle expansion.	3 (Low)
Recreation	<i>Hunting and Fishing:</i>	Identify actions to improve recreational hunting and fishing by means of access.
Socio-economics	Socio-economic impacts of recreation & tourism on local economies	3 (Low)
	How can the Monument be managed as to best accommodate equitable, sustainable, and local economic development that seeks to simultaneously preserve and protect the objects of value?	3 (Low)

Climate	<i>Paleo-climate</i>	Multi-century tree-ring reconstruction of summer and winter precipitation or Drought Indices (e.g., PDSI) for the RGDN	3 (Low)
	<i>Climate trends</i>	Are there trends in climate variables in the instrumental record (~1900 - present)?	3 (Low)