



**NATIONAL
CONSERVATION
LANDS**

El Malpais

National Conservation Area (NCA)

New Mexico Science Plan

U.S. Department of the Interior
Bureau of Land Management

El Malpais National Monument Science Plan

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|--|-----------|
| 1: INTRODUCTION AND SCIENTIFIC MISSION..... | 1 |
| 1.1: PURPOSE OF NCL SCIENCE PLANS | 1 |
| 1.2: UNIT AND GEOGRAPHIC AREA DESCRIPTION | 2 |
| 1.3: SCIENTIFIC MISSION OF THE UNIT | 3 |
| 2: SCIENTIFIC BACKGROUND OF THE NATIONAL CONSERVATION LANDS UNIT..... | 5 |
| 2.1: COMPLETED RESEARCH AND SCIENCE AVAILABLE FOR EL MALPAIS | 5 |
| 2.1.1: <i>Recreation</i> | 5 |
| 2.1.2: <i>Wilderness management</i> | 5 |
| 2.1.3: <i>Cultural Resources</i> | 7 |
| 2.1.4: <i>Wildlife</i> | 9 |
| 2.1.5: <i>Threatened and Endangered Species and Sensitive Species</i> | 11 |
| 2.1.6: <i>General Vegetation Ecology</i> | 12 |
| 2.1.6.1: <i>Vegetation- Invasive and noxious plants</i> | 14 |
| 2.1.6.2: <i>Vegetation- Forests and Woodlands</i> | 14 |
| 2.1.6.3: <i>Vegetation- Range</i> | 16 |
| 2.1.6.4: <i>Vegetation- Riparian</i> | 16 |
| 2.1.7: <i>Soil/Water/Air</i> | 16 |
| 2.1.8: <i>Fire and fuels management</i> | 18 |
| 2.1.9: <i>Geology and Mineral Resources</i> | 18 |
| 2.1.10: <i>Paleontology</i> | 19 |
| 2.2: ONGOING RESEARCH AND SCIENCE ON EL MALPAIS | 20 |
| 3: MANAGEMENT DECISIONS AND SCIENCE NEEDS..... | 22 |
| 4: MEETING SCIENCE NEEDS..... | 26 |
| 4.1. INTERNAL ORGANIZATION | 26 |
| 4.2. COLLABORATION AND PARTNERSHIPS..... | 27 |
| 5: SCIENCE PROTOCOLS..... | 28 |
| 5.1. GENERAL SCIENCE GUIDELINES | 28 |
| 5.2. AUTHORIZATION AND TRACKING PROCESS..... | 28 |
| 6: ORGANIZATION AND COMMUNICATION OF COMPLETED SCIENCE | 30 |
| 6.1 SCIENTIFIC BACKGROUND NEEDED FOR UPDATES..... | 30 |
| 6.2. INTERNAL COMMUNICATIONS AND TRACKING..... | 30 |
| 6.3. COMMUNICATION TO THE BROADER BLM ORGANIZATION | 31 |
| 6.4. COMMUNICATION OF SCIENTIFIC RESULTS TO THE PUBLIC | 31 |
| 7: INTEGRATING SCIENCE INTO MANAGEMENT | 31 |
| 7.1. COMMUNICATIONS | 31 |
| 7.2. INTEGRATION | 31 |
| 8: SCIENCE PLAN REVIEW AND APPROVAL | 32 |
| 8.1 SIGNATURE PAGE | 32 |
| 8.2: REPORT CONTRIBUTORS: | 32 |
| 9: BIBLIOGRAPHY | 33 |
| 10: UNIT'S LEGISLATION..... | 38 |

1: INTRODUCTION AND SCIENTIFIC MISSION

1.1: Purpose of NCL Science Plans

The National Landscape Conservation System (NLCS) was administratively established in 2000 and legislatively codified in the Omnibus Public Land Management Act of 2009 (PL 111-11). It was subsequently renamed National Conservation Lands (NCL). The system encompasses nearly 900 units spread across approximately 27 million acres of public lands managed by the Bureau of Land Management (BLM) in the US Department of the Interior (USDI). The BLM is mandated to conserve, protect, and restore the outstanding cultural, ecological, and scientific values of NCL units. Scientific investigation can aid in the conservation, protection, and restoration of these lands; and therefore, science is strategically planned and organized within NCL units.

The objectives of NCL 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 NCL units are considered “living” documents and should be revised and updated frequently. 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. This science plan will be used as the basis for conducting science in BLM's El Malpais National Conservation Area (NCA), one of the units in the national NCL network.

Science has been defined within the BLM several times (USDI, BLM 2007a, 2008). For this plan, science is defined as 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. Within NCL 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.” (USDI, BLM 2007a)

1.2: Unit and geographic area description

A management plan for El Malpais NCA was written in 2001 (USDI BLM 2001), and will be referred to hereafter as the “El Malpais Plan”. The El Malpais NCA lies south of the city of Grants, New Mexico, primarily in Cibola County (Figure 1). This was the Plan Area for the Approved El Malpais Plan, and is the area covered by this stand-alone El Malpais Plan. The Plan Area encompasses approximately 231,000 acres of Federal land, 34,600 acres of private land, and 2,500 acres of Native American land. It is bordered on the east by the Acoma Reservation, on the south by Catron and Socorro Counties, on the west by Ramah Navajo land, and on the north by the Zuni Mountain portion of the Cibola National Forest (Figure 1). The northern section of the Plan Area nearly surrounds, but does not include, El Malpais National Monument, administered by the National Park Service (NPS).

For the purposes of this Science Plan, “El Malpais” will be used to refer to the BLM-operated El Malpais NCA specifically, while “El Malpais Landscape” will be used to refer to the broader landscape including the National Monument administered by the National Park Service.

The El Malpais Act, which established El Malpais NCA, directed the BLM to prepare a general management plan describing appropriate uses and development for the NCA consistent with the purposes of the Act. The plan was to include, but not be limited to: (1) an interpretation and public education plan, (2) a public facilities plan, (3) natural and cultural resources management plans, and (4) a wildlife management plan. In addition, the general management plan was to include a wilderness suitability review of the Chain of Craters Wilderness Study Area.

In conformance with the National Environmental Policy Act and the Federal Land Policy and Management Act, the general management plan (“The Approved El Malpais Plan”) was prepared as an Environmental Impact Statement/Resource Management Plan Amendment (USDI, BLM 2001). In this format, decisions and management guidance for the various resources required by the El Malpais Act to be covered by separate management plans were dispersed throughout the document. The conclusion to the planning process outlined by the El

Malpais Act is to combine the decisions and guidance for each resource into the separate management plans required by the Act.

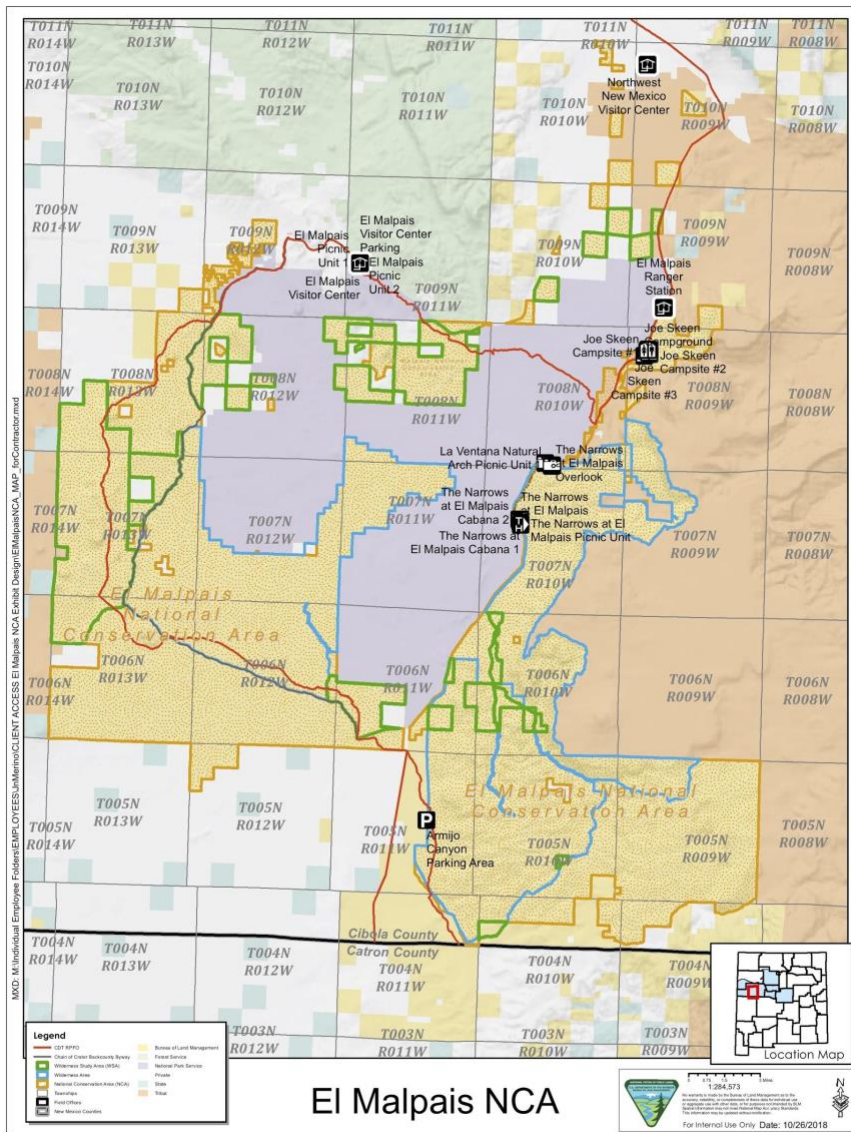


Figure 1: Map of the El Malpais National Conservation Area and surrounding lands.

1.3: Scientific mission of the unit

Science in BLM's NCL units is defined broadly as 'including basic and applied research in natural and social science, as well as inventory and monitoring initiatives' (USDI, BLM 2007a). In addition, within NCL 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' (USDI, BLM 2007a).

This Science Plan will be used as the basis for conducting science in El Malpais. Scientific efforts within El Malpais should support the objects and resources identified in the designating language including: geological, archeological, ecological, cultural, scenic, scientific, and wilderness resources of the public lands surrounding the Grants Lava Flows while allowing for the traditional uses of livestock grazing, and for trapping and hunting in accordance with applicable laws and regulations of the United States and the State of New Mexico. El Malpais National Conservation Area is a special designation area to be managed in accordance with NCL guidance. Scientific studies on El Malpais can provide information to managers and help ensure that the authorized uses do not negatively impact El Malpais's conservation mission or other objects of value.

Specifically, it is the scientific mission of El Malpais to:

- Allow and encourage pertinent science that can:
 - inform management decisions and evaluate management methods within El Malpais NCA;
 - improve and maintain ecosystem resiliency, function, and land health;
 - maintain diversity and viability of plant and animal populations;
 - use multiple lines of evidence to understand the impacts of human utilization of the landscape; and,
 - preserve and understand historically significant resources, including archaeological and paleontological sites.
- Allow and encourage long-term and short-term investigations.
- Allow scientific inquiry across diverse disciplines, as appropriate within El Malpais.
- Serve as a model system for surrounding areas, so that scientific findings can be exported to other federal and non-federal lands.

2: SCIENTIFIC BACKGROUND OF THE NATIONAL CONSERVATION LANDS UNIT

2.1: Completed research and science available for El Malpais

Research is considered for the following Science Areas: Recreation, Wilderness Management, Cultural Resources, Wildlife, Threatened and Endangered Species, General Vegetation (sub-sections on Invasive and Noxious Plants, Forests, Range, and Riparian), Soil/Water/Air, Fire and Fuels Management, Geology and Mineral Resources, and Paleontology

2.1.1: Recreation

BLM Point of Contact (POC): Jennifer Merino, Outdoor Recreation Planner

There is currently no completed recreation research or recreation science available for the El Malpais NCA.

2.1.2: Wilderness management

BLM POC: Jennifer Merino, Outdoor Recreation Planner

Topic: Measuring Attributes of Wilderness Character

Principal Investigators: RPFO Recreation Team

A multi-agency effort to monitor Wilderness character was initiated in 2010 as a means to comply with the law. The 1964 Wilderness Act (Wilderness Act P.L. 88-577) states that the agency responsible for administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area (Section 4(b)). Consultation among many agencies and partners resulted in creation of “Measuring Attributes of Wilderness Character; BLM Implementation Guide”, a strategic guide meant to define measures of Wilderness Character and the techniques needed to generate data for each measure. A report would be created describing the baseline of Wilderness Character (Untrammeled, Natural, Undeveloped, Solitude or Primitive and Unconfined Recreation, and Unique or Supplemental character) for each BLM administered Wilderness area. These indicators and their associated values are displayed in Table 1. As of March 2019, the West Malpais Wilderness Monitoring Report has been completed and the Cebolla Wilderness Monitoring Report still needs to be completed.

Table 1. West Malpais Wilderness Character Baseline and 5-year Data Report

Values are quantitative analyses of measures of Wilderness Character and were attained through various methodology described in “Measuring Attributes of Wilderness Character; BLM Implementation Guide Version 1.5” (USDI, BLM 2010).

| Measure | | Values |
|---------|---|----------|
| 1-1 | Number of authorized actions and persistent structures designed to manipulate plants, animals, pathogens, soil, water, or fire | 21 |
| 1-2 | Percent of natural fire starts that are manipulated within the boundaries of the wilderness | 0 |
| 1-3 | Number of unauthorized actions by agencies, citizen groups, or individuals that manipulate plants, animals, pathogens, soil, water, or fire | 0 |
| 2-1 | [Reserved.] | 2 |
| 2-2 | Abundance and distribution of non-native species | 4 |
| 2-3 | AUMs of livestock use inside wilderness | 4572.216 |
| 3-1 | Index of physical development for authorized or pre-designation structures and developments | 221.5 |
| 3-2 | Area and existing or potential impact of inholdings | 1521 |
| 3-3 | Type and amount of administrative and non-emergency use of motor vehicles, motorized equipment, and mechanical transport | 44 |
| 3-4 | Proportional use of motor vehicles, motorized equipment, and mechanical transport in emergency responses | 0 |

| | | | |
|-----|--|-----------------|---------------------|
| 3-5 | Type and amount of use of motor vehicles, motorized equipment, and mechanical transport not authorized by the federal land manager | 14 | |
| 4-1 | Amount of visitor use | 314 | |
| 4-2 | Area and Severity of wilderness affected by travel routes inside the wilderness | Area: 26,297 | Severity: 33,514 |
| 4-3 | Area and Severity of wilderness affected by developments that are within proximity of the wilderness | Area: 22,871 | Severity: 36,158 |
| 4-4 | Type and number of agency-provided recreation facilities | 56.7 | |
| 4-5 | Type and number of user-created recreation facilities | 30.6 | |
| 4-6 | Type and extent of management restrictions | 2 | |
| 5-1 | Severity of human-caused disturbances to cultural resources | 10 | |
| 5-2 | Index of the status of indigenous species that are listed, or are candidates for listing as threatened or endangered | 27 | |

2.1.3: Cultural Resources

BLM POC: Sean Daugherty, Archaeologist

The Planning Area is noted for its cultural resources. Archeological sites in this area span the past 12,000 years and are important for the scientific information they contain. At the same time, many of these same sites figure prominently in the history of several local American Indian tribes, and are very important in traditional cultural practices and beliefs. Other more recent sites provide links to the Hispanic and Anglo history of this area, including an active period of homesteading under the Stockraising Homestead Act. The BLM manages these resources for their information potential, for their public values, or for conservation.

The Malpais region and the area within and around the NCA first drew attention from historians and antiquarians in 1882 when A. F. Bandelier documented several sites in the area. This interest eventually led to several theses and dissertations being produced (Dittert 1949, Ruppe 1953 and Dittert 1959). Other scientific investigations into cultural resources of El Malpais also exist (Holmes 1989, Wozniak and Marshall 1991, and Elyea, Hogan and Wilson 1994). The Laboratory of Tree Ring Research at the University of Arizona has conducted dendrochronological studies of homesteads and logging operations, resulting in several Master's Theses. The University of Arizona has also conducted studies of arroyo downcutting using historic aerial photography and field studies.

Cultural resource inventories are usually conducted to satisfy the requirements of the National Historic Preservation Act. The inventories are meant to represent a good faith effort to protect resources from impacts from federally authorized actions. The inventories are classified as "Intensive" or "Class III", "Sample Inventory" or "Class II" lastly "Literature Review" or "Class I". 230,978.40 acres of the El Malpais NCA, 52,869 acres; or 21.7% of the total area, have been inventoried at the Class III level using a combination of Class II and Class III methodology. Many of the early inventories within the NCA would not be considered up to modern standards requiring ground truthing prior to being used in management decision making. A total of 113 inventories extend into or are contained within the boundaries of the NCA; additionally, the inventories have identified 805 sites extending into or wholly contained within the NCA as of the signing date of this document. Several locations within the NCA, including the Dittert site and several petroglyph panels, are open for public visitation and may be experiencing degradation from said visitation.

Several American Indian groups use the NCA for traditional religious and cultural practices. Acoma Pueblo and the Ramah Navajo Chapter have taken a strong interest in the BLM's management of the area; other tribes such as the Zuni Tribe, the Pueblo of Laguna, and the Alamo and To'Hajiilee Navajo chapters may also have concerns. Principal issues include access to sacred places and privacy for religious practices, as well as continued access to areas used for hunting, piñon picking, and gathering of other traditional plants and materials.

2.1.4: Wildlife

BLM POC: Joshua Freeman, Wildlife Biologist; Hailey Henck, AIM Crew Lead

Topic: **Raptor Surveys**

Principal Investigators: Havill and Havill (1988), Hawks Aloft (2004a, 2005)

Raptor survey efforts conducted by Havill and Havill (1988) established an inventory of nesting raptors and created a baseline inventory of raptors prevalent within the NCA. Habitats with high usage by raptors were documented and mapped (Havill and Havill 1988). Nest success rates as well as factors that may decrease nest productivity were documented. Hawks Aloft was subsequently contracted in 2004 and 2005 to conduct ground and aerial nest searches that may have been missed using prior methodologies (Hawks Aloft 2004, 2005). Nest locations were recorded in UTM's and current nest status determined. Hawks Aloft surveys from 2005 documented 2 burrowing owls and 3 burrowing owls within the NCA. Nesting raptor species documented within the study area were Golden Eagle (*Aquila chrysaetos*), Red-tailed Hawk (*Buteo jamaicensis*), Prairie Falcon (*Falco mexicanus*), and Peregrine Falcon (*Falco peregrinus*). Six active-nest sites documented in 2005 had a known outcome. These nests fledged a total of at least eight young; in addition, two nests displayed evidence that they were active.

Topic: **Breeding Bird Avian Malaria Study**

Principal Investigators: Marroquin-Flores (2017)

Fieldwork is being conducted in Pinyon-juniper woodland and ponderosa pine forest habitats and is the first comprehensive community level screening of avian malaria in New Mexico. Two objectives were identified in this cooperative agreement with the University of New Mexico: 1) Establish baseline inventory of avian communities occupying the pinyon-juniper woodlands and ponderosa pine forests within the NCA; 2) Collect blood samples to describe the avian malaria community and host-parasite relationships. Infection rates varied strongly among species, for example there was nearly universal infection among vireos and no infection among nuthatches (Marroquin-Flores 2017).

Topic: **Cebolla Canyon Restoration Area Small Mammal Survey**

Principal Investigator: Thibault and Perry (2010)

This survey effort was part of the ongoing riparian restoration efforts in Cebolla Canyon located within the NCA. Three different habitat types found within the canyon were surveyed for small mammals: 1) Dry reach upstream of Cebolla spring dominated by rabbitbrush; 2) Wetland area near Cebolla Spring; and 3) Location downstream of spring dominated by willows . Five rodent species were documented within the three survey efforts as well as a Townsend's big-eared bat (a BLM sensitive species). Surveys provided insight on the effectiveness of riparian restoration efforts and if changes to the ecosystem had any effect in bringing back native small mammal species to riparian reaches with increases in vegetation and water availability (Thibault and Perry 2010).

Topic: **Surveillance for White-Nose Syndrome (WNS) in the Bat Community** at El Malpais National Conservation Area and National Monument, and adjacent Cibola National Forests lands, NM

Principal Investigator: Ernest Valdez, USGS

In 2011, USGS conducted an assessment for the presence of WNS or the causative fungus (*Pseudogymnoascus destructans* or *Pd*) on El Malpais National Monument and NCA, and adjacent Cibola National Forest lands. During the late winter and early spring of 2011, the USGS initiated mist-netting efforts, resulting in the capture of 421 bats belonging to 8 species (E. Valdez, unpublished data). None of these bats showed evidence of the presence of *Pd* or WNS. Acoustic detectors were also employed at some sites, resulting in the detection of at least one species that was not captured in mist nets. Although efforts did not result in the detection of *Pd* or WNS, it was recommended that monitoring for this disease should continue.

Topic: **Surveillance for White-Nose Syndrome in lava tube caves on El Malpais NCA**

Principal Investigator: Diana Northup, University of New Mexico, Northup Microbiology Lab

In 2018, Northup and lab associates collected sediment samples inside a number of lava tube caves, and analyzed the samples for the presence of *Pd*. The samples tested negative for *Pd*, however samples from several lava tubes on El Malpais National Monument resulted in low level positives for the presence of *Pd* (D. Northup, unpublished data). These sites will be re-sampled and analyzed in 2019.

2.1.5: Threatened and Endangered Species and Sensitive Species

BLM POC: Marikay Ramsey, Threatened and Endangered Species Program Lead; Joshua Freeman, Wildlife Biologist.

Topic: **Small Mammal Community of El Malpais NCA**

Principal Investigator: Dunnam and Cook 2019; University of New Mexico

The project assessed the small mammal community at El Malpais NCA and adjacent El Malpais National Monument Lands (Dunnam and Cook 2019). The study is documenting the geographical extent and relative numbers of individuals of a colony of Gunnison's prairie dogs (*Cynomys gunnisoni*). The project will determine the efficacy of possible reintroductions of the federally endangered black-footed ferret (*Mustela nigripes*). Population size, abundance and density estimates of other small mammals present within the NCA are also being documented. Ectoparasite communities from all other species co-occurring with prairie dogs (e.g., grasshopper mice, ground squirrels, etc.) are being evaluated due to susceptibility of prairie dogs and black-footed ferrets to sylvatic plague caused by the bacterium *Yersinia pestis*. The project is a multi year effort and a final report and publication are anticipated to be completed at the beginning of the fiscal year 2020.

Topic: **Mountain Plover, Burrowing Owl, and Prairie Dog Surveys** at El Malpais National Conservation Area

Principal Investigator: Hawks Aloft 2004b, 2006, 2007

These surveys had three objectives: 1) Locate Mountain Plovers (*Charadrius montanus*) at El Malpais NCA ; 2) Locate Burrowing Owls (*Athene cunicularia*) and monitor reproductive success; and 3) Locate prairie dog colonies, determine status and estimate colony sizes. Seven active prairie dog colonies were mapped during 2004 survey efforts and were subsequently surveyed in 2006 and 2007. Colonies ranged in size from 7 acres to 1,957 acres. Prairie dogs estimated at each colony ranged from a low of 4 individuals to a high of 1,057 individuals. Surveys provided vital information on three bureau sensitive species, which BLM currently manages under BLM Manual 6840.

Topic: **Gunnison's Prairie Dog (*Cynomys gunnisoni*) Colony Enhancement** at El Malpais National Conservation Area

Principal Investigators: Rio Puerco Field Office Wildlife Biologists

In 2001 through the El Malpais Plan, the Rio Puerco Field Office determined that the Gunnison's Prairie Dog (GPD) habitat that exists within a portion of the El Malpais NCA had the capacity to support an enhanced prairie dog colony. The goal of augmenting this GPD colony was to provide greater opportunity for future reintroduction of the endangered black-footed ferret (*Mustela nigripes*). Promotion of a keystone species like GPD would also benefit the prairie grassland ecosystem and associated flora and fauna. The City of Santa Fe began to relocate GPDs in 2009, through a contracted relocater, who captured, quarantined, and transported prairie dogs from Santa Fe to multiple release sites on the NCA. As of summer 2013, approximately 2,500 GPDs had been relocated from Santa Fe to the NCA. Preliminary monitoring results in 2012 indicated that the relocation efforts had been successful and had increased the size of the active GPD population. The project was postponed in 2014 in order to evaluate the status of the population and determine the project's future direction.

2.1.6: General Vegetation Ecology

BLM POC: Hailey Henck, AIM Crew Lead

Topic: **BLM Terrestrial Assessment, Inventory, and Monitoring (AIM) Strategy Core**

Methods

Principal Investigator: AIM Crew, Rio Puerco Field Office and Southwest Conservation Corps
This project is an ongoing effort in response to a request from the Office of Management and Budget. The goal of AIM is to report the status, condition, trend, amount, location, and spatial pattern of vegetation and ecosystem conditions such as soil and site stability, watershed function, and biotic integrity. The second goal of AIM is to implement the data at multiple scales of management and across multiple resources including wildlife, range, forestry, soil, hydrology, and fuels management. Data collection for this project follows the *Monitoring Manual for Grassland, Shrubland, and Savanna Ecosystems Volume 1: Core Methods* (Herrick et al., 2017). AIM data collection within the El Malpais NCA began in 2017 and is ongoing until 2022 when all baseline data collection will be completed and will provide an overarching view of the current vegetation and ecosystem conditions across the NCA. AIM core methods can be used to analyze the status and trend of the NCA Resources of Value (ROV's), by starting with developing a crosswalk to identify AIM indicators to be used in ROVs trend analysis.

Topic: **Seeds of Success**

Principal Investigator: New Mexico State Office Seeds of Success Crew (incl. Zoe Davidson), Rio Puerco Field Office and Southwest Conservation Corps

Seeds of Success (SOS) is a national effort to collect wildland native seed for use in restoration and research. The main goal is to collect, conserve, and develop native plant materials to use in rehabilitating and restoring native ecosystems, which is a vital part of the BLM's Native Plant Materials Development program. Since 2015, New Mexico has employed SOS crews to collect genetically diverse, native plant seed across the state in conjunction with the Southwest Seed Partnership. Each year, crews visit El Malpais NCA to scout for priority grass, forb and shrub species in an effort to collect genetically diverse seed throughout the 8 ecoregions of New Mexico. Data collection follows the national Seeds of Success protocol which is guided by the [National Seed Strategy](#). SOS crews coordinate collection efforts based on evolving species target lists which change based on current restoration needs and seed demand.

Topic: **Pollinator Presence and Absence**

Principal Investigator: AIM Crew, Rio Puerco Field Office and Southwest Conservation Corps

This project is an ongoing effort in response to a request from the Office of Management and Budget. This project is conducted in conjunction with AIM (see above). The goal of the monitoring pollinator presence and absence is to identify valuable pollinator plant species and habitat and to record basic observations about groups of active pollinators. Data can be used to assess floral resource availability for pollinators, determine appropriate seed mixes, assess impacts of proposed actions on pollinators, track changes in phenology, document pollinator use of plants and plots, and more. Data collection for this project follows the *Pollinator Supplementary Indicator for AIM Protocol*. Pollinator presence and absence data collection within the El Malpais NCA began in 2017 and is ongoing until 2022 when all baseline data collection will be completed and will provide an overarching view of the presence and absence of pollinator species and pollinated plant species across the NCA.

2.1.6.1: Vegetation- Invasive and noxious plants

BLM POC: Alec Bryan, Range Management Specialist; Adam Belew, Range Management Specialist

Attention has been given to the invasion of salt cedar within the riparian areas (2018-present). Control efforts are being employed including cut-stump treatments (USDI, BLM 2007b; USDA FS 2010). Other aboveground control methods that may also be used include fire, mowing, grazing, and defoliating herbicides (USDA FS 2014). Mapping of all noxious plant infestations is an on-going activity within the El Malpais NCA. These mapped infestations are populated in a nationwide database that is available to the public via the National Invasive Species Information Management System (NISIMS; USDI BLM 2019; Will be V-map in the future). There is no cheatgrass (*Bromus tectorum*) mapped or reported as of yet on the NCA.

2.1.6.2: Vegetation- Forests and Woodlands

BLM POC: Jack River, Forester.

Topic: **Climate and fire history derived through dendrochronology**

Principal Investigator: Henri Grissino-Mayer, Graduate Research Associate, University of Arizona, Laboratory of Tree-Ring Research

Old-growth trees in and around the El Malpais NCA have been an important resource on understanding and mapping historic climatic conditions and fire intervals in the area through dendrochronology (Grissino-Mayer et al., 1997; Grissino-Mayer 1995; Lewis 2003). These data can assist in understanding how climate and fire intervals have changed over the years where data is available. As of 2019, there is no generally accepted scientific definition of old-growth. The Laboratory of Tree-Ring Research has 1,279 curated specimens from El Malpais National Monument (i.e. NPS lands) that includes *Pinus ponderosa*, *Pinus edulis*, *Psuedotsuga menziesii*, *Juniperus scopulorum*, *Juniperus monosperma*, *Quercus gambelii*, and *Populus tremuloides* dating in age from the years 1119 Common Era (CE) to 1991 CE (Brewer 2019).

Topic: **Forest stand delineation**

Principal Investigator: Patti Dappen, GIS Specialist, New Mexico Forest and Watershed Restoration Institute

The goal of this project was to delineate forest stands for BLM lands in the Malpais Region of

New Mexico. This report outlines the process used to delineate stands within the NCA and integrate it with the FORVIS database structure. The extent of the final stand boundaries includes 26 HUCs in an area greater than 689,000 acres within/around the NCA. The stand boundaries can be used within the FORVIS database structure and facilitate BLM project planning and analysis. The LANDFIRE vegetation descriptions can aid in the inventory and monitoring of vegetation. While there are some limitations with the LANDFIRE vegetation classification system, the FORVIS database structure is adaptable and easily edited. As more detailed vegetation classifications are developed the FORVIS tables can be modified. The FORVIS database structure allows for both general and detailed vegetation descriptions as well as updating of management events that may take place in the future. When treatments, such as thinning or controlled burns are applied on the landscape, the FORVIS database can be updated. Project funding was limited to this area of New Mexico but the procedures developed could easily be applied to other areas across the state (Dappen 2011). Although FORVIS has been replaced with EcoSurvey, the stand delineation results and processes to obtain them can still be applied for forest management in the NCA.

Topic: Ponderosa pine resilience to climate change

Principal Investigator: Breana Chavez, graduate student, University of New Mexico, Water Resources Program

This project was designed to understand the potential impacts of climate change on soil moisture and the resilience of ponderosa pine to drought (i.e. sensitivity to decreases in soil moisture) in the forested region of the Cebolla Canyon watershed (Cebolla). This project aims to help BLM managers understand how climate change is projected to impact ponderosa pine seedling establishment and mature ponderosa pine productivity in Cebolla. Soil moisture for all sites was interpreted relative to its θ_{crit} , a site specific soil moisture value that depends on soil properties and the minimum soil-water potential at which ponderosa pine can extract water from the soil. The results suggest that ponderosa pine resilience is low. It is possible that current thinning treatments have increased deeper soil moisture to a point where ponderosa pine survival is facilitated, but the impact of thinning treatments in the future remains uncertain and small changes in θ_{crit} significantly alter the projection of ponderosa pine resilience. Therefore, a monitoring program is recommended to obtain measured meteorological, soil moisture, and soil water potential data in Cebolla. These data would improve the BLM's understanding of soil moisture changes and projections for ponderosa pine resilience as the climate changes (Chavez 2016).

Topic: **Common stand exams**

Principal Investigator: Jack N. River, Forester, Rio Puerco Field Office, Bureau of Land Management

Common stand exams were conducted within the NCA in the years 2014-2015 and 2017 where tree height, stem diameter, species, crown ratio, and status (live or dead), among other overstory attributes, were collected. Downed woody material and vegetation plots were included in the 2017 dataset. These data are stored locally at the field office and are also contained in EcoSurvey, the Bureau's forest inventory database. These data allow managers to determine current and past conditions to guide forest management decisions for desired conditions.

2.1.6.3: Vegetation- Range

BLM POC: Alec Bryan, Range Management Specialist; Adam Belew, Range Management Specialist

There is minimal existing research on grazing specific to the El Malpais NCA. Grazing practices are predicated upon the standards and guidelines of rangeland health in accordance with state-specific and general federal guidelines (USDI 2001; USDI, BLM 2005). We also adhere to principles in Holecheck et al. (2011).

2.1.6.4: Vegetation- Riparian

BLM POC: Joshua Freeman, Wildlife Biologist. David Mattern, Hydrologist-Soil Water and Air;

Based on riparian improvement and protection opportunities in Cebolla Canyon, a number of on-the-ground riparian projects were conducted and documented in 2011 - 2014 with grant funding from the USEPA and the State of New Mexico. A partner watershed group, the Rio Puerco Management Committee, was instrumental in the planning and administration of the work. Fencing, in-stream structures, stream redirection, and short term inventory and monitoring were elements of these efforts designed to stabilize, improve, and expand the riparian and wetland areas. As required by the grantors, final reports and monitoring documentation were issued (NMED, 2014). Due to the short period of monitoring after the projects were completed, only limited conclusions on effects and long-term effectiveness of the projects could be made. Repeat-monitoring opportunities exist at documented monitoring sites for shallow ground water, photopoints, and stream morphology.

2.1.7: Soil/Water/Air

BLM POC: David Mattern, Hydrologist-Soil Water and Air

Topic: **Soil Survey**

Principal Investigator: USDA, Natural Resources Conservation Service.

The most recent soil survey covering the NCA was published in 1993 (USDA, 1993). The soil survey is useful for examining existing potential plant communities on the NCA landscape, and for understanding limitations and capabilities for other potential land management activities due to soil properties. The dominant soil erosion feature observed is the network of gully erosion in the alluvial valleys and swales throughout the NCA. As an erosion control measure, forest thinning slash is purposely placed in gullies under a contract provision for thinning projects. Contract provisions also have included scattering of thinning slash, conventionally known as lop-and-scatter. Upland soil stability at thinning sites probably is being improved due to likely increased herbaceous cover after thinning and the soil-covering effects of the slash itself. Soil moisture response to thinning and slash treatments was explored by Chavez (2016), as discussed in the ponderosa pine resiliency section above.

Topic: **Upland vegetation management: effects on soil moisture and associated site vegetation potential.**

Principal Investigator: Jacobs and Gatewood, 1999; Jacobs et al, 2002; Wood and Javed, 2001.

An emerging issue is whether or not thinning slash should be burned to meet fire behavior objectives or benchmarks, or be left in place for ecological objectives including erosion protection, soil thermal and moisture mitigation, and vegetation recovery, establishment, and resiliency. A number of studies (not within the NCA) bear out an increase in soil moisture availability from leaving thinning slash and forest residue on site (Jacobs and Gatewood, 1999; Jacobs et al, 2002; Wood and Javed, 2001). We need to determine "best practices" for managing thinning-generated slash to balance improvements in site stability and desired plant communities against meeting fuels and fire behavior objectives. In accordance with *Incorporating Assessment, Inventory, and Monitoring (AIM) for Monitoring Fuels Project Effectiveness* (USDI, BLM 2018), data gathered through AIM using both core and supplemental methods (as necessary) should be used to make sound decisions for the management of slash.

2.1.8: Fire and fuels management

BLM POC: Todd Richards, Fire Management Officer.

During the time period of 2000 to present woodland transects have been completed for all of the prescribed fire and thinning treatments within the NCA. Specific data research or science available for the El Malpais NCA currently covered within the sections on Vegetation, Forests, and Soil/Water/Air are also considered in fuels management decisions.

2.1.9: Geology and Mineral Resources

BLM POC: Calvin Parson, Geologist.

There are several geologically significant areas/features within the NCA. The geological features differ in character and range from sedimentary protoliths to igneous protoliths; they are the Chain of Craters, the Cliffs at the Narrows, the La Ventana Natural Arch, the Cerro Rendija, the Hole-in-the-Wall, and Cerritos de Jaspe.

Until Congress decides on the Approved Plan's wilderness suitability recommendations, the Chain of Craters and Canyons Wilderness Study Areas (WSA's) will be managed under the BLM Interim Management Policy (USDI, BLM 1995). There are no privately owned minerals in the Chain of Craters WSA, while ownership of minerals is a mixture of Federal and private in the Canyons WSA. As in the rest of the NCA Federal minerals in the WSAs were automatically withdrawn from the mining and mineral leasing laws by the El Malpais Act.

The El Malpais National Conservation Area was established by Congress on December 31, 1987 (PL 100-225, 100 STAT 1539, 16 USC 460uu) and all Federal lands within the monument and the conservation area and all lands and interests therein which are hereafter acquired by the United States are hereby withdrawn from all forms of entry, appropriation, or disposal under the public land laws and from location, entry and patent under the mining laws, and from operation of the mineral leasing and geothermal leasing laws and all amendments thereto (16 USC 460uu-46).

Topic: **Survey and Inventory of Lava Tube Cave #16 - El Malpais NCA**

Principal Investigators: Victor Polyak (UNM), Paula Provencio (UNM), and members of Sandia Grotto

The PIs and members of Sandia Grotto visited Lava Tube Cave #16 in January and July of 2004 in order to survey, inventory, and map the cave. Approximately 600 feet of the cave were surveyed in January, and an additional 300 feet of passage were surveyed in July. An inventory of a portion of the cave floor found it mostly covered with large breakdown blocks. Portions of the walls and ceiling were preserved with black and gold glazed lava drips, and several small skylights were documented. An additional survey and inventory trip was conducted in 2007, where several leads were pursued.

Topic: **Inventory of Cave Resources in Lava Tube Cave #16 - El Malpais NCA**

Principal Investigators: G. Atkinson, D. Decker, N. Woodward, D. Northup, and K. Ingham

A preliminary inventory of the cave resources observed in approximately half of Lava Tube Cave #16 was conducted in 2017. Notes, photos, and a map of the significant observations were included in the report. Significant observations recorded included archeological (hand torches, man-made dam), geological (lava benches, cave coral, lavacicles), biological (microbial mats, bat guano), and other (seasonal ice speleothems).

2.1.10: Paleontology

BLM POC: Sean Daugherty, Archaeologist.

Twelve known Paleontological locations are known within the NCA, all are from the late cretaceous. The NCA contains 125,234 acres of Potential Fossil Yield Class (PFYC) 1; mostly in the western reach of the NCA, 29,244 acres of PFYC 2 and 76,747 acres of PFYC 3. More survey and location identification is needed to aid management decision makers and avoid resource conflict.

2.2: Ongoing research and science on El Malpais

Notable ongoing research projects on the El Malpais NCA are highlighted in Table 2.

Table 2. Ongoing Research in the El Malpais NCA

| Science Area | Research Topic/Question | Research Description |
|-----------------------|---|--|
| Recreation | | None |
| Wilderness Management | | Ongoing - Wilderness Monitoring Reports for West Malpais Wilderness have been completed and will continue to be updated. Plans to complete Cebolla Wilderness Monitoring Report are in process and the report will be continuously updated after completion. |
| Cultural Resources | <i>How have small scale logging operations in the immediate post WWII period affected the landscape observed today?</i> | See Towner and Kessler 2016, and references therein. |
| Wildlife | <i>Documenting the arrival of Pd, the causative fungus of White Nose Syndrome; documenting the impact of Pd/WNS on bats and lava tube cave environments</i> | Ongoing research by Diana Northup (UNM), Marikay Ramsey (BLM), Ernie Valdez (USGS) |
| | <i>Documenting the small mammal community of the NCA</i> | Small Mammal Survey Work UNM population estimates forthcoming (Dunnam and Cook) |
| | <i>What is the current status of the turkey release project?</i> | Ongoing effort in coordination with NMDGF and Acoma. Nest success and survivability of relocated turkeys being monitored by Acoma Biologist |

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| Threatened and Endangered, and BLM Sensitive Species | <i>Can the NCA and surrounding area support sufficient prairie dogs to reintroduce black-footed ferrets?</i> | Ongoing - Small Mammal Survey Work UNM population estimates forthcoming (Dunnam and Cook) |
| | <i>What is the current status of the resident Gunnison's prairie dog colony re-introductions?</i> | Ongoing - Small Mammal Survey Work UNM population estimates forthcoming (Dunnam and Cook) |
| General Vegetation | <i>BLM Terrestrial AIM Strategy</i> | Continue collecting baseline data (to be completed during the 2022 field season). |
| | <i>Pollinator Presence and Absence</i> | Continue collecting baseline data (to be completed during the 2022 field season). |
| Vegetation- Invasive and noxious plants | | None |
| Vegetation- Forests and Woodlands | <i>Forest Structure</i> | Continue conducting forest stand exams to determine current conditions and changes over time and to prioritize stands for treatment through sales and thinnings/plantings as needed. |
| | <i>BLM Terrestrial AIM Strategy</i> | How can AIM collection be designed and the data used to guide management decisions? |
| Vegetation- Range | <i>BLM Terrestrial AIM Strategy</i> | How can AIM collection be designed and the data used to guide management decisions? |
| Vegetation- Riparian | | None |
| Soil/Water/Air | | None |
| Fire/fuels management | | None, beyond what is listed in Forests |
| Geology/Mineral Resources | | None |
| Paleontology | | None |

3: MANAGEMENT DECISIONS AND SCIENCE NEEDS

Table 3 describes desired future science needs and associated management decisions.

Table 3. Science Needs in the El Malpais NCA

| Science Area | Desired Research Topic/Question Description | Priority level within Science Area (High, Medium or Low) | Related Topic area/ Management Decision |
|-----------------------|--|--|---|
| Recreation | What will the impacts of increased visitation be on general NCA resources? | High | Visitor survey upcoming June to August 2019. |
| | What are the current visitation numbers at some of the main recreation sites? | High | Numbers are being collected for visitors to the Ranger Station on a daily basis as of opening in 2018. The hope is to install traffic counters at La Ventana Natural Arch Recreation Area, Joe Skeen Campground, The Narrows Picnic Area and South Narrows Rim Trailhead, and at the El Malpais Ranger Station. There are also plans to install visitor check in boxes at La Ventana Natural Arch Recreation Area, Joe Skeen Campground, The Narrows Picnic Area and South Narrows Rim Trailhead, Lobo Canyon Trailhead, Armijo Canyon Trailhead, Homestead Canyon Trailhead, West Malpais Hole-in-the-Wall Trailhead, and both CDT entry points along CR 42. |
| | What collections are available for loan for creation of exhibits and what security requirements are there for their use? | Medium | Tied to Cultural. |
| Wilderness Management | What is the current condition of wilderness characteristics within Cebolla Wilderness and West Malpais Wilderness? | High | Wilderness monitoring reports for each designated Wilderness will determine the current conditions and document future changes. |
| | How will increased visitation affect wilderness character? | High | Related to recreation. Project this summer for visitor surveys. |
| | What is the ecological role of fire/disturbance (historical or projected) in wilderness areas? | Low | Note the distinction between designated wilderness and wilderness study areas in terms of management |

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| | Has enough been done to preserve wilderness characteristics of Cebolla canyon, after stabilizing and restoring human impacts? | Medium | Riparian management |
| Cultural Resources | Where are homestead locations? | Medium | Fire management vulnerability |
| | Effects of prairie dog introductions on Cebolla community (early puebloan arc sites)? | High | Tied into wildlife |
| | What are the effects of visitation on cultural sites? | High | |
| | Can we digitize paper records? | Low | |
| | Land use changes from the prehistoric to present. | Medium | |
| | What collections are available for research and where are they housed? | Medium | |
| | Class III Cultural Resources inventory of the Cave systems. | Medium | |
| | What is the best management practice for evaluating and treating historic period sawmill waste piles that considers their historic value as well as the fire and other risks they may pose? | High | |
| Wildlife | What is the current status of the turkey release project? | Low | Wildlife Management |
| | What is the status of white-nose syndrome (WNS) on the NCA? | High | Sensitive Status Species , Wildlife Management, Recreation implications |
| | What are the effects of vegetation treatments on wildlife habitat? Particularly for big game and migratory birds e.g. Pinyon Jay | Medium | |
| | What would the effect be of bringing in honey bees? | Low | |
| | How are the presence of pollinated plant species and pollinator species changing over time? | Medium | This can be answered through the use of an ongoing AIM program which will begin resampling in 2022 (see "Vegetation" below) |

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| T&E and other Special Status Species | What is the current status of prairie dog populations within the NCA? | High | |
| | Can the current or projected future Gunnison prairie dog population support a re-introduction of Black-footed ferrets? What parameters are required to get there? | High | EI Malpais Plan/ RMP decision to be made |
| Vegetation | How are vegetation and ecosystem conditions changing over time? | High | This can be answered through the use of an ongoing AIM program which will finish baseline data collection in 2021. AIM points will start being resampled in 2022 and data from resampling will be compared against baseline data to assess changes over a 5-year time period. |
| | Research impacts of chemical treatments on browse | Low | |
| Invasive and noxious plants | What is the potential for creosote expansion/ invasion | Low | |
| Forests | What slash should be left in place vs burned for soil moisture dynamics? What are the impacts on herbaceous vegetation? | High | |
| | What are ponderosa pine regeneration dynamics? | Medium | Slash management effects (effects on soil moisture and temperature) |
| | Ponderosa pine trial plantings | Low | Conduct paired trial plantings - underneath slash vs. open area - controlled for slope position, aspect, etc. |
| | What are vegetation treatment effects on eventual fire severity and behavior? | Medium | Slash management effects |
| | How should forest stands be prioritized for treatments to maintain/improve forest health? How are we defining forest health (e.g. sustainable wood, resilience, habitat, fire behavior)? | High | Available product for firewood harvest? |
| Range | What is the extent of PJ encroachment into grasslands? How does this comport with historical range of variability? | Medium | As per Marikay Ramsay, NMSO: Associated and important questions before determining extent include: 1) Have these areas long been occupied by trees (and as what type: persistent woodland or savanna or wooded |

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| | | | shrubland), or was it definitely a former grassland or shrubland that was converted to woodland via tree expansion during the past 150 years? 2) What is the primary mechanism driving increasing tree density in these areas? Important because the expansion of pj is not well understood (see Romme et al. 2009). Mechanisms can include recovery from past, severe disturbance; natural, ongoing, Holocene range expansion; livestock grazing; fire exclusion; and effects of climatic and rising CO2, etc. |
| | Can we document PJ encroachment with repeat photography? | Medium | Note that Cynthia Herhahn, NMSO, has access to some slideshows from U of AZ with early photography around 20th century homesteads. |
| Riparian | Is upland management affecting the Cebolla Canyon riparian corridor? (e.g. through reduction in runoff, erosion, sediment transport) | Medium | Uplands management: especially forestry, fire/fuels. |
| Soil/Water/Air | What are the "best practices" for managing thinning-generated slash to minimize erosion and achieve our desired plant communities and their sustainability ? | High | The chief related topic is vegetation management and its effects on soil moisture and temperature dynamics. Can we better achieve our desired plant community through using thinning-generated slash as an asset to improve available soil moisture, while also meeting our hazardous fuels objectives? <u>Recommendations:</u> use data generated from AIM / Fuels monitoring (USDI BLM, 2018) to conduct fire behavior modeling to quantitatively determine whether fuelbed characteristics are hazardous or not. Conduct trial plantings of ponderosa pine in lopped-and-scattered slash beds. |
| Fire/fuels management | What is fire history and appropriate management targets for fire use in PJ? | High | Consider the different types of PJ woodlands (Romme et al. 2009), and their ecotones with PIPO. Also consider spatial patterns and landscape positions (Huffman et al. 2006), and suggested fire rotations of 300-400 years (Huffman et al 2008). |
| | What are the effects of slash removal through firewood on eventual fire effects in PJ? | High | Slash management effects |

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| | What are effects of slash treatments on eventual fire effects in Ponderosa pine? | High | Slash management effects |
| | What are the effects of slash on the probability of insect and disease outbreaks | Medium | Slash management effects |
| | Identify decay rates in PJ and Ponderosa Pine thinning treatments. | Medium | |
| | Identify indices and vegetation properties that contribute to the initiation of crown fire. | Medium | Recommendation: use data generated from AIM / Fuels monitoring (USDI BLM, 2018) to conduct fire behavior modeling to quantitatively determine whether fuelbed characteristics are hazardous or not. |
| Geology and Mineral Resources | None | NA | |
| Paleontology | Where are the paleo resources located? | Low | |

4: MEETING SCIENCE NEEDS

A Cooperative Ecosystem Study Units (CESU) framework exists for El Malpais. The CESU Network is a national consortium of federal agencies, tribes, academic institutions, state and local governments, nongovernmental conservation organizations, and other partners working together to support informed public trust resource stewardship. The BLM will adhere to the Federal Agency Roles and Responsibilities as described in the CESU MOU 2017-2023 to the extent possible based on available resources.

4.1. Internal Organization

An effective internal organization is necessary to strategically identify and address science in El Malpais. The internal organization is effective if it promotes **interdisciplinary** awareness among staff and scientists. Specifically, communication around management on the NCA among scientists and management specialists in different disciplines is critical for successful incorporation of science.

The NCA Manager and Field Office Manager will serve as the overarching managers of scientific inquiries on the NCA. The role of El Malpais Science Coordinator will be fulfilled by the NCA Manager. The Science Coordinator will work directly with the Field Office Manager to assist in this process, collaborating with appropriate BLM staff in the Rio Puerco Field Office and at the BLM New Mexico State Office, and with other science partners. The roles of the Science Coordinator in relation to scientific inquiries on El Malpais are:

- Serving as the point of contact for scientific inquiries, from both internal and external sources. Scientific inquiry proposals must be submitted in writing to the science coordinator.
- Distributing information about new and ongoing research to the Interdisciplinary (ID) Team.
- Coordinating the processing of research permits for the NCA by working with resource specialists on at the Rio Puerco Field Office or NMSO to (if applicable): identify the issues in conducting the research; ensure appropriate planning, environmental and wilderness reviews are in place; and ensure appropriate mitigation measures and research permit stipulations are implemented. If appropriate, the El Malpais Science Coordinator will also prepare the research permit for signature by the Field Manager or the authorized officer (See section Section 5.2). Note that there may be instances when issuance of a permit for scientific research is best issued by a specific resource specialist, under whom the research areas falls under. Contact information for these employees is listed in Section 11.
- Coordinating internal/external scientific inquiries with the Field Office Manager.
- Coordinating the inquiry process with the applicant and other scientific partner, if necessary.
- When appropriate, coordinating the process of requesting, administering, and utilizing BLM funds for proposed inquiries.

4.2. Collaboration and Partnerships

- Collaboration and open communication with existing and potential science partners is critical to the success of implementing the Science Plan. This collaboration will ensure that research on El Malpais is pertinent to the protection of NCA objects and future management decisions.
- Cooperative Ecosystem Study Units (CESUs) enable effective collaboration with universities. El Malpais has a number of CESUs.

- Current Scientific Partnerships with El Malpais NCA:
 - University of Arizona Laboratory for Tree Ring Research (This partnership is active, but does not have an active assistance agreement as of 2019).
 - University of New Mexico Biological Sciences Department

5: SCIENCE PROTOCOLS

5.1. General Science Guidelines

- Scientific inquiries will comply with current and relevant agency laws and regulations.
- Scientific research should not detrimentally impact the long term health or sustainability of NCA objects or other resources of El Malpais.
- Scientists initiating research projects within El Malpais must be aware of existing data within the BLM and should incorporate these data into projects whenever possible.
- Proposed research within the El Malpais should comply with appropriate laws and regulations.
- Proposed research will follow 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 Science Coordinator in order to proceed (Section 5.2).
- All scientific inquiries will be presented to the ID team for review.

5.2. Authorization and tracking process

- Proposals, including those from the Research and Stewardship Partnership, will be submitted to the El Malpais Science Coordinator. Archaeological and Paleontological research that proposes removal and/or destruction of artifacts or specimens will require approval from the appropriate Deputy State Director from the New Mexico BLM State Office and either an ARPA or PARPA permit.
 - The proposal (not to exceed 3 pages) will include the following:
 - Contact information of the principal investigator;
 - Background information of the question being studied (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 NCA Manager will review the proposal for completeness and consult with the appropriate BLM resource specialists to determine the scientific validity and integrity of the proposal, and potential impacts to resource and resource uses.
- The NCA Manager will brief the Field Manager upon receipt of request to conduct research. In coordination with the NCA Manager, the Field Manager will determine whether the proposal:
 - Is consistent with this Science Plan;
 - Meets El Malpais' scientific mission (see Section 1);
 - Conforms with the El Malpais Plan 2001; 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 NCA Manager will coordinate with the partnership to ensure it meets the goals and objectives of the partnership.
- If the proposal is not accepted, the Field Manager will provide written notification and justification to the applicant of the decision as soon as practical.
- If the proposal is accepted:
 - The Field Manager will determine what, if any, NEPA analysis is required to carry out inquiry.
 - If a Categorical Exclusion or an 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 El Malpais 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. The permit will be returned to the Field Manager for final signature and approval unless the permit falls under one of the following:
 - Archaeological and Paleontological research that proposes excavation/removal and/or destruction of artifacts or specimens will require approval from the appropriate Deputy State Director from the New Mexico BLM State Office and either an ARPA or PARPA permit.
- Reporting for all scientific investigations will require:
 - Annual progress reports to be filed with the NCA Manager and appropriate BLM resource specialist.
 - A final report that includes an executive summary, research background and results; results' relevance to El Malpais management; public outreach efforts; 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.

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 and Tracking

- All reports described in Section 5 will be stored, organized, and shared on a share drive or sharepoint site, accessible to all staff on the Rio Puerco Field Office. The Science Coordinator should strive to organize periodic presentations of scientific results to Field Office staff.
- A separate project file shall be set up for each research proposal received with all associated documents stored in this location.

- A tracking spreadsheet will be set up by Fiscal year on the shared drive to track project status of each proposal received within that Fiscal Year.
- All internal communications will be shared with the ID team.

6.3. Communication to the Broader BLM Organization

- The NCA 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 NCA annual report.

6.4. Communication of Scientific Results to the Public

- The NCA Manager, in coordination with the State Public Affairs Specialist, will strive to make information on science projects within the EI Malpais NCA accessible to the general public. This includes posting updates on the EI Malpais NCA'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.

7: INTEGRATING SCIENCE INTO MANAGEMENT

7.1. Communications

- Direct communication between the District Manager, Field Manager, NCA Manager, Science Coordinator, scientist, and ID team.
- It is the responsibility of the Science Coordinator to ensure that scientific findings are communicated to the Field Manager, NCA Manager, the District Manager and the State Office via methods outlined in Section 6. Subsequently, the managers will be able to use the scientific information, as appropriate, in management decisions related to the EI Malpais NCA.

7.2. Integration

- Integrating scientific findings into management decisions should not end scientific inquiry into a specific topic.
- Science will be integrated into management decisions, particularly during the NEPA process, contract specifications, and terms and conditions language on permitting, to the best ability while working within existing policy and regulatory guidelines.
- Using science in the decision making process should provide an opportunity to identify future science needs to adaptively manage for certain objectives.

8: SCIENCE PLAN REVIEW AND APPROVAL

8.1 SIGNATURE PAGE

I affirm that I have read and understand approve the 2019 Science Plan for the El Malpais National Conservation Area.

This plan will be used as the basis for conducting science in El Malpais National Conservation Area. "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 El Malpais National National Conservation Area, and the Bureau of Land Management.

| | |
|--|------|
| Name Field Manager Rio Puerco Field Office | Date |
|--|------|

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| Name National Conservation Area Manager Rio Puerco Field Office | Date |
|---|------|

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| Name New Mexico NCL Lead New Mexico State Office | Date |
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8.2: Report Contributors:

BLM: Adam Belew, Adam Lujan, Alec Bryan, Angel Martinez, Calvin Parson, Cassandra Owen, David Mattern, Elaine Lopez, Hailey Henck, Jack River, Jennifer Merino, Joseph Pruitt, Joshua Freeman, Marikay Ramsey, McKinney Briske, Sean Daugherty, Todd Richards, Carin Farley

USGS: Jens Stevens, Ellis Margolis, Ernie Valdez

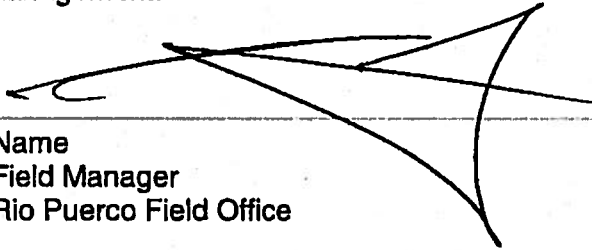
SECTION 8: SCIENCE PLAN REVIEW AND APPROVAL

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Name
Field Manager
Rio Puerco Field Office

9-10-2019


Date



Name
National Conservation Area Manager
Rio Puerco Field Office

9-10-19

Date



Name
New Mexico NCL Lead
New Mexico State Office

9-10-19

Date

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USGS: Jens Stevens, Ellis Margolis, Ernie Valdez

9: BIBLIOGRAPHY

Brewer, Peter. 2019. "Records and Research (Completed & on-going)." Received by Jack N River, Records and Research (Completed & on-going), 14 Mar. 2019.

Chavez, B. N. 2016. Predictions of Ponderosa Pine Resiliency to Climate Change in the Cebolla Canyon Watershed, New Mexico (Master's thesis, University of New Mexico, 2016).
Albuquerque: University of New Mexico.

Dappen, Patti. 2011. Automated Stand Delineation for FORVIS. A Case Study in the El Malpais Region of New Mexico. New Mexico Forest and Watershed Restoration Institute.

Dittert, Alfred E., Jr. 1949. The Prehistoric Population and Architecture of the Cebolleta Mesa Region, Central Western New Mexico. Masters Thesis. University of Arizona.

Dittert, Alfred E., Jr. 1959. Cultural Change in the Cebolleta Mesa Region Central Western New Mexico. Doctoral Dissertation. University of Arizona.

Dunnum, Jonathan L. and Joseph A. Cook. 2019. Mammals of El Malpais Prairie Ecosystem. Museum of Southwestern Biology, University of New Mexico. Bureau of Land Management: Rio Puerco Field Office, Albuquerque New Mexico.

Elyea, Janette et al. 1994. The Armijo Canyon Archeological Survey. UNM Office of Contract Archeology.

Grissino - Mayer, Henri Dee. 1995. Tree-Ring Reconstruction of Climate and Fire History at El Malpais National Monument, New Mexico. Doctoral Dissertation. University of Arizona.

Grissino-Mayer, H. D., Swetnam, T. W., & Adams, R. K. 1997. The rare, old-aged conifers of El Malpais - Their role in understanding climatic change in the American Southwest (pp. 155-161, Publication No. 156). NM: New Mexico Bureau of Mines & Mineral Resources.

Havill, Steve and Kathleen Havil. 1988. Raptor Inventory of El Malpais. US Bureau of Land Management, Albuquerque New Mexico.

Hawks Aloft Inc. 2004a. Raptor Nesting Surveys on BLM Lands of the San Luis Mesa/Rio Puerco and El Malpais Areas.

Hawks Aloft Inc. 2004b. Mountain Plover, Burrowing Owl, and Prairie Dog Observations at El Malpais National Conservation Area.

Hawks Aloft Inc. 2005. Raptor Nesting Surveys on BLM Lands of the San Luis Mesa/Rio Puerco and El Malpais Areas.

Hawks Aloft Inc. 2006. Mountain Plover, Burrowing Owl, and Prairie Dog Observations at El Malpais National Conservation Area.

Hawks Aloft Inc. 2007. Mountain Plover, Burrowing Owl, and Prairie Dog Observations at El Malpais National Conservation Area.

Herrick, Jeffrey E., Justin W. Van Zee, Sarah E. McCord, Ericha M. Courtright, Jason W. Karl, and Laura M. Burkett. 2017. Monitoring Manual for Grassland, Shrubland, and Savannah Ecosystems Volume 1: Core Methods (2 ed.). USDA - ARS Jornada Experimental Range, Las Cruces, NM.

Holecheck, Jerry L. et al. 2011. Range Management: Principles and Practices, Sixth Edition. Prentice Hall Publishers.

Holmes, Barbara E. 1989. American Indian Land Use of El Malpais. UNM Office of Contract Archeology.

Huffman, David W. and Fule, Peter Z. and Pearson, Kristen M. and Crouse, Joseph E. and Covington, W. Wallace (2006) Pinyon-juniper fire regime: Natural range of variability. Technical Report. NAU Ecological Restoration Institute, Flagstaff, United States.

Huffman, David W., Fulé, Peter Z., Pearson, Kristen M., and Crouse, Joseph E. (2008) Fire history of pinyon–juniper woodlands at upper ecotones with ponderosa pine forests in Arizona and New Mexico. Canadian Journal of Forest Research, 2008, 38(8): 2097-2108.

Jacobs, B.F., and R.G. Gatewood. 1999. Restoration Studies in Degraded Pinyon Juniper Woodlands of North-Central New Mexico. USDA Forest Service Proceedings RMRS-P-9.

Jacobs, B.F., et al. 2002. Watershed Restoration in Degraded Piñon-Juniper Woodlands: A Paired Watershed Study 1996-98(9) FINAL REPORT TO: USGS-BRD RESEARCH / NPS-NATURAL RESOURCE PRESERVATION PROGRAM.

Lewis, Daniel B. 2003. Fire regimes of kipuka forests in El Malpais National Monument, New Mexico. Master's Thesis, University of Tennessee, 2003.

Marroquin-Flores, R. A., J. L. Williamson, A. N. Chavez, S. M. Bauernfeind, M. J. Baumann, C. R. Gadek, A. B. Johnson, J. M. McCullough, C. C. Witt, and L. N. Barrow. 2017. Diversity, abundance, and host relationships of avian malaria and related haemosporidians in New Mexico pine forests. *PeerJ* 5:e3700.

New Mexico Environment Department (NMED). 2014. Letter of transmittal accompanying delivery of digital environmental and monitoring data for USEPA and NMED grant-funded Cebolla Canyon projects. NMED Watershed Protection Section, 2p.

Ruppe, Reynold J., Jr. 1953. The Acoma Culture Provenance: an Archaeological Concept. Doctoral Thesis. Harvard University.

Thebault, Katherine M. and Travis W. Perry. 2010. Preliminary Small Mammal Survey. Bureau of Land Management, Albuquerque New Mexico.

Towner, Ronald H., and Nicolas V. Kessler. 2016. Slash and Trash: Dendroarchaeological and Ecological Inferences from a Twentieth-Century Logging Camp in Western New Mexico. *International Journal of Historical Archaeology* 20(2):249-263.

United States Department of Agriculture, Soil Conservation Service. 1993. Soil Survey of Cibola Area, New Mexico, Parts of Cibola, McKinley, and Valencia Counties. Available at: <https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>

United States Department of Agriculture, Forest Service. 2010. Field Guide for Managing Salt Cedar. TP-R3-16-2, January 2010, Southwestern Region.

United States Department of Agriculture, Forest Service. 2014. Field Guide for Managing Salt Cedar. TP-R3-16-2, September 2014, Southwestern Region. Available at:
https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5410127.pdf

United States Department of the Interior, Bureau of Land Management. 2019. Weeds and Invasives. NISIMS DATABASE <https://www.blm.gov/programs/natural-resources/weeds-and-invasives/nisims-database>

United States Department of the Interior. 2001. Standards for Public Land Health and Guidelines for Livestock Grazing in New Mexico.
<https://www.blm.gov/sites/blm.gov/files/Standards%20for%20Public%20Land%20Health%20and%20Guidelines%20for%20Livestock%20Grazing%20in%20New%20Mexico.pdf>

United States Department of the Interior, Bureau of Land Management. 2001. The El Malpais Plan: A Stand-Alone Management Plan for El Malpais National Conservation Area and Adjoining Lands.

United States Department of the Interior, Bureau of Land Management. 2005. Interpreting Indicators of Rangeland Health. Technical reference 1734-6 Version 4, 2005. In partnership with USGS, USDA, ARS.

United States Department of the Interior, Bureau of Land Management. 2007a. Bureau of Land Management National Landscape Conservation System Science Strategy. Washington D.C.: U.S. Department of the Interior, Bureau of Land Management, National Landscape Conservation System.

United States Department of the Interior, Bureau of Land Management. 2007b. Final Vegetation Treatments on BLM Lands in 17 Western States. Programmatic Environmental Report.

United States Department of the Interior, Bureau of Land Management. 2008. Bureau of Land Management Science Strategy. Denver: U.S. Department of Interior, Bureau of Land Management, Printed Materials Services.

United States Department of the Interior, Bureau of Land Management. 2010. Measuring Attributes of Wilderness Character: BLM Implementation Guide 1.5.

United States Department of the Interior, Bureau of Land Management. 2018. Incorporating Assessment, Inventory, and Monitoring (AIM) for Monitoring Fuels Project Effectiveness - Guidebook.

Wilderness Act. Pub. L. 88-577 (16 U.S.C. 1131-1136). 88th Congress, Second Session. 3 September 1964.

Wood, M.K., and N. Javed. 2001. Hydrologic and Vegetal Responses to Fuelwood Harvest and Slash Disposal in a Pinyon Pine and Juniper Dominated Grassland. Department of Animal and Range Science and Range Improvement Task Force, New Mexico State University, Department of Animal and Range Sciences, New Mexico State University. Miscellaneous Report No. M27. New Mexico Water Resources Research Institute.

Wozniak, Frank E. Marshall, Michael P. (1991). The Prehistoric Cebolla Canyon Community: An Archeological Class III Inventory of 320 Acres of BLM Land at the Mouth of Cebolla Canyon.

10: UNIT'S LEGISLATION

PUBLIC LAW 100-225----DECEMBER 31, 1987

Public Law 100-225

100th Congress

An Act

To establish the El Malpais National Monument and the El Malpais National Conservation Area in the State of New Mexico, to authorized the Masau Trail, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

TITLE I –EL MALPAIS NATIONAL MONUMENT ESTABLISHMENT OF MONUMENT

Sec.101. (a) In order to preserve, for the benefit and enjoyment of present and future generations that area in western New Mexico containing the nationally significant Grants Lava Flow, the Las Ventanas Chacoan Archeological Site, and other significant natural and cultural resources, there is hereby established the El Malpais National Monument (hereinafter referred to as the “monument”). The monument shall consist of approximately 114,000 acres as generally depicted on the map entitled “El Malpais National Monument and National Conservation Area” numbered NM-ELMA-80,001-B and dated May 1987. The map shall be on file and available for public inspection in the offices of the Director of the National Park Service, Department of the Interior.

(b) As soon as practicable after the enactment of this Act, the Secretary of the Interior (hereinafter referred to as the “Secretary”) shall file a legal description of the monument with the Committee on Interior and Insular Affairs of the United States House of Representatives and with the Committee on Energy and Natural Resources of the United States Senate. Such legal description shall have the same force and effect as if included in this Act, except that the Secretary may correct clerical and typographical errors in such legal description and in the map referred to in subsection (a). The legal description shall be on file and available for public inspection in the offices of the Director of the National Park Service, Department of the Interior.

TRANSFER

Sec.102. Lands and waters and interests therein within the boundaries of the monument, which as of the day prior to the date of enactment of this Act were administered by the Forest Service, United States Department of Agriculture, are hereby transferred to the administrative jurisdiction of the Secretary to be managed as part of the Monument in accordance with this Act. The boundaries of the Cibola National Forest shall be adjusted accordingly.

MANAGEMENT

Sec.103. The Secretary, acting through the Director of the National Park Service, shall manage the monument in accordance with the provisions of this Act, the Act of August 25, 1916 (39 Stat. 535;16 U.S.C. 1 et seq.), and other provisions of law applicable to units of the National Park System. The Secretary shall protect, manage, and administer the monument for the purposes of preserving the scenery and the natural, historic, and cultural resources of the monument and providing for the public understanding and enjoyment of the same in such a manner as to perpetuate these qualities for future generations.

PERMITS

Sec.104. Where any lands included within the boundary of the monument on the map referred to in subsection 101(a) are legally occupied or utilized on the date of enactment of this Act for grazing purposes, pursuant to a lease, permit, or license which is—

- (a) for a fixed term of years issued or authorized by any department, establishment, or agency of the United States, and
- (b) scheduled for termination before December 31, 1997, the Secretary, notwithstanding any other provision of law, shall allow the persons holding such grazing privileges (or their heirs) to retain such grazing privileges until December 31, 1997, subject to such limitations, conditions, or regulations as the Secretary may prescribe to insure proper range management. No grazing shall be permitted on lands within the boundaries of the monument on or after January 1, 1998.

TITLE II—MASAU TRAIL DESIGNATION OF TRAIL

Sec.201. In order to provide for public appreciation, education, understanding, and enjoyment of certain nationally significant sites of antiquity in New Mexico and eastern Arizona which are accessible by public road, the Secretary, acting through the Director of the National Park Service, with the concurrence of the agency having jurisdiction over such roads, is authorized to designate, by publication of a description thereof in the Federal Register, a vehicular tour route along existing public roads linking prehistoric and historic cultural sites in New Mexico and eastern Arizona. Such a route shall be known as the Masau trail (hereinafter referred to as the “trail”).

AREAS INCLUDED

Sec.202. The trail shall included public roads linking El Malpais National Monument as established pursuant to title I of this Act, El Morro National Monument, Chaco Cultural National Historical Park, Aztec Ruins National Monument, Canyon De Chelly National Monument, Pecos National Monument, and Gila Cliff Dwellings National Monument. The Secretary may, in the manner set forth in Section 201, designate additional segments of the trail from time to time as appropriate to link the foregoing sites with other cultural sites or sites of national significance

when such sites are designated and protected by Federal, State, or local governments, Indian tribes, or nonprofit entities.

INFORMATION AND INTERPRETATION

Sec.203. With respect to sites linked by segments of the trail which are administered by other Federal, State, local, tribal, or nonprofit entities, the Secretary may, pursuant to cooperative agreements with such entities, provide technical assistance in the development of interpretive devices and materials in order to contribute to public appreciation of the natural and cultural resources of the sites along the trail. The Secretary, in cooperation with State and local governments, Indian tribes, and nonprofit entities, shall prepare and distribute informational material for the public appreciation of sites along the trail.

MARKERS

Sec.204. The trail shall be marked with appropriate markers to guide the public. With the concurrence and assistance of the State or local entity having jurisdiction over the roads designated as part of the trail, the Secretary may erect thereon and maintain signs and other informational devices displaying the Masau Trail Marker. The Secretary is authorized to accept the donation of suitable signs and other informational devices for placement at appropriate Locations.

TITLE III ---EL MALPAIS NATIONAL CONSERVATION AREA ESTABLISHMENT OF AREA

Sec.301. (a) In order to protect for the benefit and enjoyment of future generations that area in western New Mexico containing the La Ventana Natural Arch and the other unique and nationally important geological, archeological, ecological, cultural, scenic, scientific, and wilderness resources of the public lands surrounding the Grants Lava Flows, there is hereby established the El Malpais National Conservation Area (hereinafter referred to as the "conservation area"). The conservation area shall consist of approximately 262,690 acres of federally owned land as generally depicted on a map entitled "El Malpais National Monument and National Conservation Area" numbered NM-ELMA-80,001-B and dated May 1987. The map shall be on file and available for inspection in the offices of the Director or the Bureau of Land Management of the Department of the Interior.

b) As soon as practicable after the date of enactment of this Act, the Secretary shall file a legal description of the conservation area designated under this section with the Committee on Energy and Natural Resources of the United States Senate and the Committee on Interior and Insular Affairs of the United States House of Representatives. Such legal description shall have the same force and effect as if included in this Act, except that the Secretary may correct clerical and typographical errors in such legal description. The legal description shall be on file and available for public inspection in the offices of the Director of the Bureau of Land Management, Department of the Interior.

MANAGEMENT

Sec.302. (a) The Secretary, acting through the Director of the Bureau of Land Management, shall manage the conservation area to protect the resources specified in section 301 and in accordance with this Act, the Federal Land Management and Policy Act of 1976 and other applicable provisions of law, including those provisions relating to grazing on public lands.

(b) The Secretary shall permit hunting and trapping within the conservation area in accordance with applicable laws and regulations of the United States and the State of New Mexico; except that the Secretary, after consultation with the New Mexico Department of Game and Fish, may issue regulations designating zones where and establishing periods when no hunting or trapping shall be permitted for reasons of public safety, administration, or public use and enjoyment.

(c) Collection of green or dead wood for sale or other commercial purposes shall not be permitted in the conservation area.

(d) Except as otherwise provided in section 402(b), within the conservation area the grazing of livestock shall be permitted to continue, pursuant to applicable Federal law, including this Act, and subject to such reasonable regulations, policies, and practices as the Secretary deems necessary.

TITLE IV –WILDERNESS DESIGNATION OF WILDERNESS

Sec. 401.(a) In furtherance of the purposes of the Wilderness Act (78 Stat. 890; 16 U.S.C. 131), there are hereby designated as wilderness, and therefore, as components of the National Wilderness Preservation System, the Cebolla Wilderness of approximately 60,000 acres, and the West Malpais Wilderness of approximately 38,210 acres, as each is generally depicted on the map entitled “El Malpais National Monument and National Conservation Area” numbered NM-ELMA-80,001-B and dated May 1987. The map shall be on file and available for inspection in the offices of the Director of the Bureau of Land Management, Department of the Interior.

(b) As soon as practicable after the date of the enactment of this Act, the Secretary shall file a legal description of each wilderness area designated by this Act with the Committee on Interior and Insular Affairs of the United States House of Representatives and with the Committee on Energy and Natural Resources of the United States Senate. Such legal description shall have the same force and effect as if included in this Act, except that the Secretary may correct clerical and typographical errors in such legal description. The legal description shall be on file and available for public inspection in the offices of the Director of the Bureau of Land Management, Department of the Interior.

MANAGEMENT

Sec. 402. (a) Subject to valid existing rights, each wilderness area designated under this Act shall be administered by the Secretary, through the Director of the Bureau of Land Management, in accordance with the provisions of the Wilderness Act governing areas

designated by that Act as wilderness, except that any reference in such provisions to the effective date of the Wilderness Act shall be deemed to be a reference to the date of enactment of this Act.

(b) Within the wilderness areas designated by this Act, the grazing of livestock, where established prior to the enactment of this Act, shall be permitted to continue subject to such reasonable regulations, policies, and practices as the Secretary deems necessary, as long as such regulations, policies, and practices fully conform with and implement the intent of Congress regarding grazing in such areas as such intent is expressed in the Wilderness Act and section 108 of Public Law 96-560 (16 U.S.C. 1133 note).

TITLE V – GENERAL PROVISIONS MANAGEMENT PLANS

Sec.501. (a) Within three full fiscal years following the fiscal year of enactment of this Act, the Secretary shall develop and transmit to the Committee on Interior and Insular Affairs of the United States House of Representatives and the Committee on Energy and Natural Resources of the United States Senate, separate general management plans for the monument and conservation area which shall describe the appropriate uses and development of the monument and the conservation area consistent with purposes of this Act. The plans shall include but not be limited to each of the following:

- (1) implementation plans for a continuing program of interpretation and public education about the resources and values of the monument and the conservation area;
- (2) proposals for public facilities to be developed for the conservation area or the monument, including a visitors center in the vicinity of Bandera Crater and a multi-agency orientation center, to be located in or near Grants, New Mexico, and adjacent to Interstate 40, to accommodate visitors to western New Mexico;
- (3) natural and cultural resources management plans for the monument and the conservation area, with a particular emphasis on the preservation and long-term scientific use of archeological resources, giving high priority to the enforcement of the provisions of the Archeological Resources Protection Act of 1979 and the National Historic Preservation Act within the monument and the conservation area. The natural and cultural resources management plans shall be prepared in close consultation with Advisory Council on Historic Preservation, the New Mexico State Historic Preservation Office, and the local Indian people and their traditional cultural and religious authorities; and such plans shall provide for long-term scientific use of archaeological resources in the monument and the conservation area, including the wilderness areas designated by this Act; and
- (4) wildlife resources management plans for the monument and the conservation area prepared in close consultation with appropriate departments of the State of New Mexico and using previous studies of Area.

(b)(1) The general management plan for the conservation area shall review and recommend the suitability or non-suitability for preservation as wilderness of those lands comprising approximately 17,468 acres, identified as “Wilderness Study Area” (hereafter in this title referred to as the “WSA”) on the map referenced in section 101.

(2) Pending submission of a recommendation and until otherwise directed by an Act of Congress, the Secretary, acting through the Director of the Bureau of Land Management, shall manage the lands within the WSA so as to maintain their potential for inclusion within the National Wilderness Preservation System.

(c)(1) The general management plan for the monument shall review and recommend the suitability or non-suitability for preservation as wilderness of all roadless lands within the boundaries of the monument as established by this Act except those lands within the areas identified as “potential development areas” on the map referenced in section 101.

(2) Pending the submission of a recommendation and until otherwise directed by Act of Congress, the Secretary, through the Director of the National Park Service, shall manage all roadless lands within the boundaries of the monument so as to maintain their potential for inclusion in the National Wilderness Preservation System, except those lands within the areas identified as “potential development areas” on the map referenced in section 101.

ACQUISITIONS

Sec. 502. Within the monument and the conservation area, the Secretary is authorized to acquire lands and interests in lands by donation, purchase with donated or appropriated funds, exchange, or transfer from any other Federal agency, except that such lands or interests therein owned by the State of New Mexico or a political subdivision thereof may be acquired only by exchange. It is the sense of Congress that the Secretary is to complete the acquisition of non-Federal subsurface interests underlying the monument and the conservation area no later than three full fiscal years after the fiscal year of enactment of this Act.

STATE EXCHANGES

Sec. 503. (a) Upon the request of the State of New Mexico (hereinafter referred to as the “State”) and pursuant to the provisions of this section, the Secretary shall exchange public lands or interests in lands elsewhere in the State of New Mexico, of approximately equal value and selected by the State, acting through its Commissioner of Public Lands, for any lands or interests therein owned by the State (hereinafter referred to as “State lands”) located within the boundaries of the monument or the conservation area which the State wishes to exchange with the United States.

(b) Within six months after the date of enactment of this Act, the Secretary shall notify the New Mexico Commissioner of Public Lands what State lands are within the monument or the conservation area. The notice shall contain a listing of all public lands or interest therein within the boundaries of the State of New Mexico which have not been withdrawn from entry and which the Secretary, pursuant to the provisions of sections 202 and 206 of the Federal Land Policy and Management Act of 1976, has identified as appropriate for transfer to the State in exchange for State lands. Such listing shall be updated at least annually. If the New Mexico Commissioner of Public Lands gives notice to the Secretary of the State’s desire to obtain public lands so listed, the Secretary notify the Commissioner in writing as to whether the department of the Interior considers the State lands within the monument or conservation area to be of approximately equal value to the listed lands or interests in lands the Commissioner has

indicated the State desires to obtain. It is the sense of the Congress that the exchange of land and interests therein with the State pursuant to this section should be completed within two years after the date of enactment of this Act.

MINERAL EXCHANGES

Sec.504. (a) The Secretary is authorized and directed to exchange the Federal mineral interests in the lands described in subsection (b) for the private mineral interests in the lands described in subsection (c), if—

(1) the owner of such private mineral interests has made available to the Secretary all

(2) on the basis of information obtained pursuant to paragraph (1) and any other information available, the Secretary has determined that the mineral interests to be exchange are of approximately equal value; and

(3) the Secretary has determined—

(A) that except insofar as otherwise provided in this section, the exchange is not inconsistent with the Federal Land Policy and Management Act of 1976; and

(B) that the exchange is in the public interest.

(b) The Federal mineral interests to be exchanged under this section underlie the lands, comprising approximately 15,008 acres, depicted as “Proposed for transfer to Santa Fe Pacific” on the map referenced in subsection (d).

(c) The private mineral interests to be exchange pursuant to this section underlie those lands, comprising approximately 15,141 acres, depicted as “Proposed for transfer to U.S.” on a map referenced in subsection (d).

(d)(1) The mineral interests identified in this section underlie those lands depicted as “Proposed for transfer to Santa Fe Pacific” and as “Proposed for transfer to U.S.” on the map entitled “El Malpais Leg. Boundary, HR3684/S56”, revised 5-8-87.

(2) As soon as practicable after the date of enactment of this Act, the Secretary shall file a legal description of the mineral interest areas designated under this section with Committee on Interior and Insular Affairs of the United States House of Representatives and the Committee on Energy and Natural Resources of the United States Senate. Such legal description shall have the same force and effect as if included in this Act, except that the Secretary may correct clerical and typographical errors in such legal description. The legal description shall be on file and available for public inspection in the offices of the Director of the Bureau of Land Management, Department of the Interior.

(e) It is the sense of the Congress that all exchanges pursuant to this section shall be completed no later that three years after the date of enactment of this Act.

ACOMA PUEBLO EXCHANGES

Sec.505. (a)(1) Upon the request of the Pueblo of Acoma, the Secretary shall acquire by exchange any lands held in trust for the Pueblo of Acoma (hereinafter referred to as “trust lands”) located within the boundary of the conservation area which the Pueblo wishes to exchange pursuant to this section. Such trust lands shall be exchanged either for—

- (A) lands described in subsection (c) (with respect to trust lands west of New Mexico Highway 117); or
- (B) public lands for approximately equal value located outside the monument and outside the conservation area but within the boundaries of the State of New Mexico which are selected by the Pueblo of Acoma, so long as such exchange is consistent with applicable law and Bureau of Land Management resource management plans developed pursuant to the Federal Lands Policy and Management Act of 1976.

(2) All lands selected by and transferred to the Pueblo of Acoma at its request pursuant to this section shall thereafter be held in trust by the Secretary for the Pueblo of Acoma in the same manner as the lands for which they were exchanged.

(3) Any lands west of New Mexico Highway 117 which are acquired by the Secretary pursuant to this section shall be incorporated into the monument and managed accordingly, and section 104 and all other provisions of this Act and other law applicable to lands designated by this Act as part of the monument shall apply to such incorporated lands.

(b) For purposes of acquiring lands pursuant to subsection (a) of this section, the Secretary, consistent with applicable law and Bureau of Land Management resource management plans described in subsection (a), shall make public lands within the boundaries of the State of New Mexico available for exchange. Nothing in this Act shall be construed as authorizing or requiring revocation of any existing withdrawal or classification of public land except in a manner consistent with applicable law.

(c)(1) The Secretary shall make the lands within the areas identified as "Acoma Potential Exchange Areas" on the map referenced in section 301 available for transfer to the Pueblo of Acoma pursuant to this subsection.

(2) Upon a request of the Pueblo of Acoma submitted to the Secretary no later than one year after the date of enactment of this Act, lands within the areas described in paragraph (1) shall be transferred to the Pueblo of Acoma in exchange for trust lands of approximately equal value within that portion of the conservation area west of New Mexico Highway 117. The Secretary may require exchanges of land under this subsection to be on the basis of compact and contiguous parcels.

(3) Any lands within the areas described in paragraph (1) not proposed for exchange by a request submitted to the Secretary by the Pueblo of Acoma within the period specified in paragraph (2), and any lands in such areas not ultimately transferred pursuant to this subsection, shall be incorporated within the conservation area and managed accordingly. In addition, any lands in that portion of the areas described in paragraph (1) lying in section 1, township 7N, range 9W, New Mexico Principal Meridian, not transferred to the Pueblo of Acoma pursuant to this subsection shall be added to and incorporated within the Cebolla Wilderness and managed accordingly.

EXCHANGES AND ACQUISITIONS GENERALLY; WITHDRAWAL

Sec.506. (a) All exchanges pursuant to this Act shall be made in a manner consistent with applicable provisions of law, including this Act, and unless otherwise specified in this Act

shall be on the basis of equal value; either party to an exchange may pay or accept cash in order to equalize the value of the property exchange, except that if the parties agree to an exchange and the Secretary determines it is in the public interest, such exchange may be made of other that equal value.

(b) For purposes of this Act, the term “public lands” shall have the same meaning as such term has when used in the Federal Lands Policy and Management Act of 1976.

(c) Except as otherwise provided in section 505, any lands or interests therein within the boundaries of the monument or conservation area which after the date of enactment of this Act may be acquired by the United States shall be incorporated into the monument or conservation area, as the case may be, and managed accordingly, and all provisions of this Act and other laws applicable to the monument or the conservation area, as the case may be, shall apply to such incorporated lands.

(d)(1) Except as otherwise provided in this Act, no federally-owned lands located within the boundaries of the monument or the conservation area shall be transferred out of Federal ownership, or be placed in trust any Indian tribe or group, by exchange or otherwise.

(2) Except as otherwise provided in this Act, and subject to valid existing rights, all Federal lands within the monument and the conservation area and all lands and interests therein which are hereafter acquired by the United States are hereby withdrawn from all forms of entry, appropriation, or disposal under the public land laws and from location, entry and patent under the mining laws, and from operation of the mineral leasing and geothermal leasing laws and all amendments thereto.

(e) The acreages cited in this Act are approximate, and in the event of discrepancies between cited acreages and the lands depicted on referenced maps, the maps shall control.

(f) The Secretary is authorized to accept any lands contiguous to the boundaries of the Pecos National Monument (as such boundaries were established on the date of enactment of this Act) which may be proposed for donation to the United States. If acceptance of such lands proposed for donation would be in furtherance of the purposes for which the Pecos National Monument was established, the Secretary shall accept such lands, and upon such acceptance such lands shall be incorporated into such monument and managed accordingly.

(g)(1) Capulin Mountain National Monument is hereby re-designated as Capulin Volcano National Monument.

(2) Any reference in any record, map, or other document of the United States of American to Capulin Mountain National Monument shall hereafter be deemed to be a reference to Capulin Volcano National Monument.

(3) Section 1 of this Act of September 5, 1962 (76 Stat. 436) is hereby amended by striking the remaining portion of section 1 after “boundaries of the monument” and inserting “shall include the lands and interests in lands as generally depicted on the map entitled ‘Capulin Volcano National Monument Boundary Map’ which is numbered 125-80,014 and dated January 1987.”

(4) Jurisdiction over federally-owned lands within the revised boundaries of the monument is hereby transferred to the National Park Service, without monetary consideration, for administration as part of the monument.

ACCESS

Sec. 507 (a) In recognition of the past use of portions of the monument and the conservation area by Indian people for traditional cultural and religious purposes, the Secretary shall assure nonexclusive access to the monument and the conservation area by Indian people for traditional cultural and religious purposes, including the harvesting of pine nuts. Such access shall be consistent with the purpose and intent of the American Indian Religious Freedom Act of August 11, 1978 (42 U.S.C. 1996), and (with respect to areas designated as wilderness) the Wilderness Act (78 Stat. 890; 16 U.S.C. 131).

(b) In preparing the plans for the monument and the conservation area pursuant to section 501, the Secretary shall request that the Governor of the Pueblo of Acoma and the chief executive officers of other appropriate Indian tribes make recommendations on methods of--

- (1) assuring access pursuant to subsection (a) of this section;
- (2) enhancing the privacy of traditional cultural and religious activities in the monument and the conservation area; and
- (3) protecting traditional cultural and religious sites in the monument and the conservation area.

(c) In order to implement this section and in furtherance of the American Indian Religious Freedom Act, the Secretary, upon the request of an appropriate Indian tribe, may from time to time temporarily close to general public use one or more specific portions of the monument or the conservation area in order to protect the privacy of religious activities in such areas by Indian people. Any such closure shall be made so as to affect the smallest practicable area for the minimum period necessary for such purposes. Not later than seven days after the initiation of such action closure, the Secretary shall provide written notification of such action to the Energy and Natural Resources Committee of the United States Senate and the Interior and Insular Affairs Committee of the House of Representatives.

(d) The Secretary is authorized to establish an advisory committee to advise the Secretary concerning the implementation of this section. Any such advisory committee shall include representatives of the Pueblo of Acoma, the Pueblo of Zuni, other appropriate Indian tribes and other persons or groups interested in the implementation of this section.

COOPERATION

Sec.508. In order to encourage unified and cost effective interpretation of prehistoric and historic civilizations in western New Mexico, the Secretary is authorized and encourage to enter into cooperative agreements with other Federal, State and local public departments and agencies, Indian tribes, and nonprofit entities providing for the interpretation of prehistoric and historic civilizations in New Mexico and eastern Arizona. The Secretary may, pursuant to such agreements, cooperate in the development and operation of a multiagency orientation center and programs on lands and interests in lands inside and outside of the boundaries of the monument and the conservation area generally, with the concurrence of the owner or administrator thereof, and specifically in or near Grants, New Mexico, adjacent to Interstate 40 in accordance with the plan required pursuant to section 501.

WATER RIGHTS

Sec.509. (a) Congress expressly reserves to the United States the minimum amount of water required to carry out the purposes for which the national monument, the conservation area, and the wilderness areas are designated under this Act. The priority date such reserved rights shall be the date of enactment of this Act.

(b) Nothing in this section shall affect any existing valid or vested water right, or applications for water rights which are pending as of the date of enactment of this Act and which are subsequently granted: Provided, That nothing in this subsection shall be construed to require the National Park Service to allow the drilling of ground water wells within the boundaries of the national monument.

(c) Nothing in this section shall be construed as establishing as precedent with regard to any future designations, nor shall it affect the interpretation of any other Act or any designations made pursuant thereto.

AUTHORIZATION

Sec. 510. There is authorized to be appropriated \$16,500,000 for the purposes of this Act, of which \$10,000,000 shall be available for land acquisition in the national monument; \$1 million shall be available for development within the national monument; \$4 million shall be available for land acquisition within the conservation area; \$1 million shall be available for development within the conservation area; and \$500,000 shall be available for planning and development of the Masau Trail.

Approved December 31, 1987.