New Mexico Statewide Natural Resources Assessment & Strategy and Response Plans

New Mexico Energy, Minerals and Natural Resources Department
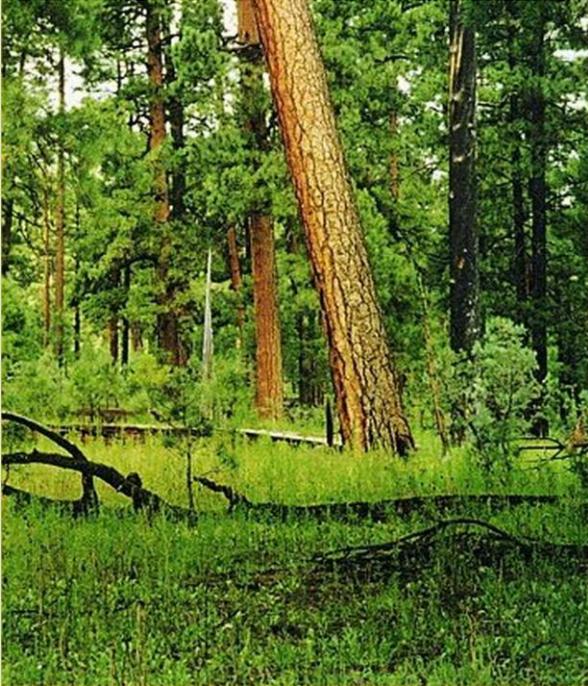
A Science-based Process for Identifying, Prioritizing and Conducting Natural Resource Management and Restoration Activities.

EMNRD

NEW MEXICO STATE FORESTRY

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Executive Summary

This New Mexico Statewide Resources Assessment, Strategy and Response Plan intends to guide long-term Division management, but as importantly, to provide useful information to our many partners who work together to create and maintain sustainable forests and their many benefits.

The Forestry Division's central purpose is to promote healthy, sustainable forests in New Mexico for the benefit of current and future generations. This mission is accomplished by working with partners interested in improving the health of the state's forests and watersheds. This document helps the Division meet two directives: the New Mexico Forest and Watershed Health Plan, completed in 2004, identifying the need for an all resources assessment and the Farm Bill (2008) requiring all State Foresters to complete a Statewide Forest Resource Assessment and Strategy and Response Plan.

Here are the over arching objectives for the Assessment, Strategy and Response Plan.
- Help natural resource agencies and the Forestry Division use the available resources efficiently by identifying priority landscapes for Division programs and Districts.
- Give clear guidance to Forestry Division employees and communicate agency priorities to cooperators and partners.
- Provide a strategic vision for the Division to meet resource objectives over the next five years.
- Identify landscapes and resource programs where collaborative watershed restoration projects will benefit multiple partners.

Drafting of the **Natural Resources Assessment** and the **Strategy and Response Plans** was a collaborative effort. The core team included staff from the Forestry Division, the Nature Conservancy and the Forest Guild. The Trust for Public Land took the lead for the Green Infrastructure Resource Model in the Assessment. Forty-nine different agencies and organizations met with the Division in collaborative workshops to provide recommendations.

For the **Natural Resources Assessment**, we looked broadly, to develop information not only for our agency, but for all land managers in New Mexico. With the dual purposes from both the Farm Bill and the FWH Plan, the Forestry Division chose, in many cases to look beyond the forest and woodland boundaries to gather information. In retrospect, our mission-driven interest in forests and woodlands, and the biases towards forests in geospatial information used in the analysis such as Landfire, we recognize that this assessment has a forest bias.

The **Strategy** and **Response Plans** are Forestry Division-focused documents. Because it is the nature of the Forestry Division to partner with other agencies, organizations, and individuals, we share these plans with you to clearly communicate our direction.

The **Natural Resources Assessment** consists of available information on natural resources and major threats to resources, mapped at a scale appropriate for large landscape planning. Available resource data were combined to create eight core resource models. The eight resource models are: *Biodiversity (Fish and Wildlife Habitat), Development Potential (Risk), Economic Potential (Risk), Forest Health,*

Fragmentation (Forest Fragmentation), Green Infrastructure, Water Quality and Supply, and Wildfire Risk The data used were existing spatial data and the models created with the help of 82 resource managers and scientists from many agencies and organization who served on technical teams. An important contribution of the technical teams was the identification of key resource data gaps for New Mexico. We believe that working together to fill these data gaps should be a priority for us and other resource managers in the state. A detailed description of the models and advice of the technical teams, and more details on data gaps can be found in *Volume II: Data Atlases*.

In the **Strategy Plan**, resource models were combined to represent Four Key Themes that will help the Forestry Division determine priority landscapes for management.

- Conserve Working Landscapes
- Protect Forests and Watersheds from Harm
- Enhance Public Benefit From Natural Resources
- Promote Urban and Community Forestry

For each Key Theme, the Division identified, from our perspective, the Issues, Trends, Barriers to Addressing the Issues and the Strategies we plan to implement, and show the priority landscapes where the Division and our partners can work to address the Issues.

In the **Response Plan**, we identify how the Division will invest programmatic and personnel resources to address the priorities identified in the Strategy Plan, including how federal and other funding will be invested, and how our objectives align with national State and Private Forestry objectives.

The Division uses three factors to make funding and implementation decisions. The three factors are each equally important when making decisions to invest resources. The three factors are:

Resources: There is concern about the condition of, or a threat to, the natural resource(s). The concern may center on the resource itself or on the potential that resource conditions could negatively impact something else valued, like water supply, public safety, or wildlife habitat.
Opportunity: There is some current circumstance that creates a window of opportunity to act now. Examples of such circumstances are available funding, new or existing partnerships, or public attention targeted on the issue or project location.
Urgency: There is either huge benefit to taking this action now or huge risk in not doing it now.

The **Assessment** provides guidance and scientific backing for the *Resources* factor for prioritization. **The Strategy and Response Plans** recognize that *opportunity* and *urgency* are equally weighted when identifying priority project areas. The Forestry Division develops an annual strategy that guides work within the constraints of existing budgets. The priorities in the Strategy and Response Plans will assist the Division in being more effective with limited resources and help identify opportunities to leverage funds with partners. Our objective over time is to move priority landscapes to an operational mode, or one in which initial projects are expanded to address the key issues across a watershed, and improvements are sustained over time. On-the-ground project work with partners is generally initiated and implemented at the District level. For the six Division Districts, in *Appendix B,* priority landscapes and programs are identified.

Original spatial data and models created are available to you, our partners. We invite you to use the data to create your own maps or resource analysis to assist you in your work. We expect the data to be posted at the New Mexico Resource Geographic Information System Program (http://rgis.unm.edu/) site soon. In the near term, data will be made available through a link on the Division's "All About Watersheds" information clearinghouse http://allaboutwatersheds.org/groups/SAS.

New Mexico Division of Forestry

The state of New Mexico, while primarily a high desert climate, boasts a unique blend of ecosystems, from rolling plains and complex river valleys to alpine mountain vistas. The one feature these ecosystems share is the reliance on water. The bulk of New Mexico's water originates in the forests.

The Energy, Minerals and Natural Resources Department, Forestry Division (Forestry Division) provides leadership in New Mexico's management of these complex ecological ecosystems. Although the Forestry Division's primary responsibility is to sustain healthy and productive forests, it recognizes the interconnectedness of forest lands and other vegetated landscapes, of watersheds and waterways, of land management practices, and of the many entities, which are responsible for stewardship of the land. This understanding provides the foundation for the Forestry Division's efforts, which are collaborative, interdisciplinary, and focused on long-term sustainability.

Established as the Forest Conservation Commission in 1957 to address fire protection on state and private land, the Forestry Division's mission soon expanded to include timber management and conservation efforts. The Forestry Division's role has increased in the areas of technical forestry assistance to private and state landowners, conservation of forest lands through easements, encouragement of forest industries, inmate forestry work programs, heritage of native plants and many other programs that support healthy ecosystems in New Mexico.

The Forestry Division places the importance of proper watershed management as a top priority to achieve overall ecosystem health. To achieve this goal, the Forestry Division has taken a leadership role in crafting collaborative efforts with local, state, federal and tribal agencies, as well as private landowners, businesses and non-governmental organizations.

The Forestry Division is guided by a Strategic Plan contained within the Strategic Plan for the Energy, Minerals and Natural Resources Department, which is reviewed and updated annually. The Division Strategic Plan identifies three major areas of program delivery—1) forest and watershed management, 2) community forestry, and 3) wildland fire management—to accomplish its mission of promoting healthy, sustainable watersheds and forests in New Mexico for the benefit of current and future generations. This Statewide Assessment, Strategy and Resource Plan is independent of the Division Strategic Plan, yet has been fully integrated and cross-walked to insure unified purposes.
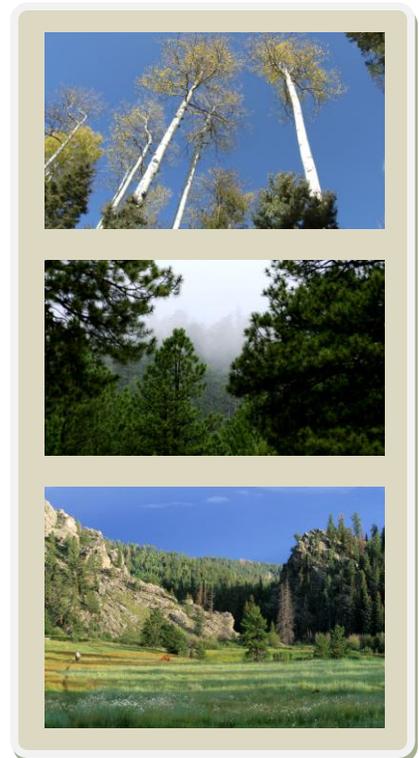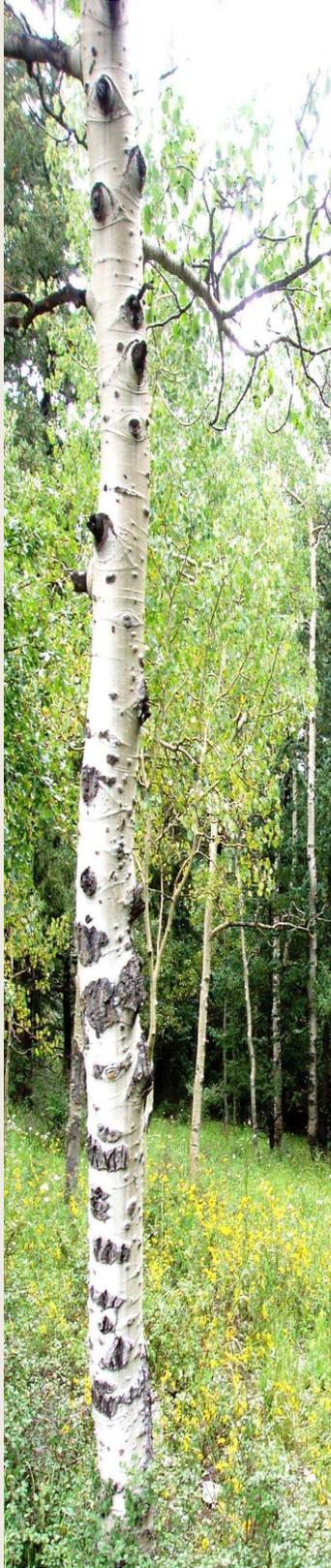
Background

New Mexico's Statewide Natural Resources Assessment (Assessment) provides the Forestry Division and its partners with a comprehensive analysis of the conditions, trends, threats, and opportunities for natural resources management within the state. The New Mexico Statewide Strategy Plan identifies priority rural and community landscapes with opportunity for cross-jurisdictional projects for the Forestry Division. Where appropriate, the Strategy Plan provides links to multiple existing conservation plans, strategies and initiatives. The New Mexico Statewide Response Plan outlines specific actions to address priority landscapes and management need for the Forestry Division. The Assessment, Strategy and Response Plans also provide New Mexico's Forestry Division with tools for coordinating and implementing landscape restoration, management, and conservation activities across the state's diverse landscapes and among multiple conservation plans, strategies, and initiatives.

Two directives guided the development of the Assessment and Strategy and Response Plans. First, the 2008 Farm Bill mandate, which calls for a statewide evaluation of forest resources; and second, *The New Mexico Forest and Watershed Health Plan* (2005), which identified a wall-to-wall natural resource assessment as a key data need for improved resource management and collaboration within New Mexico.

State and Private Forestry (S&PF) is a branch of the USDA Forest Service that provides technical and financial assistance to landowners and resource managers, primarily through partnerships with State Forestry agencies. S&PF Redesign is an approach conceived to focus limited resources in areas with the greatest threats to forest sustainability. *The Food, Conservation, and Energy Act of 2008*, also known as the 2008 Farm Bill, codified the main components of the S&PF Redesign into law by amending the Act. The Act requires each State to complete a Natural Resource Assessment as well as a Strategy and Response Plans. The **Natural Resources Assessment** provides an analysis of current conditions and trends and highlights key landscapes for management. The State **Strategy and Response Plans** emphasize the state's vision for investing resources in a targeted, strategic fashion while leveraging

limited resources. National guidance, developed by the USDA Forest Service and the National Association of State Foresters for conducting state assessments state that at a minimum, state forest resource assessments should:

- Provide a cross-jurisdictional analysis of present and future forest conditions, trends, and threats using best available information.
- Analyze forest related threats, benefits, and services consistent with the State & Private Forestry Redesign (S&PF) national themes.
- Identify priority rural and community forest landscape areas to be addressed by the state resource strategy.

Three national themes of S&PF Redesign were set in law as national priorities for the Assessments and Strategy and Response Plans. The intent of the national themes is to identify the desired outcomes and key strategies that will serve as a guide for the investment of federal funds and to provide the framework for measuring the success of the state's strategies. The national themes include:

- Conserve working forest landscapes
- Protect forests from harm
- Enhance public benefits from trees and forests

The New Mexico Forest and Watershed Health Plan (2005) was developed by the Forestry Division at the request of Governor Bill Richardson and the New Mexico State Legislature. With over 400 contributors, the Plan provides a road map for all natural resource managers across the state to collaboratively address the unhealthy condition of New Mexico's watersheds and ecosystems. Dense forests and woodlands, deterioration of wildlife habitat, increased occurrence and extent of insect and disease outbreaks, degradation of water and air quality, and fragmentation were among top concerns in the Plan. These conditions are the result of many human- and climate-driven factors that have caused New Mexico's watersheds to experience greater susceptibility to destructive wildfire, increased drought, decreased water supply, accelerated erosion, expanded invasive plant distribution, and desertification.

The Plan lays out a framework for addressing these issues through a collaborative, landscape-scale approach.

It recommends 20 actions intended to transform the way ecological restoration is accomplished in New Mexico by strengthening on-the-ground efforts, eliminating unnecessary barriers to this work and, in the end, realizing much greater impact for the dollars invested.

A multi-entity Coordinating Group meets quarterly to advise and provide direction on the Plan's implementation, ensure coordination of and outreach to stakeholders, identify issues in need of attention, and propose solutions. The group establishes task teams that tackle specific problems or produce desired products. The Coordinating Group's membership includes representatives from seventeen agencies and organizations.

Among the recommendations is the development of a statewide assessment of ecological conditions and restoration needs to provide the basis for the state's strategic approach. Additional objectives include identifying gaps and opportunities and analyzing environmental threats to communities, causes of ecological degradation, current restoration activities, and distribution of funds. This assessment, paired with concurrent development of *the New Mexico Resource Treatment Map (see inset)*, will fulfill a significant portion of that recommendation.

In addition, the FWHO keeps regular contact and coordinates many of its activities directly with the New Mexico Forest and Watershed Restoration Institute, one of three such institutes formed to ensure that the best available science is used to implement effective restoration-based forest treatments in the Southwest.

Since the creation of the Forest and Watershed Health Plan in 2005, several 'watershed' events have occurred to move forward the healthy watershed approach in New Mexico. Among these are:

- the establishment of permanent support organizations to implement the intent of the plan: Forest and Watershed Health Office with the Forestry Division; Forest and Watershed Restoration Institute at New Mexico Highlands University; and the Forest and Watershed Health Coordinating Group.
- the All About Watersheds portal
- the New Mexico Resource Treatment Map
- public outreach campaigns, including road signs designating watershed boundaries

- conference sponsoring and presentations promoting watershed approaches to land management.

By tying the Farm Bill requirement for a Statewide Assessment with the Forest and Watershed Health Plan recommendation for a wall to wall, all resources assessment, Forestry Division recognized the opportunity to develop this multi-jurisdiction, all natural resources assessment. The Forestry Division solicited proposals for assistance in the development of the Statewide Assessment and Strategy and Response Plans. The Nature Conservancy in New Mexico, in partnership with The Forest Guild, responded, bringing matching funds and expanded resources to the project. The State Assessment core team thus consisted of representatives of The Nature Conservancy, the Forest Guild, and the Forestry Division.

Using the national themes as a basis, the Forestry Division and the core team developed state themes that would encompass the necessary Farm Bill priorities as well as the vision and actions identified by the Forest and Watershed Health Plan. The Strategy and Response Plans are organized around these themes which include 1) *Conserve Working Landscapes, 2) Protect Watersheds from Harm, 3) Enhance Public Benefit from Natural Resources, and 4) Promote Urban and Community Forests.*

The *Conserve Working Landscapes* theme delineates landscapes with high economic potential that should be conserved as working forests and identifies areas where forest conversion should be limited. Potential strategies for conserving working landscapes include developing economic viability of forest product markets and other environmental services, encouraging tax incentives and zoning for conservation, providing additional funding for conservation easement acquisitions, and developing other economic incentives that achieve this goal.

The *Protect Watersheds from Harm* theme is directed at reducing the threat of uncharacteristic wildfire, insect and disease outbreaks, and encroachment by non-native invasive species. Thus, restoration of New Mexico's fire- and flood-adapted systems is a key approach in addressing these
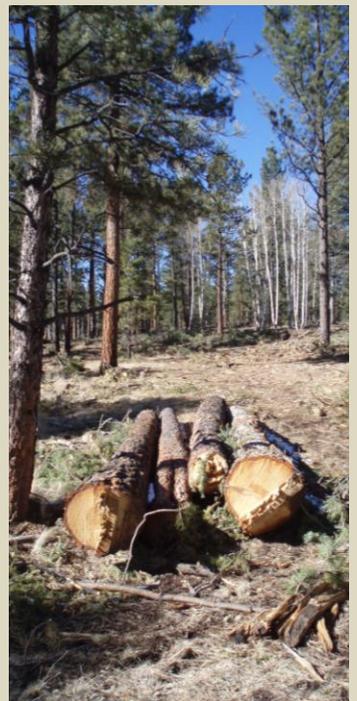
threats. Ongoing monitoring and assessments of ecosystem conditions including data on forest and woodland tree densities, insect and disease mapping, and tracking invasive species are also considered an integral part of achieving this goal.

The goal of the *Enhance Public Benefit from Natural Resources* theme is to improve the condition of New Mexico's watersheds for public benefit and to reduce risk of uncharacteristic wildfire to communities. Ecosystem services such as clean air and water, fish and wildlife habitat, open space, recreational opportunities, renewable forest products, reduced fire suppression costs, and buffering from climate change are all considered public benefits. Key strategies for addressing these goals include expanding community forestry programs; watershed planning; enhancing community fire protection capabilities; increasing understanding about and restoration of hydrological functions of riparian and upland ecosystems, and improving the link between environmental health and public benefit. The *Promote Urban and Community Forests* theme, although a sub-theme of *Enhance Public Benefits of Natural Resources* emerged as the fourth theme due to importance of the state's urban and community forests, and the lack of existing geospatial to adequately address community forests within the context of other forests and woodlands in the state.

Overview of New Mexico's Natural Resources

New Mexico is the fifth largest state, covering 121,598 square miles (77,818,500 acres) and is largely privately owned, with 44 percent of total land within private ownership (Table 1; Map 1). Its landscape ranges from large grassland expanses to deserts to high snow-capped peaks. The size and topography of the state make it one of the most biologically diverse in the nation. The state is the fourth most diverse overall providing habitat for over 4,500 species including: 3,305 vascular plants (4th in US); 154 mammals (3rd in US); 447 birds (2nd in US); 98 reptiles (3rd in US); 26 amphibians (27th in US); and 54 freshwater fish (38th in US).

Forests and woodlands cover approximately 22 million acres (28 percent of the state); grasslands, the largest in area, stretch across 29 million acres (37 percent of state); shrub-scrub vegetation typical of desert cover 18.5 million acres (24 percent of state). While riparian habitats make up less than one percent of the landscape, they are some of the most florally and faunally diverse habitats in New Mexico.

From the highest elevations (Wheeler Peak 13,161 ft.), forest systems transition from treeless alpine tundra, through mesic and dry coniferous forests, into lower elevation woodland systems, which are dominated by piñon-juniper woodlands, foothill grasslands, and shrublands. New Mexico has extensive montane and lower montane-foothill vegetation including Southwestern mixed conifer and ponderosa pine forests, as well as mixed ponderosa pine-oak forests in the southeastern part of the state. A major natural disturbance factor throughout New Mexico's forests is fire. Although fire is important in all forests, its characteristics differ with the vegetation type.

Lower elevation montane forests typically experienced higher frequency, less severe fires (Fire Regime I). For example in ponderosa pine forests, fires burned the understory grasses and shrubs while leaving most trees standing. Fires occurred historically as often as every 5-25 years. Higher elevation forests experienced less frequent and often more severe fires, which created small to large openings where young conifers or aspen regenerated over time. Foresters can use historic fire pattern and severity information to design treatments that can restore forest
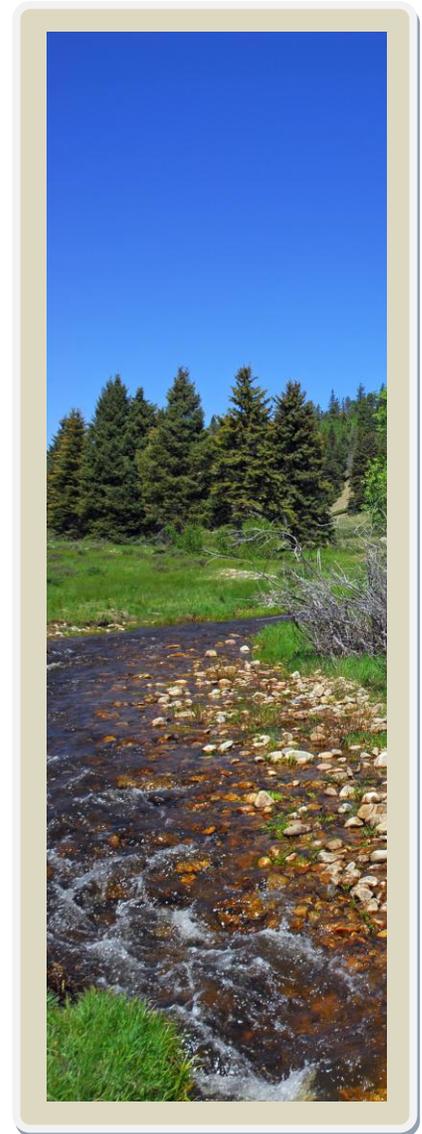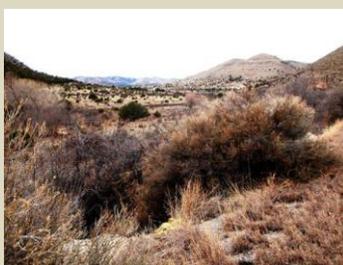
stands to more natural conditions, or restore grasslands where woodland trees or shrubs have encroached.

Five natural fire regimes have been identified for major vegetation types in the United States, including New Mexico (adopted from Schmidt et al. (2002)). :

I – 0-35 year frequency and low severity (most commonly associated with surface fires) to mixed severity (in which less than 75 percent of the dominant overstory vegetation is replaced)
II – 0-35 year frequency and high severity (stand replacement: greater than 75 percent of the dominant overstory vegetation is replaced)
III – 35-200+ year frequency and mixed high and lower severity
IV – 35-200+ year frequency and high severity
V – 200+ year frequency and high severity

Much of New Mexico is dominated by non-forest vegetation. Temperate grasslands comprise about 37 percent of the state, mostly in the east, where ownership is primarily private. These grasslands support many communities, whose economies are dependent on farming and ranching. The majority of New Mexico grasslands in the east can be considered southern shortgrass prairie dominated by large expanses of blue grama and buffalo grass. Climate and edaphic factors are the dominant factors driving the structure and composition of the grasslands. As the climate becomes more arid species more typical of desert grasslands, such as black grama and bush muhly become more common; with greater precipitation, the dominant shortgrass species are typically replaced by common mixed-grass species like little bluestem and switchgrass. Edaphic factors drives variation at more local scale, and species such as sand blue stem, western wheatgrass, and galleta can be found. Grazing and its interaction with fire are important processes that maintain the shortgrass prairie. Exclusion of these processes encourages encroachment and expansion of shrub species into the systems. In New Mexico we are fortunate to have some of the largest remaining intact prairie grasslands.

Wetlands and riparian ecosystems are precious, comprising less than 1 percent of New Mexico (NMDGF 2006). Riparian forests and wetlands are rare and biologically critical communities that traverse the upland systems along water courses. New Mexico's desert systems are known for their large number of native fish species. A significant percentage of all wildlife in the Southwest uses riparian habitat and approximately 80 percent of all sensitive and specially designated vertebrate species in New Mexico depend upon riparian or aquatic habitat at some time during their life cycle. Maintenance of hydrologic regime including riparian flows and water quality is essential to maintaining proper functioning of our riparian systems.

Deserts and dry shrublands cover about 18.5 million acres in New Mexico and can be found within the Chihuahuan Desert, the Apache Highlands, and the Colorado Plateau ecoregions. These are extreme environments, having both hot summers and cold winters. A surprisingly diverse array of plants and animals manage to thrive in these harsh conditions. The Chihuahuan Desert is particularly notable for its high plant species diversity, including more species of cactus than any other ecoregion on Earth.

Map 1. Land Ownership in New Mexico

Legend

Land Ownership

- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- National Forest Service
- Fish & Wildlife Service
- Tribal
- National Park Service
- Private
- State

SCALE 1:3,380,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
The priority layer was created in 2009 by TNC in NM. The data atlas describing the input models and associate layers can be found on http://allaboutwatersheds.org.

Table 1. Land Ownership in NM

Ownership	Area (acres)	% of NM	Forest (acres)	Woodland (acres)
Federal				
Bureau of Land Management	13,481,000	17	97,800	2,161,100
Department of Defense	2,552,000	3	7,000	156,700
Bureau of Reclamation	54,500	<1	0	0
Fish and Wildlife Service	383,000	<1	1,500	42,600
National Park Service	379,000	<1	11,000	42,600
Forest Service	9,223,000	12	4,811,600	2,785,500
Other Federal	237,000	<1		
TOTAL FEDERAL	*26,309,500*	*34*		
State	**9,171,000**	**12**	**150,500**	**1,326,700**
Private	**34,157,000**	**44**	**1,654,800**	**5,617,600**
Tribal	8,178,000	10	802,700	2,284,600
Local	3,000	<1	0	0
TOTAL	**77,818,500**	**100**	**7,608,700**	**14,386,300**

Responsibility for stewardship and management of approximately half of forests and woodlands in New Mexico falls to federal agencies, primarily the USDA Forest Service which manages 7.6 million acres of forest and woodlands (Table 1). The Forestry Division provides technical and financial assistance to state, private, and tribal landowners and land managers. Approximately 15 percent of forest and woodlands are under state or private ownership, while Native American tribal governments control 15 percent. The Forestry Division does not own and manage land within New Mexico, but works with partners to promote healthy, sustainable forests in New Mexico through its various programs, encouraging sustainable economic growth while protecting and enhancing watershed health and community safety.

Threats to New Mexico's Private Forests and Woodlands

Approximately 7.3 million acres of the state's forests and woodlands are privately owned, and more than three million acres are under tribal management. These working forests supply New Mexico's citizens with wood products and critical ecosystem services including clean water, wildlife habitat, flood protection, erosion control, and carbon sequestration. Non-federal forests and woodlands provide a wealth of recreational opportunities and contribute intangible but culturally important values such as tribal, community, and family identity. They also create linkages within the landscape, often serving as wildlife corridors and access to federal lands.

Private forests and woodlands, and the benefits they provide, are threatened by a combination of factors. Trends across the West show that private lands are being converted to non-forest uses and are suffering environmental degradation at an increasing rate due to the combined stresses from climate change, market shifts, changing demographics, and competing societal values. A recent publication by

the Western Forestry Leadership Coalition describes these threats in detail and outlines a national path to protect and preserve working forests in the West (WFLC 2010).

The Economic Role of Forest and Woodlands in New Mexico

New Mexico's forests and woodlands play an important role in providing the state with economic commodity and non-commodity benefits. Economic commodity benefits from forests include traditional wood products such as timber, vigas, latillas, and biomass. Non-commodity benefits, often referred to as ecosystem services, cover the broad range of benefits from forests that currently do not have market values such as the production of clean water, recreation and scenic values, and the sequestration of carbon. Below is a summary of current research and data for timber, biomass, tourism, non-timber forest products, hunting and fishing, and water quality in New Mexico.

Timber

Over the last 20 to 30 years, New Mexico's timber economy has declined steadily, both in harvest volume and processing capacity. However, as of 2002, it still provided significant economic value, with $47.7 million in sales of finished wood products and mill residues from a harvest of 74.4 MMBF Scribner (Morgan et al. 2006). The resulting products and sales include the following:

- Lumber, mine timbers, and other sawn products ($34.3 million, 72%)
- Vigas/Latillas ($4.4 million, 9%)
- Mill residues and other products ($8.9 million, 19%)

Of the 95,001 bone dry units (or about 9,120 million cubic feet) of mill residue produced by New Mexico facilities in 2002, 95.7 percent was utilized, including the following by volume:

- Coarse Residue (50.5% of volume, with 99% utilized mostly by out of state pulp and paper facilities, as well as for energy and other uses)
- Fine Residue like sawdust and planer shavings (29.6%, with 87.7% utilized as mulch, animal bedding, or other uses)
- Bark (19.9%, with 98% utilized mostly as mulch)

Woody Biomass
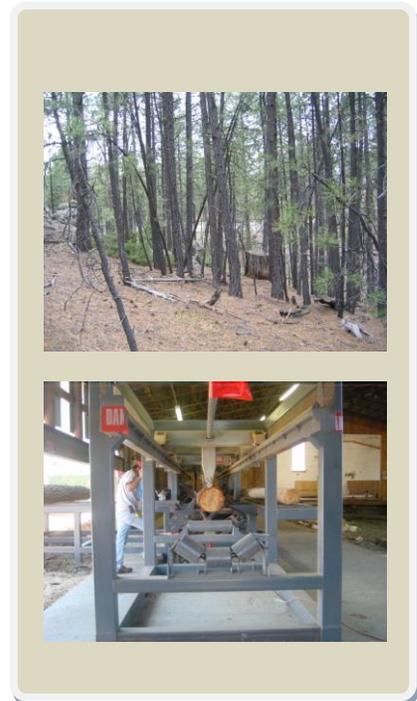
It is clear that woody biomass has the potential to be a viable emerging market in the years ahead, due to increased concern about the cost of energy, carbon emissions, and wildfires, but in the meantime there are significant hurdles to overcome before it is financially sustainable (Evans 2008).

Nationally, biomass accounted for 47 percent of energy consumption from renewable in 2003, and is projected by the Energy Information Administration to increase to more than 60 percent, a jump that would mean increasing from around 3 percent to about 13 percent of total U.S. energy consumption (US DOE 2009 and Perlack 2005, as cited in Wayburn, 2009). Close to 87 percent of that biomass comes from forested land, equaling 142 million dry tons of woody biomass annually. Furthermore, the US DOE estimates that forests could yield up to 368 million dry tons for energy production each year.

In addition to energy, small diameter wood products range from tipi poles to components of plastic signs. The associated removal of trees provides many co-benefits (Evans 2008):

- Fire suppression value in the Southwest: $238 - $601 per acre saved due to avoided future cost of fire suppression (Snider et al. 2006).
  - Smoke emission reduction
  - Carbon emission reduction or offset
  - Local job creation and industry expansion
  - Habitat improvement

However, in New Mexico as well as many other areas, this potential is hampered by inconsistent supply, difficulty obtaining environmental permits for wood-to-energy facilities, and the economics of electricity generation (Evans 2008). As for New Mexico's inventory statistics, O'Brien (2003) estimated the total biomass in live trees to be 296 million tons and the total volume of wood in live trees of diameter five inches and larger to be 16 billion cubic feet. Given the age and general nature of her report, however, it is clear that we would still need a more comprehensive woody biomass supply analysis in order to appropriately size the industrial demand to match the appropriate supply to realize this sector's full potential in New Mexico.

Tourism and Recreation

Although the numbers of actual visitors fluctuate annually due to the price of gas and the state of the economy, consistently a large proportion of visitors are overnight, non-business and often non-family visitors. They come to New Mexico to drive the scenic byways, enjoy the forest, and explore the mountains. These activities lead to expenditures and payrolls in the hundreds of millions and jobs in the
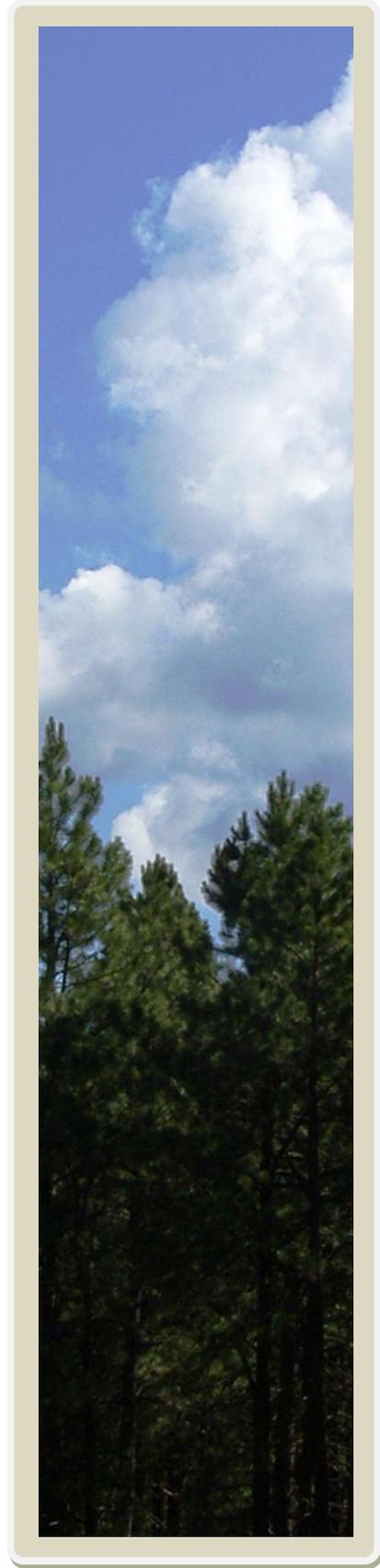
thousands. However, due to the nature of available data, it is almost impossible to either map this activity across the state or to determine an exact monetary impact.

Another major data gap is the lack of a comprehensive economic analysis of the value of our forests to recreation – similar to the analysis done by Berrens et al. (2006) regarding New Mexico's Inventoried Roadless Areas. This study applied a series of non-market valuation techniques to data and statistics mostly from wilderness areas. Techniques included an econometric regression model for wilderness areas from Loomis (2005), as well as data about the acreage of New Mexico's Roadless Areas and a benefit transfer estimate of consumer surplus per recreation visitor day (RVD) in wilderness areas from Loomis (2005). This study estimated an annual consumer surplus value of $25 million for recreation in Inventoried Roadless Areas. This specific study lacked collaborative involvement, specifically with the NM counties. More research is necessary to extrapolate from these wilderness numbers to the rest of New Mexico's forested lands. Their report indicates that these non-commodity services have significant potential. Their final calculation pertains to just 1.5 million acres, whereas all of New Mexico holds 16.7 million acres of forested lands that includes over 10 million acres of total public forested land (O'Brien 2003).

Non-timber Forest Products

New Mexico's forests provide many non-timber forest products which are culturally important and provide local economic benefits. Most notable of these products are piñon nuts. In many Native American and Hispanic communities, piñon gathering is done by a majority of people. For example, among the Zuñi people, up to 80 percent actively collect piñon nuts (Miller and Albert 1993). Although New Mexico piñon nuts do make it to commercial markets, crop values and prices are not well tracked. The BLM has used a formula for piñon collecting permits, charging an estimated 10 percent of the selling price. In 1993, that price was 20 to 25 cents per pound (Norwick et al. 1993).

Hunting, Fishing, and Wildlife-associated Recreation

One of the largest economic impacts of wildlife is hunting. Hunters spent as much as $24.7 billion and generated $67.5 billion in economic activity nationwide in 2001 (IAFWA 2002). In New Mexico,

in fiscal year 2006-07 more than 97,000 people bought big game licenses, 246,000 bought fishing licenses, and the Habitat Stamp program collected nearly $850,000 (NMDGF 2007). The economic impact of hunting in New Mexico in 2006 was estimated at about 524.1 million (US DOI and US DOC 2008). Nationally, the economic impact of bird watching in 2001 was $85 billion (La Rouche 2001). The 531,000 birders who live in or visited New Mexico generated about $173 million in economic activity (La Rouche 2001). In New Mexico hunting, fishing, and wildlife-watching activities directly contributed $822.1 to the state economy in 2006, with an estimated 947,000 people engaged in wildlife-associated recreation (US DOI and US DOC 2008).

Nationally, the economic impact of bird watching in 2001 was $85 billion (La Rouche 2001). Watching wildlife generated an estimated $1.2 billion in Colorado during 2006 (BBC Research & Consulting 2008). The 531,000 birders who live in or visited New Mexico generated about $173 million in economic activity (La Rouche 2001). In New Mexico hunting, fishing, and wildlife-watching activities directly contributed $822.1 to the state economy in 2006 (US DOI and US DOC 2008).

Water Quality

The Rio Grande Basin receives 29 percent of its water from National Forest lands alone (Sedell et al. 2000). This is not unusual – in the country as a whole, two-thirds of the clean water supply in the U.S. comes from water that has been filtered through forested land, the majority of which is privately owned (Smail and Lewis 2009). To demonstrate its value, Smail and Lewis cite studies by Brown (1992) and Krieger (2001) that estimate the direct value of national forest water alone at over $27 billion per year – as a product. Few have been able to assess its value to the processes involved in producing other services (timber, wildlife, etc.), largely due to the high variation in ecosystem characteristics from one region to another. Nonetheless, it is clear that water plays a critical role in enhancing the stability of hydrological conditions that support and promote many other services (Graham and Smith 2004, Postel and Carpenter 1997, Sweeney et al. 2004).

Natural Resource Assessment

Collaborative Approach

The Forestry Division implemented a collaborative, stakeholder-driven process in the development of the Natural Resource Assessment. A collaborative approach allowed the Forestry Division (1) to solicit stakeholder expertise and place-based knowledge from across the state, (2) to use this knowledge in the development of the core data models, (3) to foster transparency, and (4) to encourage much needed investment and confidence in the final products from the diverse groups engaging in natural resource management and conservation in the state. Overall, the collaborative approach represents an intensive and comprehensive effort by Forestry Division to create high confidence core data models that reflect a heavy investment in knowledge of New Mexico's natural resources.

The collaboration first began with outreach to the 22 Native American tribal governments in New Mexico. All tribal governments were given notification of the project and invited to an introductory meeting to engage either as part of the collaborative Stakeholder Steering Committee or directly with State Forestry. Beginning in July 2009, the Forestry Division convened the first meeting of the stakeholders which initiated the formation of the Technical Advisory Teams, teams of resource experts representing different agencies which worked together to develop the core data models. Technical Advisory Teams and core data models are described more fully below. The initial stakeholder session provided an opportunity for questions and answers and the core team with feedback and recommendations. This meeting was attended by over 70 professionals and interested parties representing 49 agencies, tribes, or organizations. All applicable federal land management agencies were present, as well as the State Department of Game and Fish. Subsequent to this initial stakeholder meeting, the State Forest Stewardship Coordinating Committee received quarterly updates on the progress of the Statewide Assessment effort.

Information was gathered from each technical team through a series of web-based meetings where existing data and developed data were evaluated for each core data model. Each team met at least three times; additional web-based meetings, conference calls, and in-person meetings were utilized as needed. Each team reviewed and approved the final core data model results.

When the core data models were complete, the Forestry Division again convened the stakeholders in early November 2009 for a collaborative prioritization meeting. At this meeting, the stakeholders were presented the results of all eight of the core data models. Additional opportunity for review of the model results, and questions and feedback on each of the models were given in small groups. The intent of the small group sessions was to allow stakeholders to become better acquainted with each model and its strengths and weaknesses. After a more detailed review, the stakeholders were asked to provide a measure of confidence (Figure 1) for each model and to weight the importance of each model in prioritizing restoration and management opportunities within the state. Voting for the overall priority weights was collected through the use of electronic keypads. The overall statewide stakeholder input map (Map 2) depicts the weights given to the eight core models.

Figure 1. Stakeholder Confidence in Core Data Models

How well does this model characterize the topic at the statewide scale?

	Fish and Wildlife	Development Potenti	Economic Potenti	Forest Health Risk	Fragmentation	Green Infrastructure	Water Quality and	Wildfire Risk
Series1	3.8	3.4	3.3	3.7	2.9	1.2	3.8	4.1
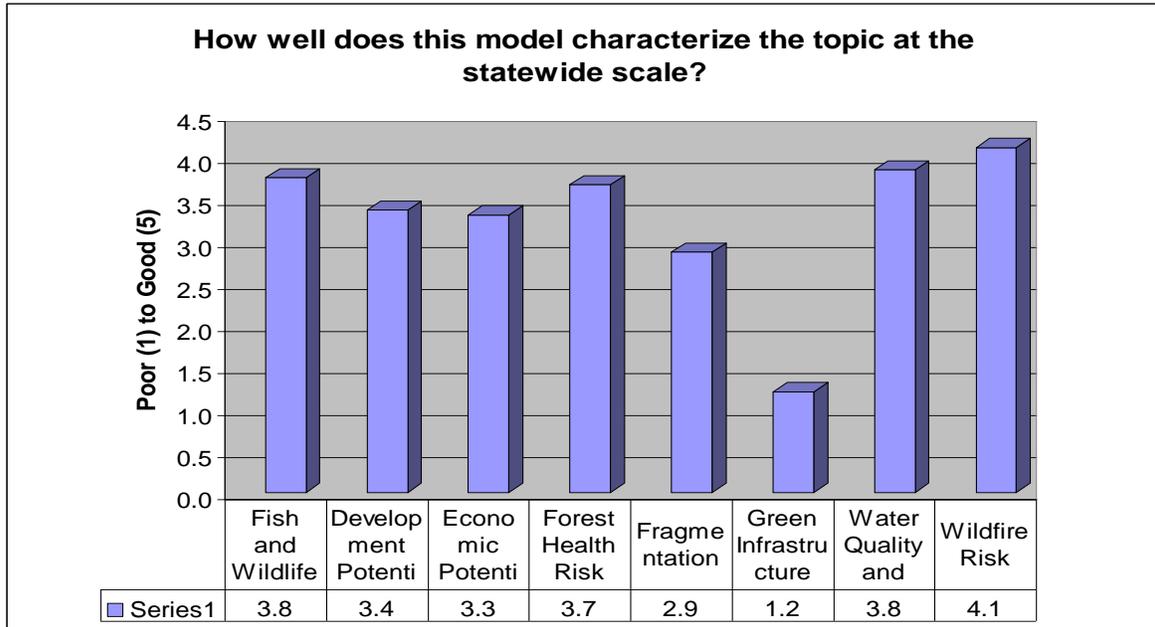
Map 2. Stakeholder Weighting of 8 Core Data Models from November Meeting

High Priority
High/Medium Priority
Medium Priority
Medium/Low Priority
Low Priority

SCALE 1:3,380,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
The priority layer was created in 2009
by TNC in NM. The data atlas describing
the input models and associate layers
can be found on http://allaboutwatersheds.org.
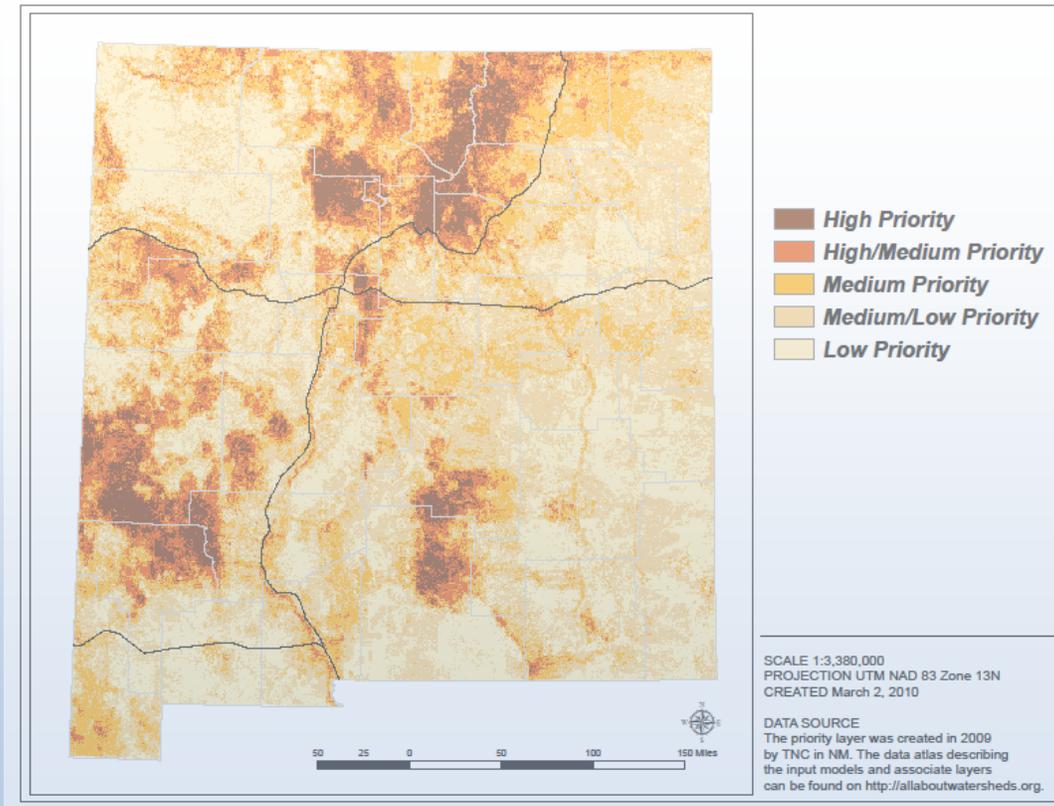
One of the goals for the Statewide Assessment is to provide the tools for natural resource managers to identify priority areas for the purposes of allocating funding and developing projects. In working with stakeholders in ranking and analyzing the core models, the clear conclusion was that project objectives needed to drive project prioritization. The best use of the Assessment lies in first determining program objectives, and then selecting the specific core models (or at times, individual data layers of the core model) that reflect those objectives. The assessment models and data layers are available for any agency, organization, etc. to use to develop prioritization maps for specific goals or objectives. For the purposes of the Forestry Division's Strategy and Response Plans, prioritization maps were developed to address the state themes, which were adapted from the national themes presented in the 2008 Farm Bill. In addition, the Forestry Division recognized that as projects are developed at the district level, additional analysis district by district, would inform the process. Therefore, Forestry Division priority areas and projects are primarily addressed in the district discussions in Appendix B.

In January 2010, the core team requested additional input from the national forests in New Mexico and provided information and progress regarding the Statewide Assessment. Forestry Division invited all five USDA Forest Service forest supervisors to join a video call to learn more about State Forestry's all resources all lands approach to the Statewide Assessment. The Forestry Division also convened an Executive Panel comprised of the leaders of natural resource management agencies (federal, tribal, and state) for New Mexico. The Executive Panel was invited to provide input in the draft stages of the plan and to begin building and strengthening partnerships to collaboratively implement restoration and conservation priorities.

Technical Team Members

Technical teams, comprised of subject and technical experts from agencies and other partners, served as advisors in the development of each of the data models. Individuals on the technical teams were from environmental organizations, private industry, federal, state, and municipal partners, private landowners, conservation organizations, and citizens groups. One technical team was formed for each of the eight core data models plus an additional Technology Team to provide GIS and other technical guidance to the project. There were more than 100 participants across the nine Technical Teams representing over 45 interest groups. The purposes of the Technical Teams were to:

- utilize local and place-based knowledge about New Mexico's natural resources;
- identify data gaps and needs;
- learn about regional and statewide data and its associated confidence and strengths; and
- use collaboration and consensus to develop model inputs and parameters.

Core Data Models

The data of the Assessment were organized around eight data themes. Themes were suggested in the 2008 Farm Bill and outlined in guidelines provided by USDA Forest Service (Redesign Components: State Assessments & Resource Strategies, Appendix A). Some of these themes were adapted for New Mexico by the Stakeholders These themes are (with Forest Service language in parentheses if adapted): Biodiversity (Fish and Wildlife Habitat); Development Potential (Development Risk); Economic Potential;

Forest Health (Risk); Fragmentation (Forest Fragmentation); Green Infrastructure; Water Quality and Supply; and Wildfire Risk. For each data theme, models were developed and served as the foundation for identifying the priority landscapes within New Mexico. While the 2008 Farm Bill provided the framework for the models developed, the Forest and Watershed Health Plan provided the vision for the content of each model and expanded the scope to include all resources, not just forests. Summary descriptions of the models are provided below; more detailed information can be found in *Volume II – Data Atlases: Methods and Descriptions of Core Data Models Used in the Development of the Statewide Natural Resource Assessment*. It is also available online at the All About Watersheds portal (http://allaboutwatersheds.org/groups/SAS/public/data-atlases).

Biodiversity (Fish and Wildlife Habitat)

Two biodiversity models were developed as a part of the assessment. The first data model examines overall biodiversity within the state; the second model emphasizes biodiversity within forest and woodland systems. The data models identify areas that provide habitat for plants and animals, including, but not limited to, threatened and endangered species. The intent of the models is to assess overall biodiversity and not limit evaluation to habitat for fish and wildlife. The statewide model combines threatened and endangered species potential habitat, sensitive fish species habitat, occurrences of terrestrial species tracked by Natural Heritage New Mexico (NHNM), occurrences of rare plants on Rare Plant Technical Council list and tracked by NHNM, The Nature Conservancy (TNC) ecoregional conservation areas, and Comprehensive Wildlife Conservation Strategy (CWCS, which is the New Mexico state wildlife action plan) key areas. The forest emphasis model combines 1) potential habitat for 14 key forest and woodland species and 2) a majority richness metric of 62 terrestrial species to the overall statewide model.

The statewide and forest biodiversity models are shown in Maps 3 and 4, respectively. The maps delineate areas from the least to most diverse habitat for plants and animals across the state. Approximately 10 million acres (12 percent of the state) were delineated as valuable, diverse habitat in the statewide model, and approximately 11 million acres were identified in the forest emphasis model. These areas are shown as High and High/Medium classes on the maps.

Map 3. Biodiversity (All Resources) Model Results

High Priority
High/Medium Priority
Medium Priority
Medium/Low Priority
Low Priority

SCALE 1:3,380,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
The priority layer was created in 2009
by TNC in NM. The data atlas describing
the input models and associate layers
can be found on http://allaboutwatersheds.org.

50 25 0   50   100   150 Miles
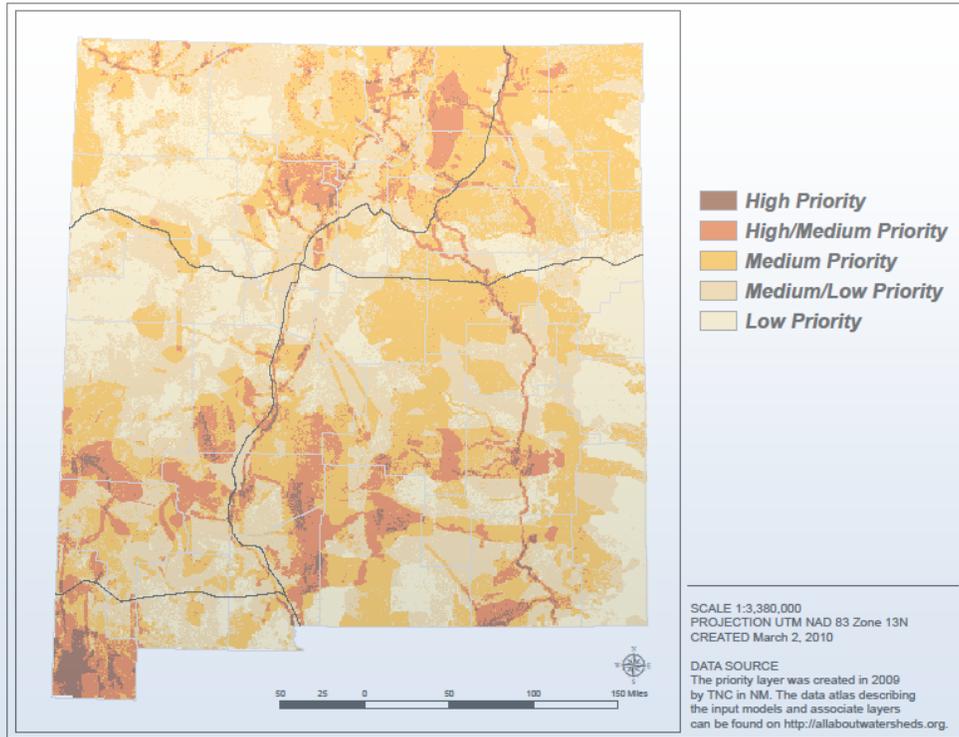
Map 4. Biodiversity (Forest Emphasis) Model Results

High Priority
High/Medium Priority
Medium Priority
Medium/Low Priority
Low Priority

SCALE 1:3,380,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
The priority layer was created in 2009
by TNC in NM. The data atlas describing
the input models and associate layers
can be found on http://allaboutwatersheds.org.

50 25 0   50   100   150 Miles
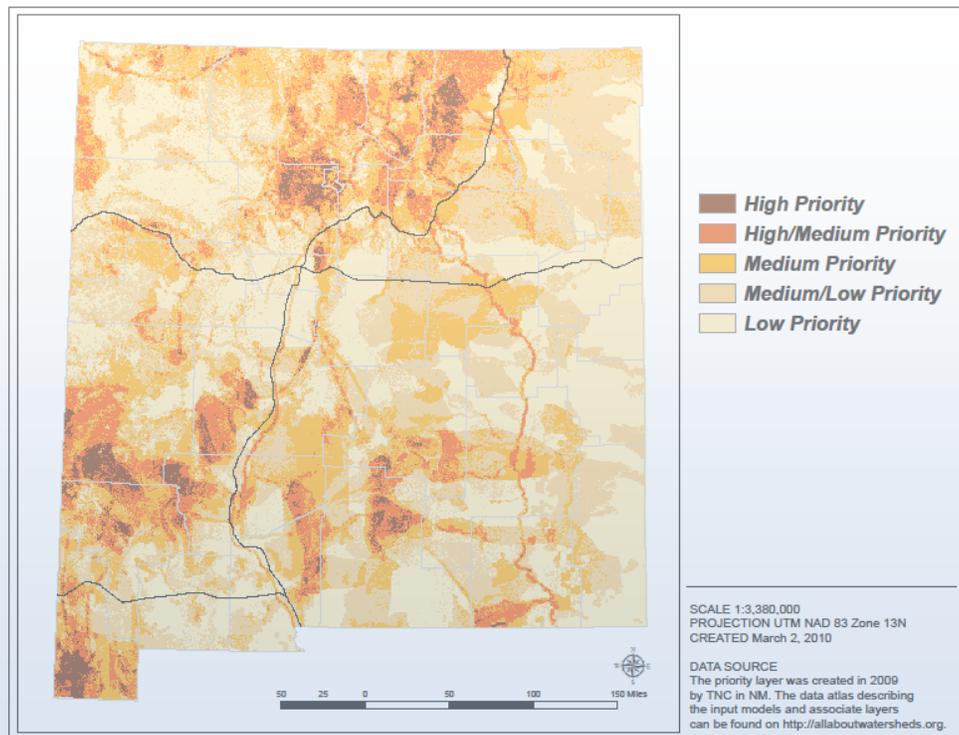
Development Potential (Risk)

This data model emphasizes areas that are projected to experience increased housing development in the next 30 years. The housing development density data were based on data derived using the Spatially Explicit Regional Growth Model (SERGoM) developed by Dr. Dave Theobald (Colorado State University), and more fully described in the data atlas (http://allaboutwatersheds.org/groups/SAS/public/data-atlases). The SERGoM model provides historical, current, and future estimates of housing density for the coterminous United States. The 2000 and 2030 development projections were clipped to New Mexico and combined. The expected development change was grouped into development classes defined by the Theobald data (Table 2). Priority classes for each type of development change were set through stakeholder input.

The final data model (Map 5) represents areas expected to experience an increase in housing development with priority given to those development changes considered most critical to the stakeholder group. Approximately 5% of the state is expected to experience some type of housing density increase. A majority of the increase falls into development change types considered medium priority by the stakeholders (Table 2). High priority development change (undeveloped to exurban or urban suburban housing density and rural to exurban or urban/suburban housing density) is predicted for approximately 955,000 acres (1% of the state). Low priority development change was mapped for less than one-half percent of the land base.

Table 2: Description of Development Density Data and Development Change Ranking

Development Category/Type Change	Priority Rank	2000 Dev Density Class	2030 Dev Density Class
Undeveloped to Exurban	High	0	4, 5, 6
Undeveloped to Urban/suburban	High	0	7, 8, 9
Rural to Exurban	High	1, 2, 3	4, 5, 6
Rural to Urban/suburban	High	1, 2, 3	7, 8, 9
Exurban increase	Medium	4, 5	5, 6
Exurban to Urban/suburban	Medium	4, 5, 6	7, 8, 9
Undeveloped to Rural	Medium	0	1, 2, 3
Rural increase	Low	1, 2	2, 3
Urban/suburban increase	Low	7, 8	8, 9
Commercial/industrial	Zero/No Change	10	10
Exurban	Zero/No Change	4, 5, 6	4, 5, 6
Private undeveloped	Zero/No Change	0	0
Rural	Zero/No Change	1, 2, 3	1, 2, 3
Urban/suburban	Zero/No Change	7, 8, 9	7, 8, 9
0 = Undev. Private; 1=>80 acres/unit; 2=50-80 acres per unit; 3=40-50 acres per unit; 4=30-40 acres per unit; 5=20-30 acres per unit; 6=10-20 acres per unit; 7=1.7-10 acres per unit; 8=0.6-1.7 acres per unit; 9=<0.6 acres per unit; 10=Commercial			

Map 5. Development Potential (Risk) Model Results

High Priority

Medium Priority

Low Priority

SCALE 1:3,380,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
The priority layer was created in 2009
by TNC in NM. The data atlas describing
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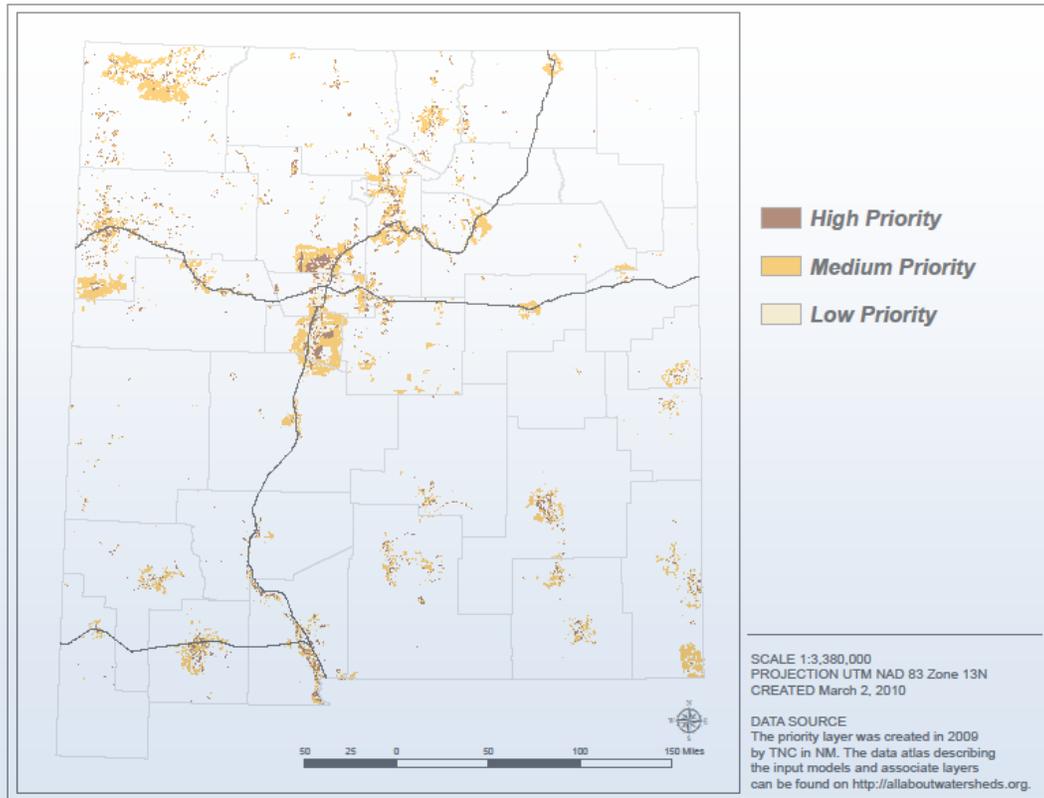
Economic Potential

The economic potential data model highlights areas where forests and rangelands play a major role in local or state economic growth or could in the future. The model also highlights areas that contribute to the development of emerging markets, such as biomass energy. The model is based on four submodels: one highlighting the availability of saw timber, one emphasizing the availability of lower-value material such as firewood or biomass for energy, one valuing the economic importance of natural resources-based recreation, and one mapping expected rangeland productivity. The timber submodel specifically identifies areas where timber, defined as larger diameter trees for traditional lumber markets, could be economically important. The low value wood product submodel assesses smaller diameter trees for emerging markets, specifically biomass. The recreation model maps where active and passive recreation is known to occur and hence is economically important. The rangeland productivity model highlights where rangelands are or could be supporting economic activity based on vegetative cover and precipitation.

The combination of the four submodels depicts landscapes from least to greatest economic potential with approximately 6.9 million acres having highest potential for economic growth (Map 6). The timber submodel identifies approximately 750,000 acres of stands with high basal areas and large trees in working forests (e.g., not in restricted lands such as National Parks) that are accessible (e.g. slopes <40% and within reasonable distance to roads and/or rails). The biomass submodel identifies an additional

744,000 acres of stands with high basal areas and smaller diameter trees in working forests that are accessible. The biomass submodel also includes areas with large amounts of phreatophytes that could be used for biomass energy.

Map 6. Economic Potential Model Results
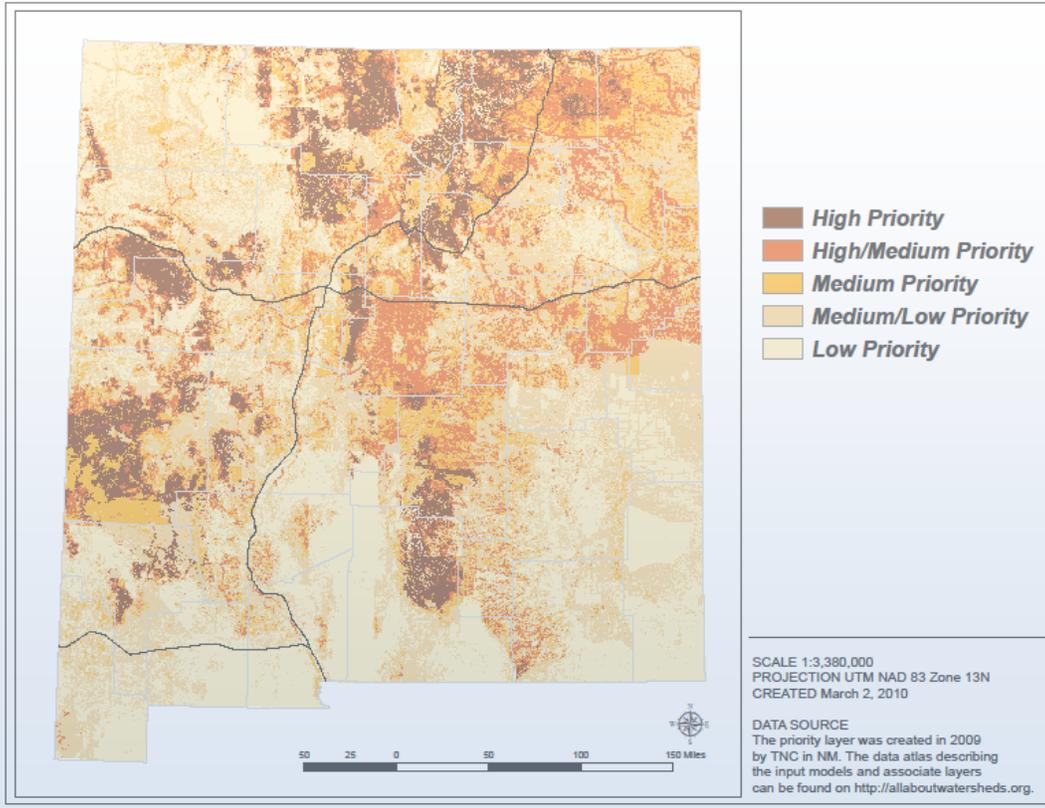
Forest Health

The intent of the Forest Health data model is to emphasize forest and woodland areas that are susceptible to insect and disease outbreaks (Map 7). Approximately 747,000 acres of New Mexico's forests and woodlands were identified as having high risk to insect and disease outbreaks. The technical team identified four available data layers including stand density index (SDI), basal area loss, drought stress, and insect and disease surveys for the model. SDI determines the relative density of a stand, and was used in this model to identify where the density of small diameter trees is high. Basal area loss is defined as "the expectation that, without remediation, 25 percent or more of the standing live basal area of trees greater than 1 inch in diameter will die over the next 15 years (starting in 2005)." For the purposes of the State Assessment, the basal area loss data layer represents areas of dense forest/woodlands with large diameter trees expected to experience mortality from insect and disease. SDI and basal area loss data layers were derived as a part of the 2006 National Insect and Disease Risk Map (NIDRM) and based on New Mexico's Forest Inventory Analysis Data from 1987-1999.

Map 7. Forest Health Model Results
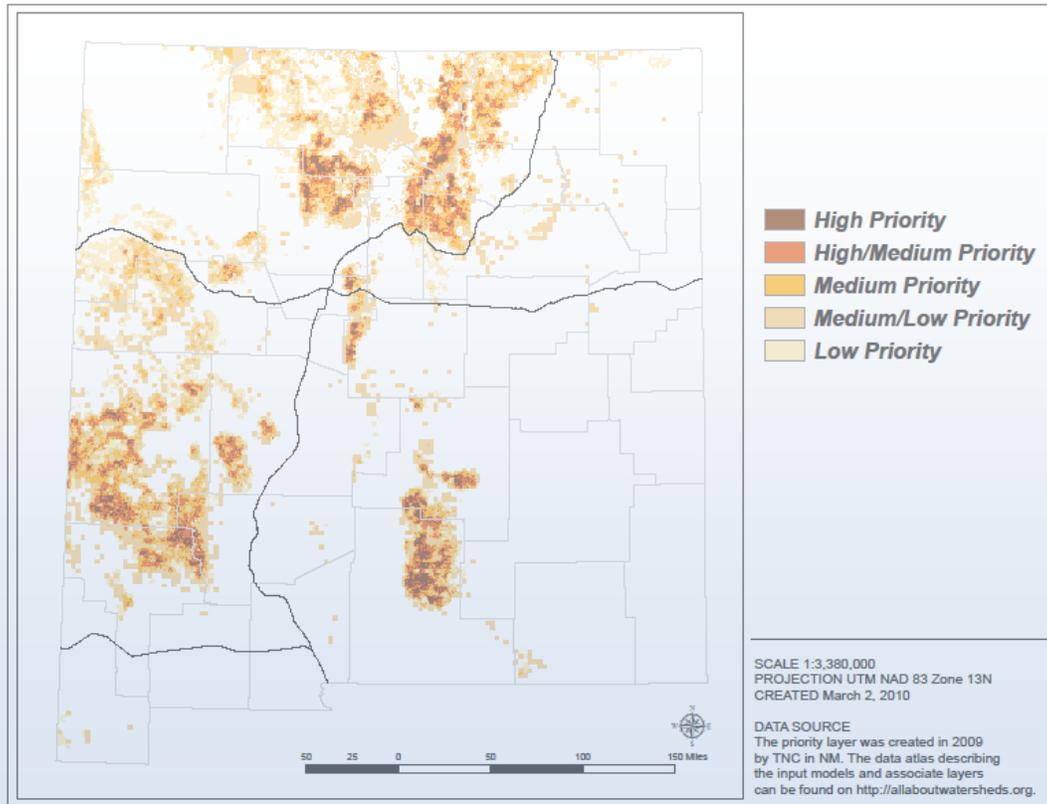
Moisture stress increases susceptibility to insect and disease outbreak as well as wildfire and tree mortality, eventually leading to shifts in vegetation type and distribution. The percent of normal precipitation is one of the simplest and commonly used drought indices. The technical team noted that, although there is little literature to support relating a precise number to a quantified increase in susceptibility, the general assumption that areas which have experienced less than 50% of normal winter precipitation are more likely to experience insect and disease outbreaks is reasonable based on current knowledge and studies in forest health.

Insects and diseases play an important role in maintaining forest health. They are essential to the function of dynamic ecosystems: they serve to thin out some of the trees, recycle nutrients, create habitat and provide food to many wildlife species. However, stressful conditions (e.g., drought-stressed, dense forests) favor extensive outbreaks of forest pests, which can have serious negative effects on the structure and function of forested systems. Unlike other insect and diseases, recurrence of budworm and tent caterpillar outbreaks is likely in areas where outbreaks have previously been detected. Thus, insect and disease surveys were limited to budworm and tent caterpillar in this model.

Fragmentation

The purpose of the model is to represent the current extent of fragmentation of forests, woodlands and rangelands (Map 8). The fragmentation model combines patch size and patch continuity with diversity

of vegetation types per patch and rarity of vegetation types per patch. A patch was defined as an area of natural vegetation not bisected by roads, utilities, or rails. Patch size and continuity were calculated separately for forests, woodlands, shrublands, grasslands and riparian areas. Definitions of each system type can be found in the Volume II – Data Atlases (http://allaboutwatersheds.org/groups/SAS/public/data-atlases).

Larger patches of continuous habitat are more ecologically and economically viable. As forest patch size decreases, habitat becomes isolated and viability of populations dependent on large blocks is reduced significantly. In addition, the sustainability of private forestry activities depends on the maintenance of large intact blocks as a resource base. Less continuous patches contain a large proportion of edge habitat. Edge habitat favors invasive species, increases parasitism and predation, reduces the system's ability to recover from disturbance events such as wind-throw, fires, or insect and disease infestations, and reduces viability of interior and wide-ranging species. The model should be considered a baseline of current habitat fragmentation conditions. Large, continuous patches with high diversity and variety were mapped for 7.3 million acres of land. These areas are the least fragmented and of the highest priority for protection. As stated above, this model focuses on current habitat fragmentation conditions. It does not address trends or connectivity measures of habitat fragmentation. The stakeholders agreed that future models should incorporate metrics addressing these aspects of fragmentation.

Map 8. Fragmentation Model Results

Legend:
- High Priority
- High/Medium Priority
- Medium Priority
- Medium/Low Priority
- Low Priority

SCALE 1:3,380,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
The priority layer was created in 2009 by TNC in NM. The data atlas describing the input models and associate layers can be found on http://allaboutwatersheds.org.
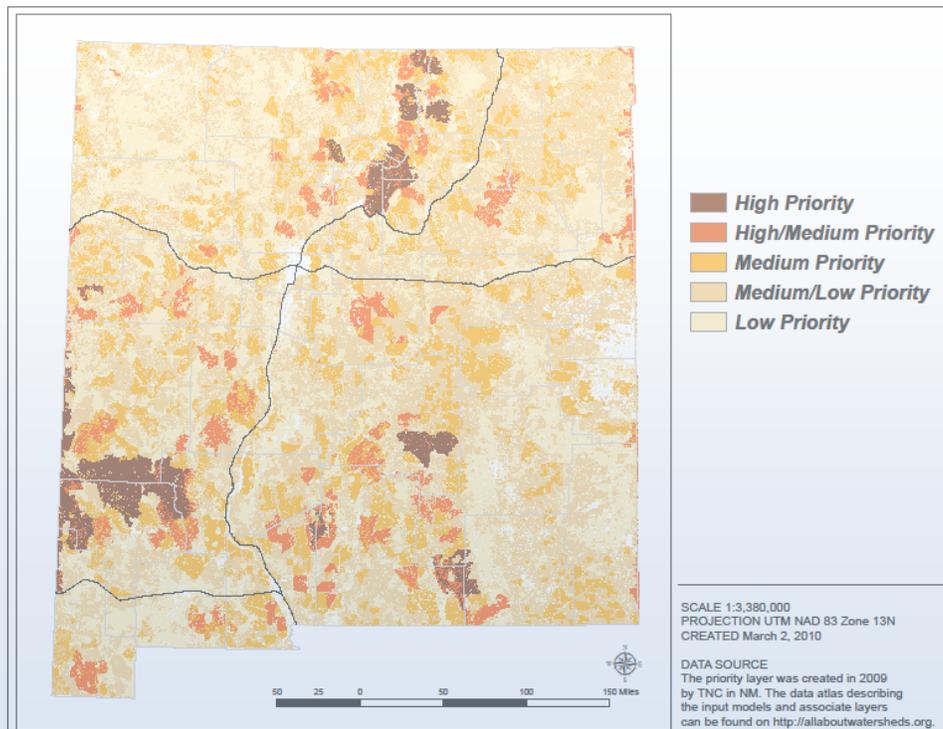
Green Infrastructure

Green Infrastructure is the least defined theme. Definitions vary from coarse-scale strategic conservation planning to localized management of natural infrastructure for stormwater management in an urban environment. For the purpose of the Assessment, the technical team chose to define green infrastructure using the North Carolina Division of Forestry vision:

> *"…an interconnected system of natural areas and other open spaces that are protected and managed for the ecological benefits they provide to people and the environment. It is the idea that trees and natural areas provide ecosystem function and value to sustain clean air and water, reduce soil erosion, provide wildlife habitat, and various other benefits to people."*

The technical team identified 20 key natural and protected areas and connected these key areas using a least cost path analysis. The key areas, or hubs, include the 10 most diverse protected areas as identified through the TNC ecoregional planning efforts and the 10 largest protected areas as identified through the SWReGAP stewardship layer and are assumed to represent the highest quality habitat with an excellent source for ecosystem services such as availability of clean water and a refuge to help maintain healthy wildlife populations. The resulting hub and corridor layer was then prioritized based on ancillary data representing high value conservation areas, such as the CWCS key area analysis (Map 9). A full description of the model and cost layers can be found in the Volume II – Data Atlases (http://allaboutwatersheds.org/groups/SAS/public/data-atlases).

Map 9. Green Infrastructure Model Results

Legend:
- High Priority
- High/Medium Priority
- Medium Priority
- Medium/Low Priority
- Low Priority

SCALE 1:3,380,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
The priority layer was created in 2009 by TNC in NM. The data atlas describing the input models and associate layers can be found on http://allaboutwatersheds.org.
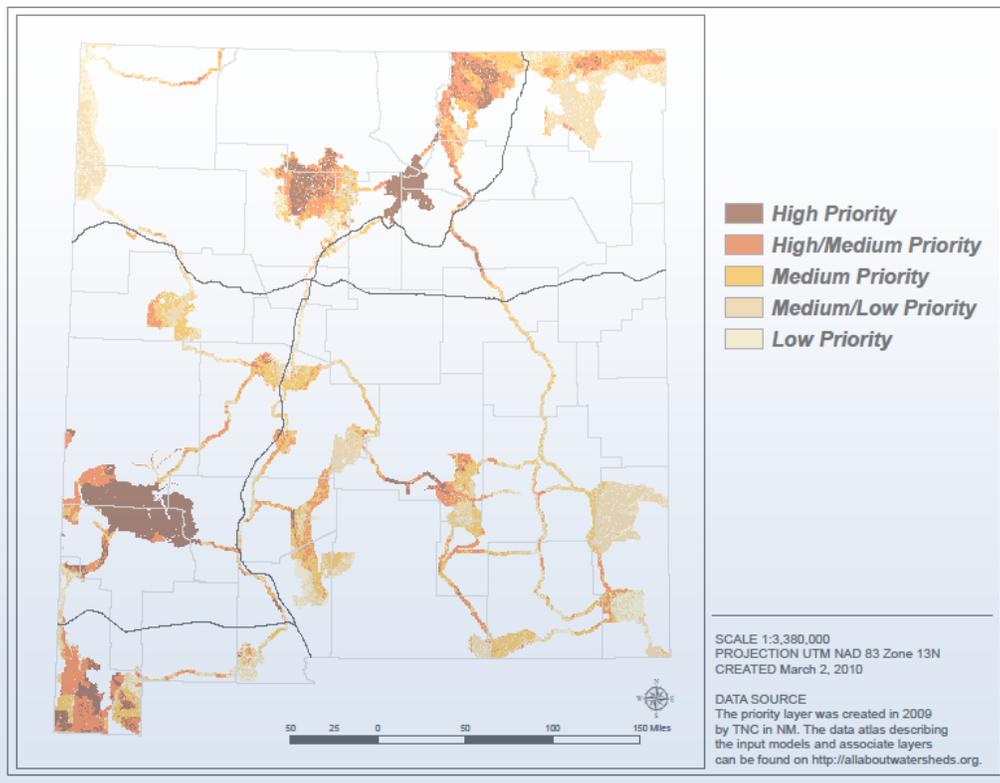
The Stakeholder group did not agree upon the selection of initial hubs, with many desiring the inclusion of additional hubs such as the Sacramento Mountains. This approach also tended to give narrow, sinewy connections among hubs and sometimes connected dissimilar hubs with ecologically confusing paths. Therefore, the stakeholder group had the lowest confidence in the ability of this layer to characterize the green infrastructure at the statewide scale and it was ultimately excluded from weighted overlay analysis and in defining priority areas on the landscape. This model can serve as a starting point, however, for future analysis of green infrastructure.

Water Quality and Supply

The intent of the Water Quality and Supply data model is to prioritize watersheds important for supplying sustainable water along with the potential risks to water quality. For the foundation of the model, the technical team identified the following 10 available data layers: public drinking supply, priority watersheds identified by the New Mexico Nonpoint Source Management Program (WQCC 2009), impaired waters (see below for complete description), specific New Mexico Environment Department (NMED) impaired/impacted watersheds, percent irrigated cropland and pasture, NMED water quality risks, aquifer recharge areas, aquifer vulnerability, impervious surface, and erosion risk.

The public drinking supply data represent 5th code watersheds containing a public drinking water source and are considered important drinking water protection areas. The aquifer recharge data similarly show priority areas for protection. The resulting overlay of the 10 layers (Map 10) delineates watersheds from low priority (low risk and lowest need of protection and restoration) to highest priority (greatest risk and need of protection and restoration).

Impaired waters were defined for this assessment as those listed as category 4 and 5 in the 305b assessment of stream conditions for the *State of New Mexico Clean Water Act §303(d)/§305(b) Integrated Report* (WQCC 2008). The impaired waters include all 303d listed waters as well as those waters with impairments on the 305b list. NMED also supplied data showing specific impaired/impacted watersheds. The first layer identifies watersheds with stream reaches that are impaired by nutrients and bacteria. The second layer shows watersheds which contain significant concentrations of septic systems. The data have not been evaluated or approved through a public process, described more fully in Onsite Sewage Management in New Mexico (NMED 2006), and are provisional. All the data representing impairments emphasize watersheds with serious water quality issues in terms of public health and fisheries in need of restoration.

The NMED water quality risk, erosion risk, aquifer vulnerability, percent irrigated cropland and pastureland, and impervious surfaces data layers identify treats to water quality and supply. NMED water quality risks include watersheds with active landfills, hazardous waste sites, and petroleum sites. The erosion risk layer is a coarse scale estimation based on the Revised Universal Soil Loss Equation. The technical team noted that this data was not particularly effective at measuring risk of non-agricultural areas, particularly forested areas. Improved data would add weight or priority in these areas (see data gaps section).

Map 10. Water Quality and Supply Model Results
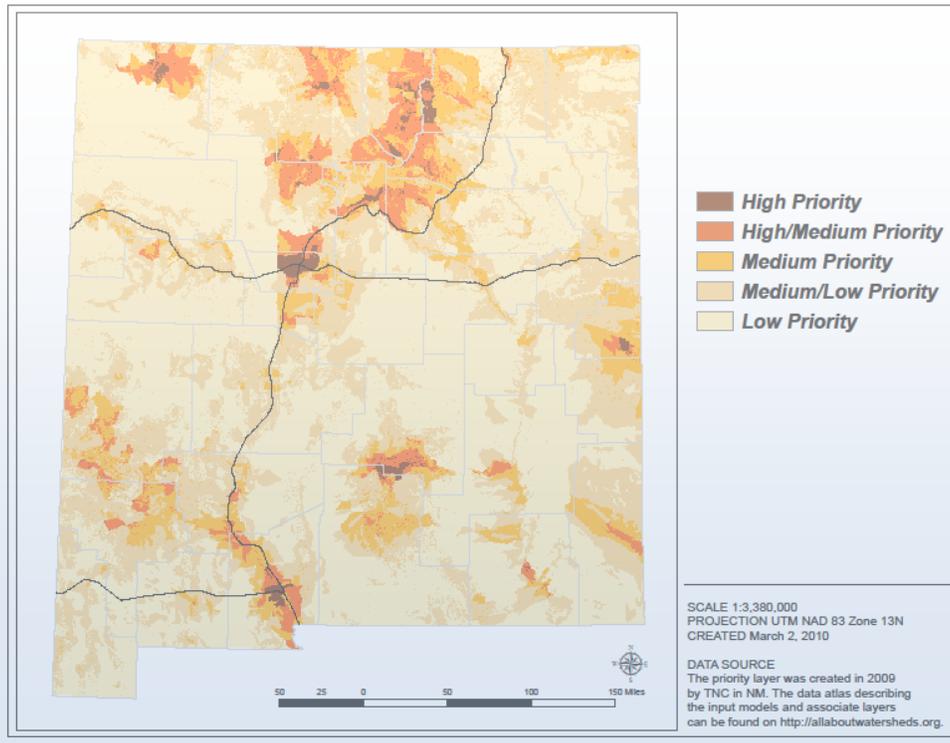
Wildfire Risk

The Wildfire Risk data model identifies areas with a relatively high risk of destructive wildfire. The intent of this layer is to highlight areas where management is most likely to reduce the risk of wildfire damage, which is defined as reducing the impact of wildfire on natural resources, and human infrastructure and development. The model combines three modeled fire behavior parameters (rate of spread, flame length, crown fire potential) and one modeled ecological health measure (fire regime condition class) with wildland urban interface areas and ignition probability. Fire behavior parameters were modeled using FlamMap; fire regime condition class was modeled using the FRCC tool; wildland urban interface areas were delineated using spatial data from the county level community wildfire protection plans within the state; and ignition probabilities were derived using fire history locations from 1987-2008. For a detailed description of each parameter, refer to the Volume II – Data Atlases found at http://allaboutwatersheds.org/groups/SAS/public/data-atlases.

Map 11 shows areas from least to greatest risk of uncharacteristic wildfire. High priority areas with greatest modeled risk to uncharacteristic wildfire were mapped on approximately 4.8 million acres. Of these high priority acres, approximately half (2.2 million acres) are within identified wildland urban interface areas. Wildland urban interface areas were delineated using spatial data from the county level community wildfire protection plans within the state.

Map 11. Wildfire Risk Model Results

High Priority
High/Medium Priority
Medium Priority
Medium/Low Priority
Low Priority

SCALE 1:3,380,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
The priority layer was created in 2009
by TNC in NM. The data atlas describing
the input models and associate layers
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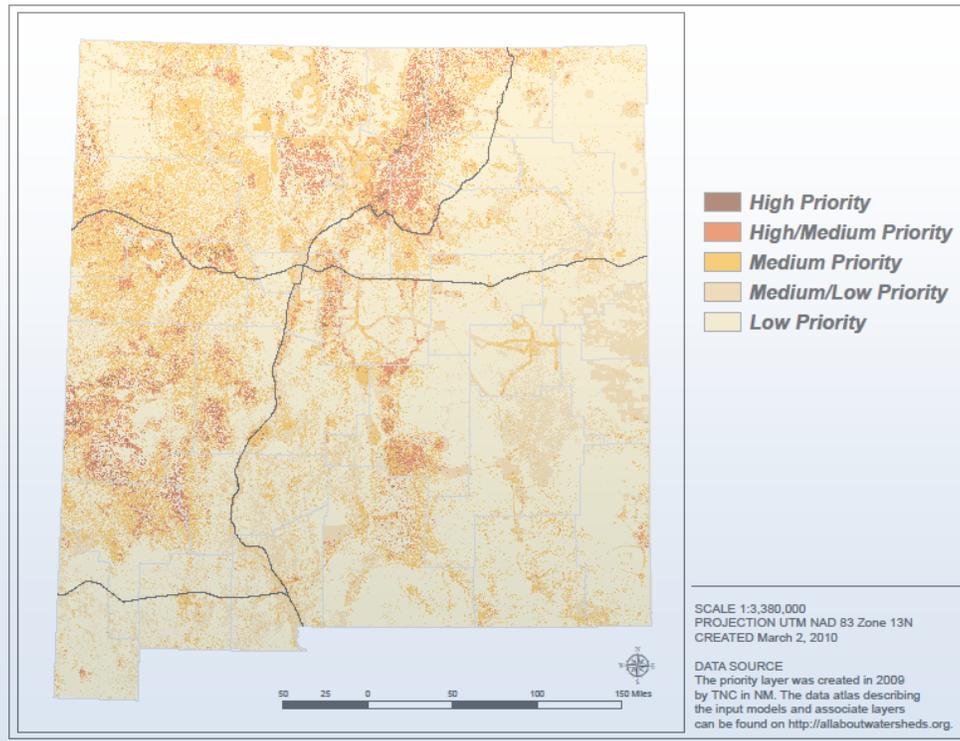
Data Gaps/Data Needs

During the development of each of the data models for the eight themes, the technical teams identified important data needs that would improve the model. Each technical team also prioritized the data needs from high to low indicating the importance of the data gap to the resource model being developed. The identification of key data gaps is a critical product of the Assessment. A detailed list of these data needs not only provides perspective on the content and confidence of the core data models and current assessment but also is an essential part of the assessment process so that this information can be acquired as opportunities arise. Data that were considered by the technical team but not used in the model were also recorded. The identified data gaps/need and data considered but not used lists have been organized by data model below. A summary of common data gaps between the eight models has also been compiled. These shared data gaps are considered priority data needs for the state. While the value of collecting missing data should not be underestimated, the risk of environmental degradation due to "taking no action" while waiting for more complete information is often considered greater than the option of "taking appropriate action" based on current available information. When additional data are available, priorities can be reconsidered or adaptive management strategies can be applied to fine tune existing projects.

Fish & Wildlife Habitat (Biodiversity)

Data Gaps

- High: Soils data. Finer scale soils information is needed to inform restoration potential, ecological site descriptions, and state and transition models and to help describe the natural range of variation within current condition of the landscape.
- High: Better data sharing for wildlife occurrence data. Occurrence data for all species serve as baselines for all biodiversity models. New Mexico's information could be greatly improved with a coordinated strategic approach to data sharing instead of species-by-species approach.
- High: Statewide linkages habitat assessment. A coarse scale corridors layers was used to represent habitat important for movement of species; however, the technical team noted that a more comprehensive linkages assessment would improve the model greatly.
- High: Refined birds/bat flyway data. Spatial data showing fine scale migratory routes critical for birds and bats are lacking.
- High/Medium: Statewide analysis that shows loss of habitat
- Medium: National vegetation classification crosswalk. Develop crosswalk to existing data such as Landfire and ReGap. Habitat modeling limited by ability to show more detailed vegetation classification with existing spatial data.

Data Considered but Not Used in the Model

- *Forest and Woodland Patch Size*: The original forest model included a patch size measure to emphasize large areas that would provide habitat for the greatest number of forest species. The technical team decided to remove this variable as it would weight the model heavily away from small patches that provide key habitat for movement and viability of species, such as the Animas Mountains in the Bootheel.

Development Potential (Risk)

Data Gaps

- High: Regional/county/municipal master plans reflecting future designated land use classifications in GIS. Standards have been developed for incorporating data into GIS framework; however, a statewide layer has not been created.
- High: Statewide layers representing likelihood of future energy (wind, solar, geothermal, conventional extractive) development. This layer would include availability of resource, proximity to transmission and future transmission, and areas for exclusion (e.g., T&E species habitat, crucial habitats and important wildlife corridors).
- High: Zoning information for development needed to show state development patterns.
- High: State Land Office (SLO) disposal areas. Areas for disposal are more likely to be developed.
- Medium/High: Well permits for housing or other water measure indicating increased likelihood of potential development.

- Medium: Tax rates for properties. Identify areas where it is less expensive to locate and manage utilities. Development will occur in areas where utilities will locate assets.
- Medium/Low: Statewide parcel level land/property use/management intent classifications that indicate areas available for potential development.

Data Considered but Not Used in the Model

- *Proximity to Protected Areas:* A distance to protected areas layer was created and intersected with the development potential data. The data were considered useful for specific legacy programs but not an effective measure of development potential. The technical team decided that inclusion of this layer in the model would weight too heavily toward specific conservation areas, and the intent of the layer is to look at development potential regardless of location within the state.

Economic Potential

Data Gaps

- High: Carbon capture and storage potential by ecosystem.
- High: Value of surface and ground water originating from forests and rangelands and potential markets for ecosystem services.
- High: Value of vistas and scenic areas.
- High: Value of active and passive recreation by spatially discreet units.
- High: Medium: Value of ski areas.
- Medium: Tourism and recreation numbers by more discrete units such as by county, town, ranger district, etc.
- Low: Improved lbs/acre data consistency and coverage from SSURGO and STATSGO data sets.

Data Considered but Not Used in the Model

- *SSURGO County Range productivity values:* The technical team investigated using NRCS Soil Survey Geographic (SSURGO) and State Soil Survey Geographic (STATSGO) range productivity values associated with each soil map unit. After review of the spatial data and values, this data set was excluded as it did not reflect where rangelands are or could be supporting economic activity.
- *STATSGO Statewide Range productivity values:* See above.

Forest Health

Data Gaps

- High: Specific stand exam data and updated and complete Forest Inventory Analysis Data. More specifically, forest density and species make-up information as a statewide GIS coverage, including all non-National Forest Lands.
- High: Comprehensive invasive species GIS layer at statewide level.
- High: Aspen and other upper elevation vegetation plot/baseline data.

- High: Lower elevation gallery forest plot data related to invasive species and loss of native riparian forest.
- High: Lack of community forest health inventory and assessments for New Mexico communities.

Data Considered but Not Used in the Model

- *Moisture Stress (1951-2006):* The Nature Conservancy in New Mexico mapped recent trends using data from 1951-2006 in a combined temperature-precipitation variable, the climate water deficit (Enquist et al, 2008). This variable indicates biological moisture stress, or drying of an area. The technical team noted that insect and disease susceptibility is driven primarily by drought stress from past three years and more particularly winter drought stress and decided that moisture stress trends would not be an effective indicator.
- *Insect and Disease Surveys*: The aerial insect and disease survey data are a compilation of forest insect and disease activity of 942 agents mapped from aerial detection surveys in New Mexico. The surveys have been collected since 1987, and data from then until 2008 is included in this analysis for western spruce budworm and western tent caterpillar. Since the intent of this layer is to map areas susceptible to future activity, the polygon data was excluded for all other species because the outbreaks are not expected in the same area again for long periods whereas the damage from budworm and tent caterpillar tends to repeat in the same areas.
- *Forest Inventory Analysis Data:* The forest inventory analysis data served as the basis for the NDIRM effort. Modeling of FIA data to represent stand density was not needed since it had already been completed as a part of the national effort. However, it was noted that updated FIA data are needed statewide.

Fragmentation

Data Gaps

- High: Keeping current with threat of development and changes in the landscape.
- High: Structure and Diversity Data to evaluate patch quality.
- High: Landcover Data that more accurately show Riparian Vegetation Extent.

Data Considered but Not Used in the Model

- *Distance to Roads:* The distance to roads was considered as a measure of edge habitat. Edge habitat favors invasive species and increases parasitism and predation. The continuity metric was used instead to assess patch edge.
- *Connectivity:* As habitat becomes more and more isolated, the viability of populations is reduced significantly. Connectivity measures were not included since it was considered duplicative of the Green Infrastructure and Fish and Wildlife Habitat models

Green Infrastructure

Data Gaps

- High: Spatially explicit high-resolution, *classified, urban* data (e.g., tree canopy data) to evaluate urban green infrastructure.

Data Gaps

- High: Statewide Wetlands Data Layer. Many local wetlands layers exist; however, none covers the entire state. Natural Heritage New Mexico completed a statewide classification; the associated spatial data exist only as a sampling of wetland types, not a comprehensive coverage. In addition, the National Wetlands Inventory has not been completed for New Mexico, and it was unclear whether important ephemeral wetlands such as playas would be identified as a part of this effort. Thus, a comprehensive wetlands layer was identified as the biggest data need.
- High: Pollutant source identification for impaired reaches identified in the *State of New Mexico Clean Water Act §303(d)/§305(b) Integrated Report* . The sources of pollutants in stream reaches where water quality does not meet standards have generally not been comprehensively identified. The identification should have a spatial component and, where possible, pollutant loading from major source activities or mechanisms should be quantitatively estimated. Filling this data gap is an important component of an objective identified in the New Mexico Nonpoint Source Management Program ("Objective 1 – Watershed-Based Planning")
- High: The Water Erosion Prediction Project (WEPP) model for Erosion Risk. The WEPP model is a continuous simulation, process-based model used for assessing various soil and water conservation management options for agricultural, rangeland, and forest sites. The WEPP model is more commonly used for watershed simulations and provides much more reliable information for non-agricultural erosion. However, conducting a statewide, spatially explicit WEPP erosion modeling is time intensive and was outside the scope of this project. Chris S. Renschler at State University of New York has developed a GEO-WEPP program that could be used to develop this information.
- High: Impairment data for ephemeral and intermittent reaches. Creating a systematic approach for ephemeral/intermittent streams combined with more accurate erosion risk will give a better picture of the impact of water quality issues surrounding ephemeral reaches.
- High: Surface water flow trends over time.
- High: Statewide water balance.
- High: Refined vegetation data. Existing vegetation cover data are not attributed with percent cover or the condition of the vegetation.
- Medium: Statewide grazing layer.
- Medium: Ecological site description crosswalk to existing Landcover Types.
- Medium: Statewide data on gaining and losing reaches was considered critical information that could improve evaluation of important recharge sites.
- Medium: Completion of a WRASTIC model for surface water vulnerability.
- Medium: Statewide parcel data attributed with county zoning. This data would improve the model by providing information on areas where ground water extraction could be increased.
- Medium: Road densities for impervious areas.

Additional data gap identified during review of State Assessment by stakeholders

- Groundwater/surface water connection is key to evaluating hydrologic function (stream recharge, water quality, etc.). Any risk to this process could represent a need for action

Data Considered but Not Used in the Model

- *Point of Diversion Data*: The New Mexico Office of the State Engineer maintains a point of diversion layer in its statewide geodatabase. The point of diversion is the well or surface water diversion where the appropriated water is diverted from its natural course to be beneficially used. The data were excluded because the technical team did not think the data could be summarized using existing attributes to accurately reflect agricultural use. The recommendation was to use percent agriculture instead.
- *Arsenic Vulnerability*: The technical team recommended inclusion of an arsenic vulnerability layer. Raw arsenic data are available from the NMED; however, an interpolated data layer showing vulnerability is not available. The NMED is working on the layer which could be added when completed.

Wildfire Risk

Data Gaps

- Very High: Compatible information and data layers representing a consistent, standard method for assessing wildfire conditions by all the agencies with jurisdictional responsibilities. The technical team viewed this data need as the highest priority as it needs to happen before the other identified needs.
- High: Development and incorporation of an ecological health measure into wildfire protection planning that more accurately reflects impact of catastrophic fire on functioning of ecosystems. Fire Regime Condition Class was not considered an effective measure by the technical team.
- High – 2: A comprehensive, statewide spatial layer representing all vegetation manipulation actions (wildfire, RX fire, mechanical treatment (harvest, TSI, etc.) for a minimum of the last 20 years but preferably for the last 50-75 years. This layer would be invaluable for planning and implementation of wildfire management at the landscape scale.
- High – 3: Development of a comprehensive, statewide value at risk layers. The values need to include cultural resource sites and high density recreation areas but may also include riparian corridors, habitat for species of concern layers, private improvements on government lands that need protection, or private improvements in the wildland urban interface that require consideration. Some CWPPs address this issue but a consistent, comprehensive, statewide approach is lacking.

Data Considered but Not Used in the Model

- Index of Community Capacity for Protection from Wildfires (ICCPW). The ICCPW is designed to integrate social, human, financial, and political capital into a single measure. Nine indicators, including age dependency ratio, percent without disabilities, female only headed households, education, percent employed, English proficiency, median income, percent of community below

poverty line, and voter turn-out were used to develop the ICCPW. The community capacity data layer was created by the Forest Guild in 2007. Details of the methodology can be found in Evans et al. (2007). The technical team decided the spatial layer was too coarse to be used as a community capacity metric in the fire risk model.

- Distance to roads. A distance to roads measure was recommended as a proxy for community capacity. The distance to roads layer primarily emphasized wilderness areas and the metric was removed.
- ISO fire ranking. This data source was recommended to display community capacity to respond to fires. The data exist but were not available in the time frame of the project and was not reviewed by the technical team. A portion of the technical team was unsure about its applicability to a statewide model since it focus on fire capacity is most applicable to structural fires and not to wildland fires.
- Distance to fire station. This measure was recommended to show community capacity. A statewide fire station layer exists but also was not available in the time frame of the project.

Summary of Data Gaps/Data Needs

As stated above, a detailed list of the data needs identified by the technical teams not only provides perspective on the content and confidence of the core data models and current assessment but also is an essential part of the assessment process so that this information can be acquired as opportunities arise. The summary list of data needs highlighted below represents priority data gaps, which are either common to many models and/or missing data of key environmental factors. The data are not presented in order of priority.

1. *Updated Forest Inventory Analysis (FIA) data:* FIA data serve as a baseline for all analyses evaluating statewide forest health and economic potential, including timber availability and biomass availability. The most recent of New Mexico's FIA data are over 10 years old with as much as half in some areas being 20 years old. Keeping current with the threat of insect and disease outbreaks as well as evaluating locations where forests and woodlands could play an important role in economic growth for the state depends upon having consistent and updated FIA information.
2. *Finer scale soils data:* Soils data can potentially inform many different model themes from economic potential of rangelands to water quality risks from erosion potential. A statewide layer with fine scale soils data describing important attributes such as texture and porosity is not currently available. The NRCS SSURGO soils data exist at sufficient scale and depth, but a spatial layer is not available statewide.
3. *County- and parcel-level zoning and planning data:* County and parcel zoning planning data were considered important input into the development potential and water quality and supply models. Standards for collecting this data have been developed, an effort spearheaded by New Mexico Taxation and Revenue Department, but the data and funding to create the data have not been secured. The data would improve planning efforts at all levels from local to statewide efforts.
4. *Invasive species data*: Invasive plant species threaten virtually all of New Mexico's ecosystems. They reduce native biodiversity, disrupt ecological processes, and negatively impact economic sustainability of agricultural and forestry industries. Accurate data identifying extent of invasive

plants species distribution is a critical data gap for evaluating ecosystem health and economic potential models.

5. *Structure and quality of vegetation*: Detailed vegetation data would improve virtually all the models excepting development potential. The technical teams identified vegetation condition (e.g., percent natives) and structure (e.g., density of trees) as critical features of this data.

6. *Ecosystem services:* New Mexico's ecosystems provide a wide range of benefits, from timber to beautiful vistas that draw visitors from around the world. This wide range of goods and services supplied are called "ecosystem services." While it is clear that New Mexico's natural resources represent sizeable economic value, from the services they provide (water quality, carbon sequestration, tourism and recreation) to the products they produce (timber and woody biomass), the data to support the valuation of these service do not exist.

7. *Statewide wetlands data:* Many local wetlands layers exist; however, none cover the entire state. Natural Heritage New Mexico completed a statewide classification; the associated spatial data exist only as a sampling of wetland types not a comprehensive coverage. In addition, the National Wetlands Inventory has not been completed for New Mexico, and it was unclear whether important ephemeral wetlands such as playas would be identified as a part of this effort. Thus, a comprehensive wetlands layer was identified as the biggest data need.

8. *Spatially-explicit, high-resolution urban forestry data:* The Green Infrastructure technical team determined that scale of data needed to identify where the UCF Program can have greatest impact was not currently available. Urban Green Infrastructure requires high resolution data. For example, statewide tree canopy data and impervious surface data exist at a 30 meter resolution. As illustrated in Figure 2, a 30-meter resolution is not sufficient for delineating urban forestry priorities within municipal boundaries.

9. *Erosion potential:* The Water Erosion Prediction Project (WEPP) model for Erosion Risk. The WEPP model is a continuous simulation, process-based model used for assessing various soil and water conservation management options for agricultural, rangeland, and forest sites. The WEPP model is more commonly used for watershed simulations and provides much more reliable information for non-agricultural erosion. However, conducting a statewide, spatially explicit WEPP erosion modeling is time intensive and was outside the scope of this project. Chris S. Renschler at State University of New York has developed a GEO-WEPP program that could be used to develop this information.

10. *Better data sharing for wildlife occurrence data*: Occurrence data for all species serve as baseline for all biodiversity models. New Mexico's information could be greatly improved with a coordinated strategic approach to data sharing instead of species-by-species approach.

Statewide Strategy Plan

The Forestry Division's resource managers envision a "three-legged stool" to represent the factors considered to make, fund and implement projects. The legs of the stool or key factors evaluated to support decisions to invest resources are:

Resources: There is concern about the condition of, or a threat to, the natural resource(s). The concern may center on the resource itself or on the potential that resource conditions could negatively impact something else we value, like water supply, public safety, wildlife habitat, or quality of life.

Opportunity: There is some current circumstance that creates a window of opportunity to act now. Examples of such circumstances are available funding, new or existing partnerships, or public attention targeted on the issue or project location. Opportunity may also include considerations of efficiency: doing this action now makes other desired actions easier to accomplish, or is necessary to make those actions possible to accomplish.

Urgency: There is either huge benefit to taking this action now or huge risk in not doing it now. Urgency may also include consideration of the cost-benefit ratio of doing a project sooner rather than later; that is, the project can be done fairly inexpensively now for a substantial result, but costs will increase the longer the project is postponed.

The Assessment provides guidance and scientific backing for the *resources* leg of the prioritization stool. The Strategy and Response Plans recognize that opportunity and urgency are equally weighted when identifying priority project areas. However, the assessment can and should also be used to identify potential future project areas based on resource need.

Landscape level management is resource intensive and requires multijurisdictional collaboration. In general project success depends on concentrated focus during the initial planning and implementation phases. Typical project timelines start with initial collaboration which may include grant writing and visioning sessions. Project planning comes next, followed by implementation. Monitoring and adaptive management are the next key components which continue into the final or operational stage. Ideally once a landscape is identified and treated; it will remain in the operational mode, receiving maintenance treatments on an "as needed basis". At this point, the process is driven by a well-greased partnership of stakeholders who have invested over the years and are committed to long-term stewardship of the area. The ultimate goal is to move all landscapes into this operational mode, yet this assessment provides support for prioritizing the order in which landscapes are addressed.

Project size landscapes should be logically identified. Typically watershed boundaries provide ideal delineations, however, in some situations, community-based or ecologically-based borders make better sense. Typically project areas cover large, multi-jurisdictional reaches. Specific treatment needs within these areas are often confined by need, budget, opportunity and urgency.

Specific project development and planning is implemented at the District level. Districts will use the assessment, along with future updates and analyses, to set long-term goals for developing opportunity in areas with high resource priority. Unlike public land agencies that have greater control in choosing where to plan projects, Forestry Division works primarily with private landowners who are motivated to actively manage their lands. Therefore an important aspect of the *opportunity* leg of the decision stool is to develop effective outreach during the initial or identification phase in priority project areas. Likewise, communities that step forward with willing stakeholders will rank higher as priority projects based on existing opportunity.

The *urgency* leg of the prioritization stool considers both risk and response. The risk aspect of urgency is tied to resource conditions. One example of urgency due to risk is the concept of prioritizing areas where the current fire regime has significantly been altered from pre-settlement conditions (Fire Regime Condition Class = 3). The concept is that these areas are at a greater risk of unprecedented, catastrophic fire, so they should be treated sooner than later to develop stand structures where the fire regime is within historical natural variation. This *urgency* leg elevates priority because rapid response will prevent catastrophic effects of the "no-action" alternative.

The response aspect of urgency is the concept of prioritizing areas that have experienced extreme disturbance events. For example, post burn rehabilitation projects following catastrophic wildfire are quickly escalated to immediate projects in order to reduce flooding and erosion damage that can occur within days or weeks of large fires.

Appendix B includes detailed District discussions including current and planned priority project areas, issues and visions for specific geographies within New Mexico, and partners and collaborative opportunities. Priority area maps were developed for each District based on issues and opportunities identified by assessment results.

Priority Landscapes for New Mexico

Nationally, the USDA Forest Service's State and Private Forestry Program, through collaboration with State Foresters and as part of the S&PF Redesign, identified three national themes that would serve as a guide for the investment of federal funds. Recognizing the utility of aligning state efforts in planning, implementing and measuring success of projects, the Forestry Division adapted these themes. The New Mexico state themes reflect the belief that since all watersheds and landscapes are interconnected, removing lines between ecosystems reduces barriers to collaboration. The state themes are:

- Conserve working landscapes.
- Protect ecosystems from harm.
- Enhance public benefits from natural resources.
- Promote Urban and Community Forests

The Statewide Strategy Plan identifies priority areas based on these themes.

Conserve Working Landscapes

The *Conserve Working Landscapes* goal refers to the many ways landowners and agencies can conserve and manage landscapes for multiple values and uses. Working landscapes provide ecosystem services such as clean air and clean water; wildlife habitat; recreational opportunities; aesthetic and other intrinsic values across the state. They also provide economic benefits through sustainable forest products, grazing, and jobs; particularly for rural communities.

The Issue: Housing, energy, and other development pressures in New Mexico have increased substantially in recent years. Globally, competing demands for fiber, fuel, and food will continue to put pressure on productive forests, range and croplands. Over time, the capacity for communities to meet needs locally will become increasingly important. In addition, maximizing carbon sequestration, providing clean air, and maintaining optimal conditions for wildlife and recreation are key functions of working landscapes. Currently, financial compensation for keeping these lands 'working' is not on par with the intrinsic values they provide. Many acres of forest, woodland, grassland and farmland are converted to developed uses every year.

 Current Trends: Increased energy development is expected throughout the state. New Mexico ranks second nationally for potential solar energy development and twelfth in the nation for available wind energy resources. Plans for renewable energy projects and transmission facilities are under development. Fossil fuel demand and development continue to expand.

Under current economic conditions, the absence of markets for low-value materials means that some sites will not be managed at all, or that only high value timber will be removed, leaving lower quality trees.   This can result in high fire danger, poor quality habitat for some wildlife species, reduced productivity, genetic degradation of the growing stock, and reduced carbon sequestration.   Active forest management depends on realizing an economic return for the landowner. Diverse markets that allow landowners to realize a return from harvesting the full range of woody material is important to achieving sustainable forestry, and retaining working landscapes.   One largely untapped renewable energy resource is biomass from forest residues, woodlands, rangeland and cropland. In woodlands and forests in particular excess woody growth currently exceeds ecological norms and is being removed to improve forest health. These fuels should be utilized in sustainable energy production, although infrastructure is currently lacking.

Demand for housing, especially around existing urban areas, is expanding with two Forestry Division districts, Socorro and Bernalillo, most affected (Appendix B). The results of the existing pattern of development are fragmented working landscapes, a subsequent decrease in ecosystem services and aesthetic values, economic uses such as timber harvesting, fuel wood gathering, and livestock grazing. Traditional rural custom and culture are also at risk. Costs to protect new or expanded communities and energy infrastructure from risks such as wildfire will increase substantially.

Barriers to Addressing the Issue: As populations in New Mexico and elsewhere in the West increase, the need for energy and housing will also increase. Land ownership in the state is fragmented, making it difficult to coordinate planning efforts to conserve large working landscapes. Many residents in New Mexico desire a semi-rural lifestyle, accelerating ex-urban development around existing towns and cities. Near-term economic return from timber or livestock operations may not be as great as outright sale for development. Outreach to New Mexico landowners, ensuring that they understand how to maximize the intrinsic benefits of their forests is a continuous process that is currently unfunded.

Strategies: The Division works with private and public partners in statewide to local planning efforts to highlight the values inherent in New Mexico's working landscapes. The Division also works with communities and private industry to reduce wildfire risk. The Forestry Division offers a number of programs including forest conservation technical assistance, forest harvest regulations, urban and community forestry, forest legacy conservation easements, and land conservation tax incentives to assist and encourage landowners to conserve and sustainably manage their landscapes. A possibility for funding conservation easements may be available from the newly created (2010) New Mexico Natural Heritage Conservation Act. In addition to identifying priority landscapes where existing programs can assist agencies and landowners, the Forestry Division will also need to cultivate additional incentives that will make conservation of working landscapes more economically viable. The Division is working with partners and community leaders to promote new markets, and to create economic incentives for landowners to manage natural resources for all benefits. Specific market-based opportunities include incentives for landowners to benefit financially when they choose to manage for carbon offsets and ecosystem services such as clean water and biological diversity; incentives and educational materials for landowners so they can take advantage of forest certification , and therefore capture more of the sustainably produced forest products niche; track and make available to landowners information on efficient harvesting systems, forest condition assessment, price and product trends, effective utilization technology, and its availability. The Division also promotes sound stewardship and appreciation for intrinsic ecological values in its advice, for landowners interested in obtaining economic value from the renewable resources on their properties, and those who are not.

Priority Landscapes: Priority ecosystems and landscapes were delineated by combining development potential model, fragmentation model, and priority stewardship areas. The mapping and delineation of priority stewardship areas was completed as a part of the Stewardship Activity Project in the spring of 2007. The methodology can be found at http://www.fs.fed.us/na/sap/products/nm.shtml . The priority ecosystems and working landscapes represent the watersheds with the least fragmentation at greatest risk of development pressure and where stewardship collaboration is a priority (Map 12).

To highlight priority working landscapes with economic potential, the core team conducted an overlay of the economic potential model, fragmentation model, and development potential model. The economic potential model represents areas where forests, woodlands, and rangelands play a major role in local or state economic growth or could in the future. Combined with development potential and fragmentation, the resulting priority areas emphasize watersheds where active and sustainable management is important (Map 13).

Map 12. Conserve Working Landscapes: Stewardship Priorities

High Priority
High/Medium Priority
Medium Priority
Medium/Low Priority
Low Priority

SCALE 1:3,380,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
The priority layer was created in 2009
by TNC in NM. The data atlas describing
the input models and associate layers
can be found on http://allaboutwatersheds.org.
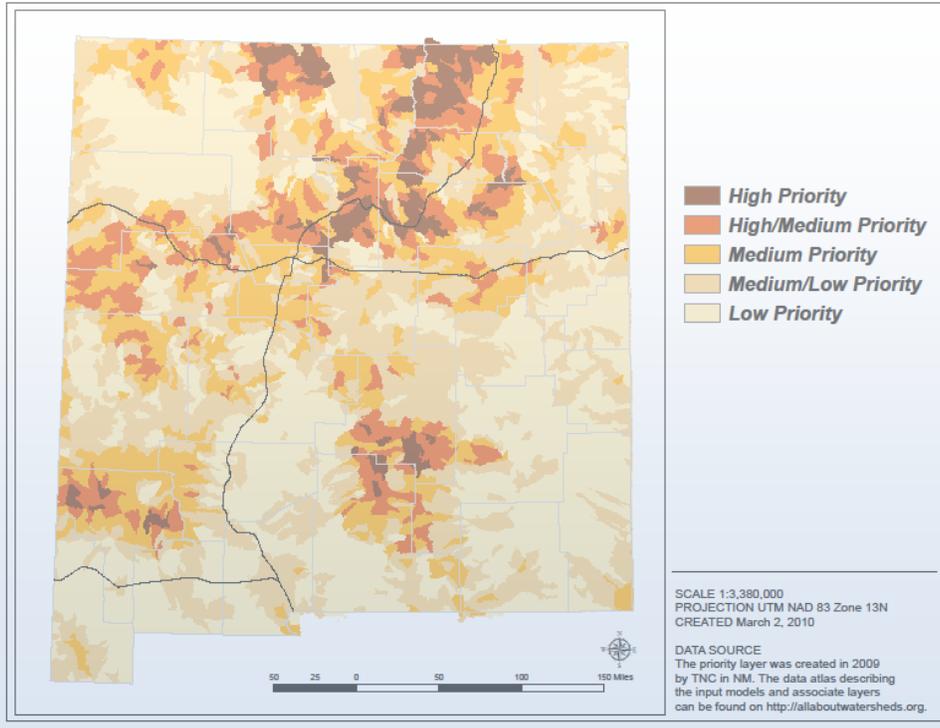
Map 13. Conserve Working Landscapes: Economic Potential

High Priority
High/Medium Priority
Medium Priority
Medium/Low Priority
Low Priority

SCALE 1:3,380,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
The priority layer was created in 2009
by TNC in NM. The data atlas describing
the input models and associate layers
can be found on http://allaboutwatersheds.org.
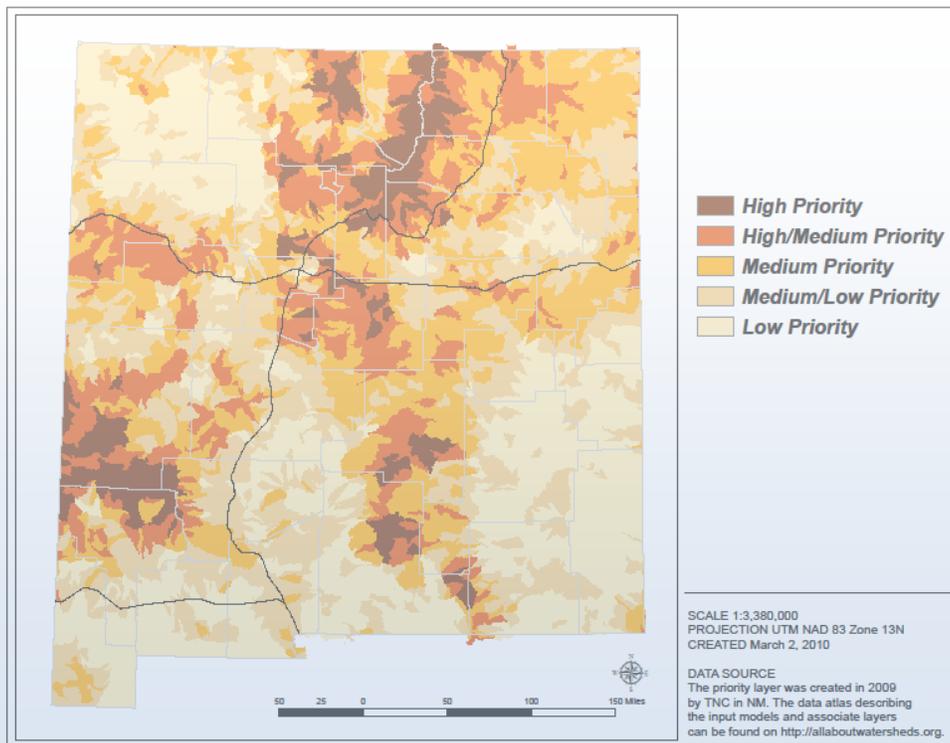
Protect Watersheds from Harm

The intent of the Protect Watersheds from Harm theme is to reduce major threats to the ecological health of New Mexico's watersheds and to restore the health and productivity of impaired watersheds.

The Forestry Division is committed to protecting the ecological values and societal benefits of soundly functioning watersheds. The need to maintain or return them to healthy condition is recognized in the State's Forest and Watershed Health Plan (2005). To accomplish this, the Division has adopted strategies that will lead to restoration of disturbance-adapted landscapes; monitoring, assessment and treatment of insect and disease pathogens; and prevention, early detection, and rapid response to invasive species.

The Issue: Most of New Mexico's systems are disturbance driven, meaning periodic disruptions such as fires or floods are necessary to maintain healthy ecosystems. In absence of these periodic disturbances, significant changes have occurred: the forests and woodlands are denser; grasslands have shrub encroachment; and invasive species are widespread, particularly in riparian areas. Economic realities, societal expectations, and regulatory constraints combine to limit the landowner's ability to react, and the land managers' ability to restore a more natural disturbance regime.

Current Trends: Insects and diseases are important components of natural patterns in forest and woodland systems. They provide food for wildlife, maintain age diversity of trees, and create small openings for growth of grasses and early seral species. In general, insect and disease activity occurs in cycles, generally spanning one to ten years. Large scale insect and disease outbreaks, such as the recent widespread tree mortality caused by pine beetle in piñon-juniper woodlands, may recur on longer time intervals, as witnessed by similar outbreaks recorded from the late 1950s.

Fire is a key driver for many of New Mexico's systems, which in many cases determines their structure, composition and condition. The absence of regular fire across New Mexico's landscapes has led to increased fuel conditions such that the scale and intensity of some current fire events are causing lasting damage to vegetation and soil, increasing erosion, impairing water quality, and decreasing resiliency of systems in general.

Likewise, river regulation, necessitated by human development, has altered or eliminated the seasonal flood events that shaped New Mexico's riparian and aquatic ecosystems. Resulting impacts on hydrologic function lead to shifts in vegetation, degradation and loss of wildlife habitat, change in local microclimates, and increased incidence of wildfire in non-fire adapted landscapes.

Barriers to Addressing the Issue: A number of factors restrict or prevent reintroduction of natural disturbances into fire- and flood-adapted ecosystems. A major barrier is development; subdivisions and exurban housing extend the wildland-urban interface well into areas that once experienced regular wildfire, and historic floodplains sprout homes and businesses where they once supported flood-dependent vegetation. Small landholdings preclude comprehensive planning on a landscape scale and complicate management. In less-developed places, barriers come in the form of checkerboard

New Mexico has 375+ fire departments with over 9,000 members, mostly volunteer fire fighters. The Forestry Division, with the responsibility for wildland fire suppression on state and private lands, has strong partnerships with fire departments in New Mexico. The Forestry Division is committed to developing qualified, equipped fire fighters to safely and effectively suppress and manage fire. The Division:

- maintains agreements with all county and most municipal governments for wildland fire protection.

- supports development, training and equipping of rural fire forces to enhance wildland fire protection, critical preparedness needs for firefighter safety, increased initial attack capability, and training.

- advocates improving fire planning and initial attack capabilities, and encourages adoption of the National Incident Management System (NIMS) and wildland fire techniques training for local fire agencies.

ownerships, and in legal, regulatory, and policy constraints (authorization to assist individual landowners, liability concerns, confusion over regulatory jurisdiction, competing claims to water rights).

Prescribed fire is one of most cost efficient tools for restoring and maintaining functioning systems. However, reluctance of the insurance industry to enter into the prescribed fire liability insurance market because of a perceived high degree of risk makes application of prescribed fire by private landowners extremely difficult. Lack of infrastructure and other industry support also limits the state's ability to move economically marginal material out of the forest.

In New Mexico another significant barrier to addressing forest health issues is the limited availability of quality vegetation data. Keeping current with the threat of insect and disease outbreaks as well as evaluating locations where forests and woodlands could play an important role in economic growth for the state depends upon having consistent and updated Forest Inventory and Analysis (FIA) vegetation information. Parallels can be drawn with the need for data on water, soils, wetlands, and other key environmental factors used to assess the condition and trends in New Mexico's watersheds.

Strategies: Identifying, managing, and reducing threats to ecosystem health is a critical focus for the Forestry Division. The Forestry Division offers a number of programs that address forest health issues including: (1) writing of land management plans, (2) promoting management on private and state lands that reduces tree competition, (3) addressing post-outbreak forest rehabilitation, (4) managing and pre-season planning for wildland fires, (5) collaborating with local weed management areas to reduce the spread of noxious plants in forests and woodlands, and (6) reducing forest management costs by supporting wood-based industries.

Acquisition of updated FIA data is a priority of the Forestry Division. The Division was awarded an ARRA grant to collect detailed FIA vegetation plot data across the state from 2010 to 2012. The Division will seek additional means to complete collection and analysis of the full dataset. This data will greatly improve its ability to effectively manage for forest health issues. The Division will support partners' efforts to fill other data gaps identified in this Assessment as being needed to accurately characterize watershed health.

Collectively, this information will be used for fire protection planning, climate change strategies, biomass and carbon offset calculations, ecosystem restoration planning, and policy development.

Restoring ecological function is another critical component of protecting and improving the condition of New Mexico's watersheds. The lack of fire in many of New Mexico's systems has altered vegetation structure, composition, and condition and increased the risk of uncharacteristic fires. The Forestry Division, through its Wildland Fire Management Program, provides assistance and training for fire planning and fuels reductions to safely and effectively manage fire while promoting natural resource benefit. However, it is important to note that in developed areas, management options that protect life and property will take first priority, but do not preclude ecological restoration. In the WUI, defensible space thinning can be combined with other practices like chipping and water harvesting to accelerate nutrient cycling while meeting stand structure and fuel reduction goals. In the wildlands, certain practices may be required to prepare a site for a second set of actions that meet ecological restoration objectives. For example, a plan may call for mechanical thinning in the forest or other pre-treatments in the grasslands before fire can be applied. The Division will participate in statewide efforts to expand and incorporate knowledge of fire ecology into ecosystem restoration and fire planning. The Forestry Division is implementing a New Mexico Fire Plan strategy that recognizes the importance of communities developing partnerships with federal and state agencies, local and tribal governments, and private citizens to address the threat from catastrophic wildland fire to infrastructure and natural resources. The goal is to build the capacity in and around communities to assess risk, protect lives and property and restore forests to a healthy, sustainable condition. The Fire Plan Strategy will be reviewed and updated periodically.

The Forestry Division specifically tackles preparedness activities to provide resources and a broad array of assistance to fire departments, and manages wildland fire suppression on state and private lands (see sidebar). For both preparedness planning and on-the-ground treatments, an emphasis is placed on areas that have developed or are developing Community Wildfire Protection Plans (CWPPs) or other collaboratively developed hazard mitigation plans. The Division uses National Association of State Foresters (NASF) Field Guidelines that follow objective criteria to analyze the hazards, values and risks to communities that are most vulnerable to wildland/urban interface fires. At the time of publication New Mexico has identified 555 at-risk communities. The New Mexico Fire Planning Task Force recognizes that the CWPPs provide a process to add at-risk-communities, re-evaluate community ratings after significant treatments occur and refine wildland/urban interface boundaries.

 Restoring resiliency to landscapes that are "out of whack" will require close coordination between professionals from different disciplines and jurisdictions. To that end, the Forestry Division is strengthening partnerships with other entities in the public and private sector that specialize in aspects of ecosystem restoration beyond forests and woodlands. The Division coordinates with sister agencies on programs and initiatives that protect range and cropland as well as riparian and aquatic ecosystems. These relationships pave the way for evaluation and project design that address a whole suite of natural resource concerns within a watershed. The Division solicited input from this broad range of partners and incorporated it into the State Assessment and the Strategy and Response Plans.

Priority Landscapes: Overall, priority landscapes for the *Protect Watersheds from Harm* theme were identified by overlaying the Wildfire Risk and Forest Health data models. These watersheds indicate watersheds with high potential for uncharacteristic fires and high susceptibility to insect and disease outbreaks (Map 14). Priority watersheds for addressing specific insect and disease issues were delineated using the Forest Health data model, which emphasizes areas most susceptible to outbreaks (Map 15). To highlight areas where risk of uncharacteristic fire is high, the wildfire risk layer was summarized by watershed (Map 16).

Map 14. Protect Watersheds from Harm: Wildfire Risk and Forest Health

Legend:
- High Priority
- High/Medium Priority
- Medium Priority
- Medium/Low Priority
- Low Priority

SCALE 1:3,380,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
The priority layer was created in 2009 by TNC in NM. The data atlas describing the input models and associate layers can be found on http://allaboutwatersheds.org.
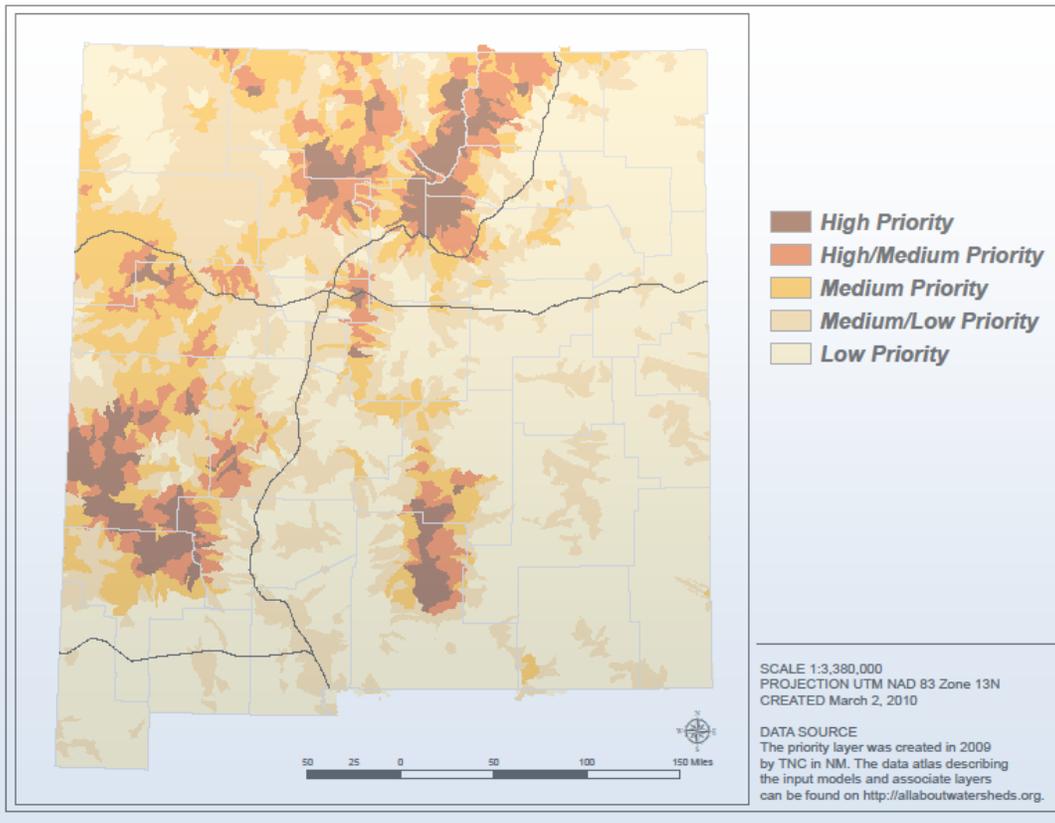
Map 15. Protect Watersheds from Harm: Forest Health

High Priority
High/Medium Priority
Medium Priority
Medium/Low Priority
Low Priority

SCALE 1:3,380,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
The priority layer was created in 2009
by TNC in NM. The data atlas describing
the input models and associate layers
can be found on http://allaboutwatersheds.org.

Map 16. Protect Watersheds from Harm: Wildfire Risk

High Priority
High/Medium Priority
Medium Priority
Medium/Low Priority
Low Priority

SCALE 1:3,380,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
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the input models and associate layers
can be found on http://allaboutwatersheds.org.

Enhance Public Benefit from Natural Resource

The *Enhance Public Benefit from Natural Resources* theme represents strategies that aim to improve the condition of New Mexico's watersheds for public benefit and to reduce risk of uncharacteristic wildfire to ecosystems and communities. Ecosystem services such as clean air and water, fish and wildlife habitat, open space, recreational opportunities, renewable forest products, reduced fire suppression costs, and buffering from climate change are all considered public benefits. Since this theme covers such a broad array of concerns, the trends, barriers, strategies and priority landscapes are addressed separately for each issue.

While the resource concerns are discussed individually, the issues that affect them all trace back to a complex set of ecological, economic, and socio-political drivers. These drivers interact in ways that put stress on the state's watersheds and the benefits they provide. Therefore, the same stressor may be identified in more than one subsection, and a strategy listed under one public benefit may also enhance other benefits. Natural resource managers who understand these interactions are better able to tailor their strategies to address the underlying stressors in ways that avoid unintended consequences. The Western Forestry Leadership Coalition (2010) published a set of recommendations for addressing the major threats to private forests in the West in a way that does just that. Some of those recommend actions the Forestry Division is already engaged in, like utilizing tax incentives that encourage the retention of working forest lands, and promoting utilization of woody biomass. Others, like supporting mechanisms to reward landowners for their stewardship of ecosystem services, are incorporated in these strategies.

In order to identify areas where the Forestry Division would have the most impact for restoring natural resources for public benefit overall, the core team conducted an overlay of the fish and wildlife (statewide) model, water quality and supply model, and economic potential model. The fish and wildlife model represents areas where biodiversity is high; the water quality and supply model depicts watersheds at greatest risk and in need of protection and restoration; and the economic potential model shows watersheds that play or could play a role in economic growth in the future. Map 17 emphasizes watersheds important for economic growth and that contribute to ecosystems services provided by New Mexico's natural resources.

Map 17. Enhance Public Benefit from Natural Resources
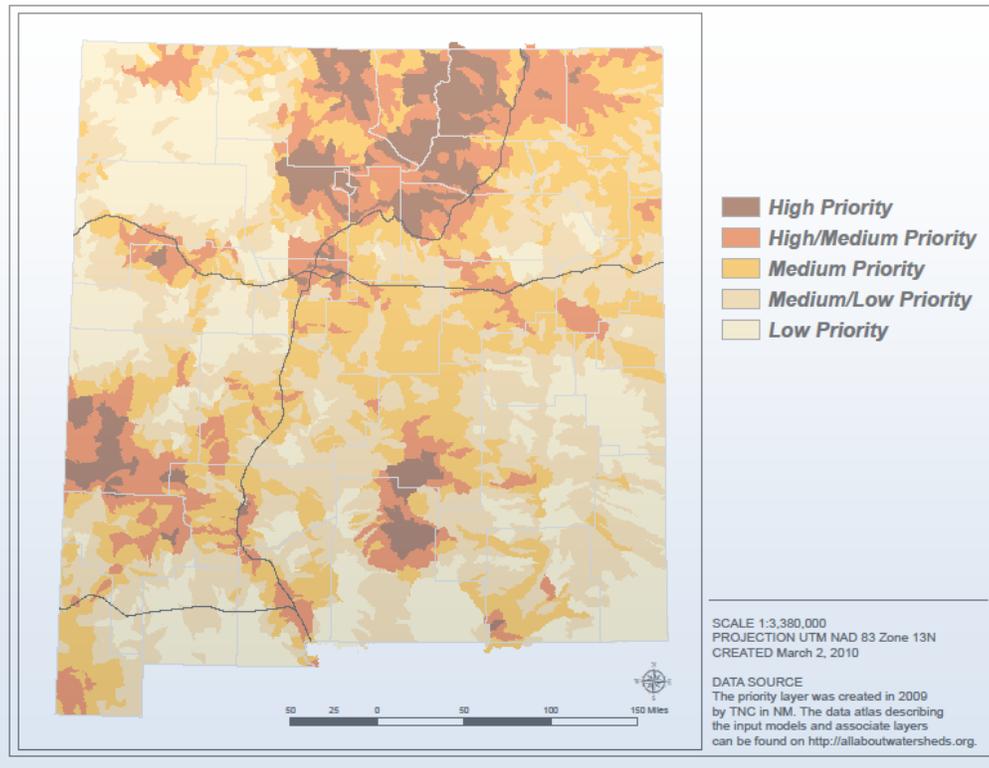
Protecting Water Quality and Supply

The Issue: Even the wettest parts of New Mexico are drier than much of the rest of the nation. For this reason, water is arguably the most precious of all New Mexico's natural resources. Much of the state's water supply originates in the forests and upper watersheds. The highlands capture precipitation, then store and release that water for later use downstream. The characteristics of healthy functioning wetlands and riparian areas also enhance water quality by intercepting and filtering non-point source pollutants. Water supply is intrinsically linked to water quality: polluted streams and aquifers cannot fulfill communities' need for clean, safe water, nor provide suitable habitat for myriad species of wildlife.

Current Trends: Conditions in many watersheds are less than optimal for a combination of reasons, including development and recreational pressures, a history of improper use, and lack of natural disturbances. Climate change threatens to push stressed ecosystems further toward the edge, or even beyond, their natural range of variability. At the same time these ecosystems are faced with increasing demand for water and other less tangible benefits by a growing population.

Barriers to Addressing the Issue: While there is a lot of momentum in New Mexico toward protecting water quality and water supplies, the need outpaces the state's ability to act, in terms of both human and financial resources. In addition, confusing and sometimes conflicting regulations and policy confound attempts to protect waters and watersheds. For example, local zoning ordinances and

covenants can restrict homeowners from removing vegetation in areas where the watershed would actually benefit from selective thinning; and state water policy can be interpreted in a way that discourages landowners from harvesting runoff to promote infiltration and reduce runoff.

Strategies: The first of two Forestry Division strategies to directly protect water quality and supply employs Best Management Practices (BMPs) for forestry in New Mexico. Actions under this strategy include periodic review and update of our Forest Practice Guidelines to ensure that they include state-of-the-art BMPs, educating landowners and land managers about those BMPs, and enforcement of commercial timber harvest regulations. The standards and guidelines pay particular attention to protecting streamside management areas.

The second is a group of actions aimed at preventing and protecting watersheds from harmful wildland fires, and helping restore lands that have been damaged by fire on emergency and long-term basis. This includes identifying watersheds and water supplies at risk, and working with communities to develop and implement plans to protect them.

Clean and abundant water supplies derive from healthy watersheds. The actions listed under the preceding *Protect Watersheds from Harm* theme also support the objective of protecting the benefits of a reliable supply of high-quality water.

Priority Landscapes: The Forestry Division would like to identify and prioritize areas for management important for preserving the function of hydrologic systems. To highlight the watersheds critical for protecting and enhancing functioning of hydrologic systems, the core team evaluated certain components of the water quality and supply model including aquifer recharge, percent irrigated cropland, drinking water supply, and NMED priority watersheds (Map 18).

Similarly, protection and enhancement of water quality is an important strategy for the Forestry Division in addressing the overall goal of enhancing public benefits from natural resources. Key watersheds important for addressing water quality issues were also identified using specific input layers from the water quality and supply model. Specifically, the core team evaluated impervious surface layer, 305b (category 4 and 5) impaired watersheds, aquifer

vulnerability, NMED priority watersheds, erosion risk, nutrient, siltation, bacteria and septic impaired reaches, and water quality risks. Map 19 depicts watersheds critical to protecting and enhancing water quality.

Map 18. Enhance Public Benefit from Natural Resources: Water Supply Emphasis
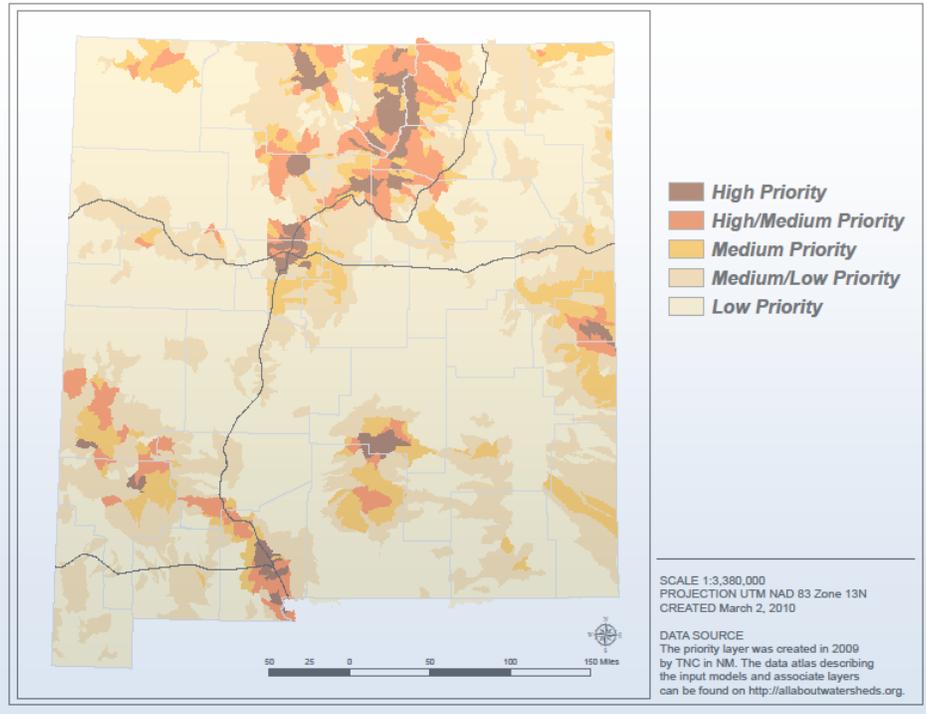
Protecting, Conserving and Enhancing Biodiversity

The Issue: Conserving biodiversity, in this context, is not just about preserving New Mexico's plant and animals, but protecting and enhancing habitats so that they not only provide spaces for our species, but also tangible public benefits such as clean air and water or recreation to communities. Ecosystems with higher biodiversity have greater built-in resiliency – they are more able to adjust to stressors like changing climate conditions.

Current Trends: Housing and energy development, extractive resources uses, transportation development, invasive species expansion, modification of natural processes (e.g. large-scale fire suppression and dams), improper natural resource use and agriculture were identified as primary threats to biodiversity in the CWCS (NMDGF 2006). Where multiple threats occur, the ability to maintain functional habitat that can sustain viable populations of plants and animals is even further reduced.

Approximately 5 percentof the state is expected to experience an increase in housing development (Map 5). Ninety-four percent of the revenue from the New Mexico State Land Office State Trust Lands for 2009 came from oil and gas leasing. For the foreseeable future, oil and gas leasing will remain a major revenue source for the state. This traditional energy development impact will be compounded by renewable energy development, which is expected to substantially increase.

Map 19. Enhance Public Benefit from Natural Resources: Water Quality Emphasis

High Priority
High/Medium Priority
Medium Priority
Medium/Low Priority
Low Priority

SCALE 1:3,380,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
The priority layer was created in 2009
by TNC in NM. The data atlas describing
the input models and associate layers
can be found on http://allaboutwatersheds.org.
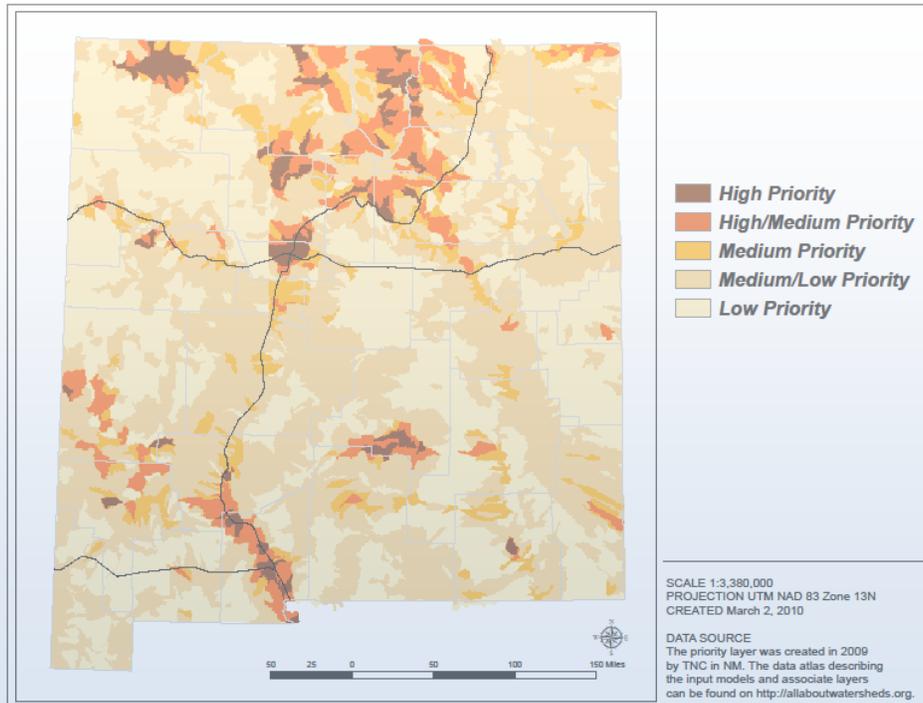
Over 206,000 miles of roads exist in New Mexico, and it is estimated that for every 16 miles, two acres of habitat is impacted (NMDGF 2006). Infestation of noxious weed species is reported as the second leading cause of threatened and endangered species listings nationally (NMDGF 2006). Improper land management practices and fire suppression have had adverse effects on many New Mexico habitats, and cumulatively have altered the functioning of terrestrial and aquatic systems such that local and regional extirpation of sensitive species is increasingly common (NMDGF 2006).

Climate change is an emerging threat. Enquist et al. (2008) evaluated climate exposure of New Mexico landscapes. One of the major findings was that 93 percentof New Mexico's watersheds have become drier over past 37 years as shown by the increasing annual trends in moisture stress from 1970-2006.

Barriers to Addressing the Issue: Similar to issues surrounding the *Conservation of Working Landscapes*, there are difficulties with coordinating statewide planning efforts to address accelerated ex-urban development around existing towns and cities. Addressing data gaps such as the creation of statewide county-level zoning and planning data will help with ability of state to coordinate planning efforts surrounding development pressures. There is also a need to develop a coordinated approach for collecting wildlife and plant occurrence information that will enable managers to have a more complete assessment of the status of biodiversity within the State.

New Mexico does not currently regulate small-scale development of wind or solar projects. Adoption of policies and best management practices for small-scale (< 300MW) projects is needed to ensure proper siting of these energy development projects.

Fire management policies vary among land managers. Although fire is recognized as an integral and important process in managing for healthy landscapes, liability and other legal issues often prevent reasonable use of fire in some jurisdictions. Most federal agencies have specific policies that allow naturally occurring fire on the landscape, but the Division remains unable to fully participate in burning initiatives on private land. Statutorily, the Division is responsible for the suppression of, not the management of, wildfires. Therefore, the implementation of burning on private lands falls directly to the landowner, who may lack adequate access to knowledge, personnel, equipment, or liability coverage, and thus be prevented from effectively using fire as a management tool.

Existing climate data are at a very coarse scale that is difficult for manager's to use in planning. Development of appropriate adaption responses will depend on the ability of climate scientists to downscale existing models from a global to a regional or local scale.

Strategies: Key strategies currently employed by the Forestry Division for addressing biodiversity conservation include implementing multijurisdictional stewardship projects, promoting research, land acquisition, and easement opportunities on biologically unique landscapes, and providing assistance with natural resource planning. The Forestry Division's Hazardous Fuels Reduction and State Fire Assistance Programs work to helps landowners reduce risk of uncharacteristic wildfire, a major threat to biodiversity. The Forestry Division offers assistance to landowners with the NRCS Environmental Quality Incentives Program (EQIP) to identify and enroll agricultural lands for conservation.

Cross-training between professionals from different disciplines, so foresters, range managers and water managers are aware of wildlife concerns, and wildlife biologists are aware of programs, opportunities and limitations is another critical strategy employed by the Forestry Division. Cross-training will help ensure not only multiple objectives are met but also maximum leveraging of funding and personnel occurs at the project-level.

The Forestry Division also runs Cooperative Forest Health and Urban and Community Forestry Programs that develop multijurisdictional stewardship projects aimed at protecting, conserving, and enhancing biodiversity. The Forestry Division is a major partner in rare and endangered plant recovery and research through its Rare Plant Program. The Forestry Division also provides natural resource planning assistance to landowners and other partners using a variety of existing programs including forest technical assistance, conservation seedling program, fire management, invasive plant program, and cooperative forest health.

Priority Landscapes: Key areas important for management of fish and wildlife habitat were identified by combining the statewide biodiversity model with the recreation component of the economic potential model. The priority areas indicate areas of high biodiversity that are also providing recreational opportunities (Map 20). Connecting people and communities to environmental benefits of healthy, diverse landscapes is another objective of the Forestry Division and its land conservation program. Priority areas where stewardship opportunities exist alongside biologically diverse landscapes were delineated by combining the SAP priority layer with the statewide biodiversity model (Map 21).

Map 20. Enhance Public Benefit from Natural Resources: Biodiversity with Economic Potential

High Priority
High/Medium Priority
Medium Priority
Medium/Low Priority
Low Priority

SCALE 1:3,380,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
The priority layer was created in 2009
by TNC in NM. The data atlas describing
the input models and associate layers
can be found on http://allaboutwatersheds.org.
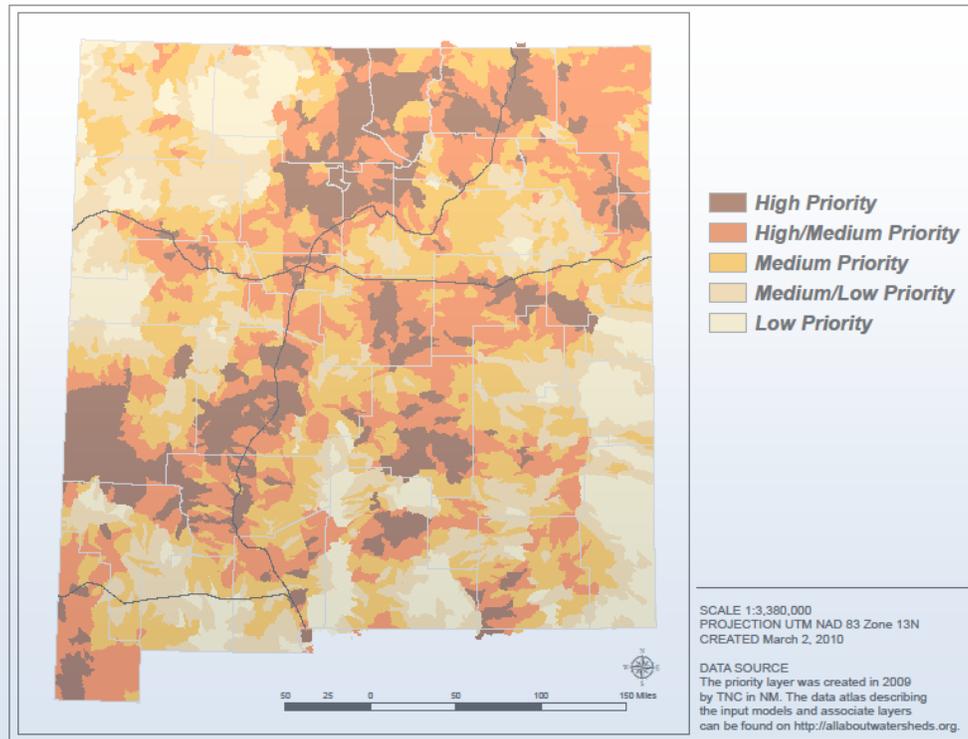
Map 21. Enhance Public Benefit from Natural Resources: Biodiversity with SAP Priority

High Priority
High/Medium Priority
Medium Priority
Medium/Low Priority
Low Priority

SCALE 1:3,380,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
The priority layer was created in 2009
by TNC in NM. The data atlas describing
the input models and associate layers
can be found on http://allaboutwatersheds.org.
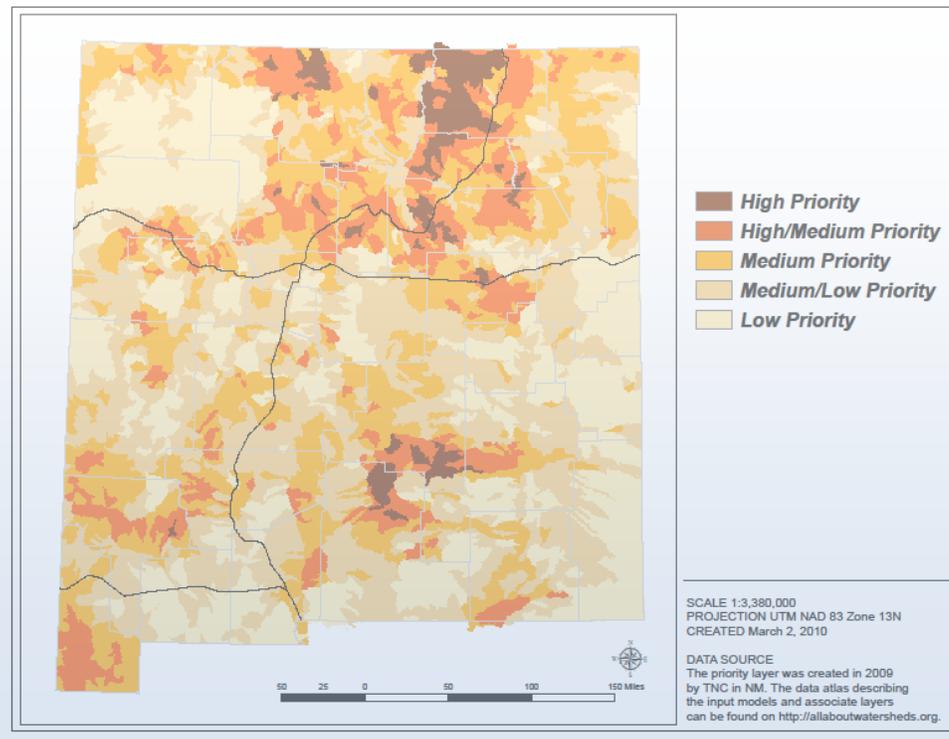
The Issue: New Mexico communities have a long tradition of living close to the land. Traditionally people relied on grasslands, woodlands, and forests sustained livestock and wildlife for sustenance and for market, to produce fuel for heating and cooking and timber for buildings, and to protect scarce surface waters. Today, many New Mexicans still rely on rangelands and forestlands for income and jobs. These working landscapes sustain ecological, economic, and social public benefits.

The incomes and jobs derived from natural resources help sustain both rural and urban communities. Enhancing the economic benefit of these resources to New Mexicans will strengthen communities by creating jobs and adding durability to existing jobs. Furthermore, natural resource based jobs support additional indirect jobs in retail, manufacturing, and transportation sectors that sustain local, regional, and statewide economies. The current conditions of New Mexico's natural resources require active management actions to transition them towards a healthy state. Climate change and uncharacteristic wildfire threatens communities, surface water, and the sustainability of natural resource based jobs and sources of income.

Current Trends: In recent decades, youth from rural communities with a natural resource base have been leaving due to lack of work or for more lucrative work elsewhere. Forestry jobs, typically centered on the logging and timber sectors have declined drastically since the 1980s (O'Brien 2003). Sawmills which were designed to mill large trees have largely closed. Within the last decade, new or redesigned forestry businesses have been emerging the dominant goals of forest management which are currently hazardous fuels reduction and forest restoration. These activities tend to focus on small and medium size trees which have low value. While timber quality trees still are harvested, their demand and value is drastically reduced due to the global economic downturn and an overabundance of supply.

Uncharacteristic wildfire threatens communities, surface water, and the sustainability of natural resource based jobs and sources of income. Hazardous fuels reduction and forest restoration often have secondary benefits such as enhancing wildlife habitat, improving aesthetics, increasing forage production, and protecting watersheds. These secondary benefits are themselves closely linked to natural resource based jobs and income such as hunting license sales, guiding services, sightseeing and recreation based tourism, cattle production, and surface water use. On private lands, ecosystem services provided through good stewardship go largely uncompensated.

Barriers to Addressing the Issue: Implementing hazardous fuels reduction and forest restoration treatments requires a wood harvesting and processing sector. Financially it requires a significant investment to update, rescale, or retool a wood processing facility or wood harvesting operation. The existing federal grant programs to assist with this investment are highly competitive across the nation. Maintaining a trained workforce is also difficult since regular furloughs and periodic layoffs are common. An inconsistent supply of wood from federal lands compounds the workforce issue.

Current forest management practices that focus heavily on hazardous fuels reduction and forest restoration yield large quantities of low value wood that typically do not "pay their way out of the forest." Woody biomass for thermal applications has a high potential to add value to the large quantities

of low value wood produced by hazardous fuels reduction and forest restoration projects. However, in New Mexico, conventional energy sources for heating continues to be preferred despite the opportunity to convert campuses, schools, hospitals, and office facilities from non-renewable fossil fuels to woody biomass heating.

Strategies: The current conditions of New Mexico's natural resources require active management actions to transition them towards a healthy state. The Forestry Division offers a number of programs aimed at facilitating active and sustainable management including:

- Continue to promote utilization of woody biomass thermal applications in or adjacent to watersheds of greatest potential (Map 22) to add value and create a market for the large quantities of lower value wood likely to be generated.
- Create a comprehensive analysis of the forest products industry, trends, projections and current markets as well as a series of priority actions to address the challenges that each industry sector confronts to maintain or diversify markets.
- Encourage all jurisdictions to implement consistent commercial timber harvests in watersheds of greatest potential (Map 22) to sustain and grow wood harvesting and processing jobs and businesses.
- Encourage proactive wildfire planning at multiple scales. Wildfire planning improves wildfire suppression preparedness and prioritizes fuels reduction treatments. The Forestry Division participates in the Firewise program to help communities with active fire management; in CWPPs helping counties and communities engage in comprehensive fire planning; and in statewide mobilization and suppression planning efforts.
- Maintain conservation seedling program to ensure consistent supply of seedlings for reforestation efforts, nursery businesses, and other uses.
- Facilitate post wildfire rehabilitation efforts where applicable to mitigate ecosystem losses and the resulting losses to jobs and incomes from natural resource based communities. Cross-train forest workers in fire and rehab-related jobs to reduce gaps in seasonal employment.

Priority Landscapes: Watersheds with greatest potential for maintaining and enhancing economic benefit of natural resources were delineated using components of the economic potential models combined with the wildfire risk model. The timber, biomass and rangelands layers of the economic potential model delineate watersheds where dense forests and woodlands dominated by small trees, forests and woodlands comprised of larger-sized commercial tree species and productive rangelands can play an important role in economic growth. The priority watersheds emphasize where wildfire risk could negatively impact the economic potential of forests, woodlands, and rangelands within the state and affect the ability of Forestry Division programs and resources to maintain and enhance their economic benefit (Map 22).

Map 22. Enhance Public Benefit from Natural Resources: Economic Potential at Risk of Wildfire
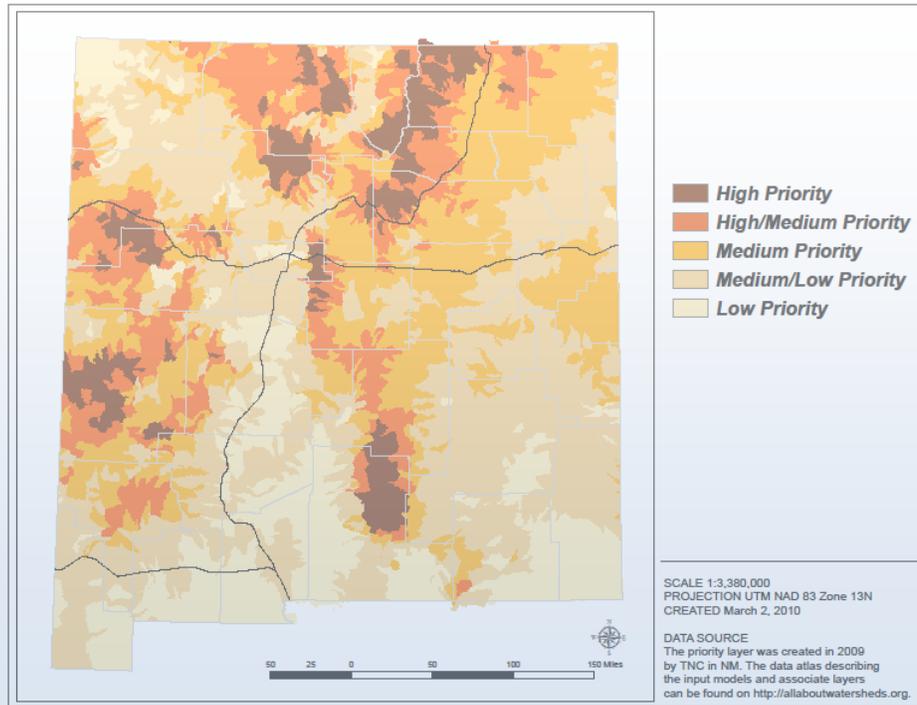
Mitigating and Adapting to Climate Change

The Issue: Address the potential impacts of climate change in New Mexico

Current Trends: Current models of changing climate point to an overall drying and warming in the Southwest. Anticipated changes include rising annual average temperatures, altered patterns and amounts of precipitation, and earlier snowmelt (Stewart et al. 2004). This condition will add an added burden to systems and species already stressed by other natural and man-made factors. Fires may become more frequent, larger and more severe as fire seasons lengthen and drought conditions become more common (Westerling et al. 2006). Insect and disease outbreaks may be more frequent and widespread with the consequence of adjusting species ranges. Enquist et al. (2008) have presented an analysis showing increased moisture stress over the last 37 years across 93 percentof New Mexico watersheds.

Barriers to Addressing the Issue: The ability of climate scientists to downscale existing models from a global to a regional or local scale is currently limited, in turn limiting managers' ability to plan appropriate responses in a particular watershed. General trends can be detected, but we are not yet able to predict what species or plant communities will prove to be most vulnerable or most resilient to the changes.   Marketplace incentives to encourage carbon sequestering or trading are in early development.

Strategies: As the Forestry Division helps partners manage ecosystems potentially affected by climate change, both *mitigation* and *adaptation* strategies can be employed. Mitigation strategies are actions

that reduce the load of excess CO_2 in the atmosphere. One mitigation measure relevant to the work of natural resource managers is carbon sequestration. Economists and scientists are looking at natural landscapes as potential storehouses of excess carbon. Forests are being valued more for their ability to sequester carbon (Ruddell et al. 2007). Investing in carbon sequestration services is often a more cost-effective carbon-offset alternative than many other current options in other sectors (Smail and Lewis 2009; Lubowski et al. 2006). The price of carbon varies over time and has ranged from $0.60 to $60 per ton (Chicago Climate Exchange 2009; FAO 2004; van Kooten and Sohngen 2007; Richards and Stokes 2004; Neeff et al. 2007). There are some uncertainties about carbon storage and how to view potential carbon loss from needed forest projects, or natural disturbances (Sedjo 2006; Van Kooten 2009). However, some value should be attached to the 148 million tons of carbon stored in trees in New Mexico's forests (O'Brien 2003), especially if new climate regulations increase the value of carbon offsets. Maintaining healthy urban forests reduces energy use for heating and cooling, thereby reducing anthropogenic carbon, and provides a tangible mitigation measure individual citizens can make. The Division's urban forestry program can help citizens make these changes through a statewide strategic tree planning program for energy conservation.

Adaptation strategies are activities that help species or systems adapt and survive the Impacts of climate change. The Division will focus on management strategies that can be characterized as "resistance", "resilience" and "response" (Millar et al. 2007). An example of a resistance strategy is the removal of the first bark beetle infected trees in a stand to prevent a beetle outbreak. The Division conducts actions to enhance resilience when it thins forest stands to increase vigor and lessen tree susceptibility to stress from drought and disease. Response to the expected changes includes actions that help systems adjust to changed climatic conditions. For example, the Division, through its tree planting program has the ability to make changes in either the genetics or the species mix. If ponderosa pine sites are no longer able to support pine because of drought, piñon pine could be planted instead.

Within our cities and towns, urban foresters help communities choose tree species that can best adapt to new conditions. Some research indicates that warming climatic conditions over a 20 year period increased the amount and duration of tree pollination (Bortenschlager and Bortenschlager 2005). Choosing trees that shed less pollen may help reduce allergens.

Priority Landscapes: To highlight areas important for mitigation and adaptation to climate change, the core team combined the statewide biodiversity model and the forest health model with a climate change exposure layer developed by TNC (Enquist et al. 2008). The climate exposure layer delineates areas which have experienced high degrees of moisture stress in the past half century. The resulting map (Map 23) shows areas of high biodiversity at high risk for forest health issues and a high degree of climate change exposure.

Map 23. Enhance Public Benefit from Natural Resources: Mitigate and Adapt to Climate Change

Legend:
- High Priority
- High/Medium Priority
- Medium Priority
- Medium/Low Priority
- Low Priority

SCALE 1:3,380,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
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can be found on http://allaboutwatersheds.org.
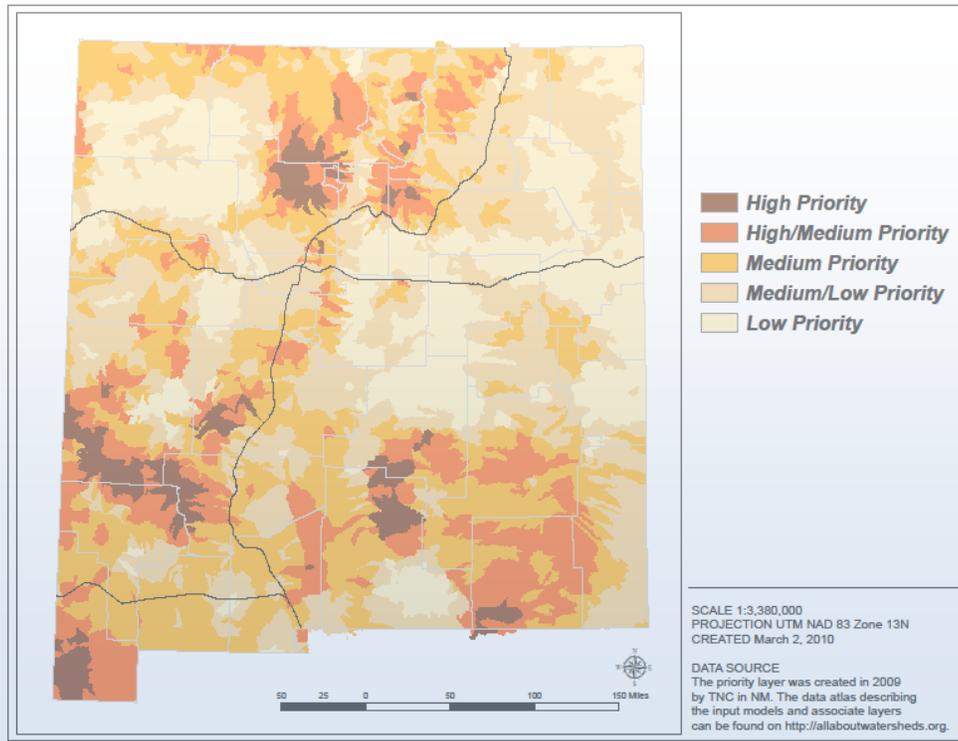
Promote Urban and Community Forests

The Promote Urban and Community Forestry goal refers to the many ways agencies, communities, and citizens can manage and develop their community forests to maximize the benefits they provide to the people and the environment. Community forests provide immense benefits, including: ecosystem services (clean air and clean water, wildlife habitat, etc); improved quality of life (shade for reduced energy use and heat island impacts, aesthetic values that can result in increased volunteerism, community achievement and reduced crime); and economic stimulus (increased property values, green jobs).

Within New Mexico, we have identified approximately 150 communities that the State Urban & Community Forestry (UCF) Program can assist with local program development. These communities range in population from more than 500,000 to less than 500; the demographics and environment (desert, forest, plains) are also highly variable and in turn, strategies to serve these communities vary greatly. To-date, New Mexico's UCF Program has charted a very progressive agenda focused on empowering our communities to develop sustainable programs that can maintain healthy community forests and maximize benefits for their citizens. Strategic program delivery is essential in continuing to build a statewide program that serves the needs of our communities.

Community Awareness

The Issue: Community forestry programs involve many partners working toward the same goals. Therefore, community awareness of local issues, initiatives, and actions is essential to overall program success. Community residents and leaders need to understand the importance of community forests.

Current Trends: With the help of new products and partnerships, community awareness is improving. Within the last 3 years, the State UCF Program developed extensive partnerships and leveraged state funding to produce a toolkit called "Plan Smart, Rethinking Green". This toolkit is rapidly becoming a valuable tool that is transforming the way communities value their trees and recognize the need to develop sustained "green" initiatives and programs that add value to their communities. Strategic program partnerships in addition to the toolkit itself are effectively empowering new communities throughout the state to develop unique and sustained strategies and programs.

Barriers to addressing the Issue: High variability in community demographics, social issues, economic resources all create barriers that make it difficult for our statewide program to efficiently and effectively serve our communities. Educating community leaders and citizens requires an ongoing investment, and limited staff and budget hinder our effectiveness.

Strategies: The strategy to increase community awareness is focused on 2 simple tenants: (1) Assist communities with developing unique strategies to meet their needs (resulting in true empowerment and sustainable local program development); (2) Build a network of partners that continues to enhance awareness among communities and can also assist with serving our communities.

Several partnerships have been developed that are improving statewide program delivery. These partnerships are rapidly creating a web of networks that will continue to grow and serve our communities. Current partners include: Tree New Mexico, New Mexico Municipal League (NMML), New Mexico Clean & Beautiful and Keep New Mexico Beautiful, several cities throughout the state, New Mexico Youth Conservation Corps, Think Trees New Mexico, International Society of Arboriculture – Rocky Mountain Chapter. While continuing to further relationships with current partners, there are a number of strategic new partnerships that are currently being pursued and will continue to evolve: NMML's Municipal Officials Leadership Institute (MOLI), NM Association of Counties, NM Region Council of Governments organizations, Nursery organizations, Landscape Architect organizations, Planning & Zoning, Public Works, NM Recreation and Parks Association, Business community.

Community Forest Health

The Issue: Community forests face many health challenges including: lack of species and age diversity, and lack of tools and knowledge to develop healthy and sustainable forests. One of the prominent issues in many New Mexico towns is the dominance of a single species (often Siberian elm) that is susceptible to increased insect and disease issues. Aging community forests that lack trees in younger age classes can experience widespread tree mortality. Although not as obvious, but just as important, is the issue of insuring communities are maximizing the opportunities to have proper size trees using appropriate amounts of water and nutrients to provide the best benefits.

Current Trends: Most of New Mexico's communities are faced with major forest health issues, limited awareness of the issue, and limited resources to effectively manage their forests. Once communities are aware of their forest health issues, they need the expertise and resources to effectively inventory, assess, and manage trees. Whether a community is faced with a high percentage of aged and declining Siberian elm (which is currently providing the majority of community forest benefits) or an overstocked conifer urban-interface forest, they need more resources to effectively to maintain a healthy and sustainable community forest.

To-date, New Mexico has built effective strategies to inventory, assess, and manage overstocked conifer urban-interface forests. However, not all communities that could benefit from these strategies are doing so. The Forestry Division and extensive partners continue to build capacity and awareness to reach communities who are not yet managing their urban interface. Strategies continue to be employed that leverage limited resources and bring funding to treat overstocked federal, state, private, and municipal lands in order to reduce the risk of wildfire and developed sustained healthy forests. The major need in serving communities with conifer urban-interface forests is developing sustainable local programs and effective strategies for biomass utilization.

In communities where most of the forest has been established through plantings or as the result of human habitation, very little has been accomplished to effectively inventory, assess, and manage the trees. In-fact, only a few communities have complete street tree or park tree inventories that are used to manage their community forests.

Barriers to addressing the Issue: A variety of barriers exist to effectively address this issue, which include: limited awareness of the problem; limited municipal funding to inventory, assess, and manage; limited professional expertise in communities (both at the municipal level in the form of certified arborists; and limited guidelines in the tree care industry (limited certified arborists and tree workers, lack of industry standards of appropriate tree care, and need for improved nursery standards).

In communities dominated by conifer urban-interface forest issues, the major barriers to effective management are: lack of continual funding; absence of support for pro-active management, and inadequately trained and available forest workforce and biomass industry. In some areas there has been significant progress with addressing these barriers, but statewide there is still much work to be done.

In order to address these issues, a major effort needs to be undertaken to *increase awareness*, *develop partnerships*, and *infuse funding and resources* to help these communities develop the knowledge and tools to effectively manage their community forests.

Strategies: *Awareness* is currently being increased through existing State UCF Program delivery and implementation of the "Plan Smart, Rethinking Green" initiative; this is an on-going effort that will be built upon for years to come. *Partnerships* are currently being developed and will continue to be developed and enhanced to create a joint effort for a positive impact. These partnerships will build on current strengths to develop a joint effort that will positively impact communities and the industry. *Funding and resources* will be infused into communities strategically to have a lasting impact and empower local community development. These resources and funding opportunities will be offered

through competitive Community Forestry Assistance Grants (which aren't currently available) that will be made available based on increases in Federal or State funding to the NM UCF Program. All of these strategies are currently being built and evolving; they are heavily reliant upon increased funding at the state level from either Federal or State resources.

Several partnerships have been developed that are improving statewide program delivery. These partnerships are rapidly creating a web of networks that will continue to grow and serve our communities. Current partners include: NM Chapter of the Colorado Nursery & Greenhouse Association, NM Urban Forest Council, USDA Forest Service – Region 3 Forest Health staff. While continuing to further relationships with current partners, there are a number of strategic new partnerships that are currently being pursued and will continue to evolve: Colleges and Universities, NMSU Extension and Master Gardeners, forest health stakeholders and industry partners.

Recognizing Environmental Services

The Issue: Until recently, community awareness of the Environmental Services provided by trees has been minimal in New Mexico. Trees are under-utilized for energy savings, water conservation, and other benefits such as enhancing clear air and water.

Current Trends: With increased interests in carbon markets and other ecosystem services, community trees are receiving renewed attention for provided benefits not often recognized. Recent discussions of Green Infrastructure as a valuable community asset have elevated community among water stakeholders in the state. As a result, a recent Green Infrastructure workshop was held in Albuquerque and is already resulting in discussions for ongoing projects and efforts throughout the state. The Division's Urban and Community Forests (UCF) Program offers technical support and serves as a conduit for Green Infrastructure development through community forestry strategies in our communities. In addition, the Division is developing partnerships and seeking funding resources for data on the benefits of community forest for air quality in select regions of the state. The Division works with Tree New Mexico to expand on partnership opportunities with Public Service Company of New Mexico (PNM) to develop a Tree Planting for Energy Conservation Program.

Barriers to addressing the Issue: Extensive barriers exist to effective implementation of strategies for using trees as environmental tools in New Mexico. These barriers include: limited community awareness; lack of data on the benefits to air and water quality in the southwest; areas of limited knowledge and support among stakeholders including state agencies, municipal public works, etc.

Strategies: A diversity of strategies are currently being implemented and continue to involve as we learn and make progress in gaining partners and supporters for using trees as environmental tools. Current strategies include: development of partnerships through a variety of venues including air, water, energy, etc.; funding to complete the necessary research to support further program and individual project development; development of a statewide strategic tree planting program for energy conservation.

In addition to foundational partnerships mentioned in *Issues: Community Awareness* and *Community Forest Health and Sustainable Community Program Development*, several partnerships have been

developed that are improving statewide program delivery. These partnerships are rapidly creating a web of networks that will continue to grow and serve our communities. Current partners include: NM Environment Department, several local community sustainability managers, Texas State Forest Service, Arizona State Forestry Division, industry consulting organizations. While continuing to further relationships with current partners, there are a number of strategic new partnerships that are currently being pursued and will continue to evolve: Environmental Protection Agency (EPA) – Region 6, AridLID (Green Infrastructure Low Impact Development in the Arid Environment), community public works and energy organizations, Public Service Company of New Mexico (PNM), Las Cruces' Smart Growth Implementation Project on the El Paseo Corridor.

Priority Landscapes: Several models developed as part of the State Assessment have direct applicability to the delivery of New Mexico's UCF Program, these include: Green Infrastructure, Forest Health and Water Quality and Supply. However, given the scale of the assessment and data gaps none of the data were appropriate to use to identify priority landscapes. As with other division prioritization strategies, urgency and opportunity issues are equally weighted with resource needs. Therefore, the Division sets a high priority for working with communities that are actively promoting community forest awareness, have identified local issues, and have clear plans to implement strong and sustainable community forest programs.

Green Infrastructure

The Green Infrastructure technical team determined that scale of data needed to identify where the UCF Program can have greatest impact were not currently available. Urban Green Infrastructure requires high resolution data. For example, statewide tree canopy data and impervious surface data exist at a 30 meter resolution. As illustrated in Figure 2, a 30-meter resolution is not sufficient for delineating urban forestry priorities within municipal boundaries. Albuquerque's example project can be used as a model for how other large communities in New Mexico can obtain the necessary data to plan and develop their Green Infrastructure effectively.

Forest Health

The health of urban forests in New Mexico communities is at great risk. Significant concerns with urban forest health include, but are not limited to: lack of species diversity; an aging and declining urban tree population (namely the Siberian elm populations spread throughout many of our communities that provide immense community benefits, but are over-mature and rapidly declining); limited inventory, assessment and effective planning in our communities for urban forest management (includes tree care, removal, replacement, etc.).

In the State Assessment, the lack of urban forest health data was identified as a significant data gap. To-date, only a few of our communities have any type of inventory or assessment: Albuquerque (volunteer inventory in parks only); Las Vegas (volunteer inventory in select parks); Roswell (inventory and management plan for parks). The Forestry Division needs to work with communities to inventory, assess, and plan for appropriate management actions now and into the future to appropriately address management of our urban forests.

Water Quality and Supply

The Water Quality and Supply model was identified as potentially useful to provide a general perspective for cities with opportunities to develop UCF projects that improve water quality. UCF programs and projects can have positive impacts on water quality through drinking water supply, 305b impaired watersheds, and through strategies that convert impervious to pervious surfaces.

Similar to the Water Quality models, air quality maps and models that may be available through EPA were identified as a valuable source to identify areas where UCF projects could be implemented to improve air quality. Specific, statewide information at scale desired, however, was not available.

New Mexico EMNRD Forestry Division Programs

Forest and Watershed Management

With an emphasis on private and state lands, the Forestry Division:

- provides technical assistance and promotes sound forest and watershed management toward statewide ecological balance.

- supports the development of community-based resource management plans and facilitates acquisition of forest health project funding.

- regulates the harvest of forest products through permits and law enforcement on state and private forestland.

- conducts habitat protection projects by studying plant species abundance, defining rare and unique ecosystems, acquiring easements and purchasing key properties to protect lands.

- administers numerous land conservation programs ranging from buying lands and easements to be held in perpetuity to monitoring endangered plant populations.

The Forestry Division can acquire ecologically unique lands through the Natural Lands Protection Act – jointly buying and co-holding parcels with New Mexico's non-profit conservation organizations. A prime example is the Blue Hole Cienega, near Santa Rosa. One of New Mexico's last true wetlands, it is home to three endangered plant species: the Pecos sunflower, the Great Plains ladies' tresses orchid, and the Wright's marsh thistle. The Forestry Division also secures conservation easements, allowing landowners to maintain ownership, but forfeiting development rights. The 2003 Land Conservation Incentives Act (LCIA) provides tax credits for land donations or conservation easements to land trusts or government agencies for natural area protection, outdoor recreation, open space, or protection of historic places. The LCIA is admisitered by the Forestry Division, and lands entered into the LCIA are protected in perpetuity.

Forestry Division assists New Mexico communities by evaluating those most at risk to wildfire and insect and disease infestation by developing management programs and implementing mitigation projects. Forestry Division develops sustainable forestry plans that enhance quality of life by providing tree care training, distributing low-cost seedlings, crafting resource management plans and identifying forest health project funding. These efforts promote healthy, sustainable forests in New Mexico for the benefit of current and future generations.

- implements the federal Forest Legacy Program, which purchases conservation easements from private forest owners to perpetually protect forest values such as wildlife habitat, watershed, and wood production.

- oversees the New Mexico Endangered Plant Species Act by determining which plants are threatened or endangered, monitoring rare plant populations, and coordinating state and federal projects for research and recovery of New Mexico's endangered plants.

Born of the Forest and Watershed Health Plan and part of the Forestry Division, the Forest and Watershed Health Office provides leadership and support for the many local, state and federal agencies responsible for the health of the state's forest and watershed ecosystems. The Office works to institutionalize and implement the Forest and Watershed Health Plan and coordinate the state's ecological restoration activities over the long term. The Forestry Division, through the Forest and Watershed Health Office, hosts a multi-entity Coordinating Group to facilitate open dialog between major agency and public sector representatives, identify issues in need of attention, and collaborate on projects and problem-solving. Together, they coordinate actions geared toward allowing restoration work to be done more easily, more effectively, and more efficiently. Those actions include developing tools, resources and partnerships, and finding ways to address institutional barriers or policy challenges that hinder restoration. The Office provides a clearinghouse for information, funding and other resources, working with statewide, regional and national entities to initiate and support needed action and policy development. Office staff offer technical support and services that enhance the capacity of stakeholder groups engaged in restoration to deal with problems on an ecosystem or landscape scale. The Forestry Division promotes campaigns and events around collaborative efforts that foster forest and watershed health in New Mexico.

Community Forestry

The Forestry Division empowers New Mexico communities to protect, enhance and utilize their forest resources. The Division serves to enhance the economic viability of New Mexico communities while protecting their natural resources. Services include assistance to communities vulnerable to damage from wildland fires, insects, invasive species and other natural processes; support for sustaining

community-based forestry programs; training on forest health principles; distribution of low-cost seedlings; and access to contractor labor and other resources. The Division also provides assistance in developing sustainable forestry practices, including the development of value-added forest products industries that utilize thinning by-products.

New Mexico has more than 100 cities and many more villages and towns where the majority of its citizens live. The Division's Urban and Community Forestry (UCF) Program serves these communities by providing education, funding, and resources to plan for, plant, and care for community trees. The program is committed to serving all communities in New Mexico and their unique needs that can be met through the use of trees and vegetation as a tool to "make their community better."

The UCF Program's mission is to empower communities to develop and sustain healthy community forests for the benefit of current and future citizens of the state and the environment. The underlying goal is to create and support sustainable community-based forestry programs.

In 1990, the State Legislature created the New Mexico Forest Re-Leaf Program (Re-Leaf), which is designed to educate the public, help protect the environment, and improve the quality of life by encouraging and arranging for the planting of trees throughout the state by children, students, parents, schools, civic and community groups and the general public. Administered by the Forestry Division and funded completely through private and corporate donations, Re-Leaf provides grants to public entities such as local, state, federal and tribal government agencies as well as school districts for the planting of trees on public lands for the purpose of creating an educational tool enhancing community forests and educating the public on the benefits of trees. In addition to its educational and tree-planting mission, Re-Leaf also fills a budgetary void for public entities lacking tree-planting funds. Since 1990, approximately $500,000 has been granted toward the planting of more than 18,000 trees.

One of the most important facets of proper land management is the ability to protect the land from fire, harsh weather conditions, and erosion. For more than 40 years, the Forestry Division has offered landowners low cost tree seedlings for reforestation, erosion control, windbreak establishment, Christmas tree farms and more. Since the program began in 1960, more than four million trees have been purchased and distributed throughout New Mexico. The Forestry Division works with landowners on the best uses and types of trees for their land, depending on location, elevation, soil quality and availability of water. More than 40 species of tree and shrub are made available through the program twice a year for the spring and fall planting periods.

Wildfire Management

The Forestry Division has the responsibility to protect lands from wildfire and has the lead responsibility for wildland fire management on non-federal and non-municipal lands. The Division provides for fire fighter safety and community protection while promoting natural resource benefit through programs such as Firewise, Smoky Bear and Fire Information. The Division maintains appropriate fire suppression capability, including the development of qualified fire fighters and the maintenance of state-of-the art firefighting equipment.

The Inmate Work Camp Program (IWC) was established by state statute in 1997. The program provides a work force to help improve forest health and the safety of citizens living in and near forested lands. Project work is conducted only on public lands. The IWC was developed through the combined efforts of the New Mexico Corrections Department and the Forestry Division. Projects are coordinated by the Forestry Division's office located at the state's Los Lunas Minimum Security Prison Facility and are completed by minimum security inmates who are professionally trained and supervised by Forestry Division employees. For several years, a second location at the minimum security facility in Grants provided female inmate work crews. Since 1997, Division inmate work crews have conducted hundreds of natural resource projects, improved thousands of acres of wildlife habitat, responded to dozens of wildfires and planted tens of thousands of trees.

New Mexico EMNRD Forestry Division Districts

The Forestry Division implements programs across six districts; Chama, Cimarron, Bernalillo, Las Vegas, Socorro, and Capitan. Each district is led by a district forester who oversees a staff of natural resource professionals dedicated to assisting private landowners in the management of their forests and woodlands. Due to the highly diverse landscapes within each Forestry Division district, the district staffs are adept at engaging with a wide array of partners to tackle specific landscape issues. For example, the Bernalillo District balances the urban and wildland urban interface needs of Albuquerque's East Mountains with the needs of rural communities in the western counties while the Chama District has worked to develop silvicultural answers to quaking aspen decline in mixed conifer forests. Appendix B details the current condition and priority landscape assessment completed for each district.

Statewide Response Plan

The Statewide Assessment process used the best knowledge and geospatial resources available to evaluate the condition of New Mexico's natural resources and the Statewide Strategy Plan interpreted those data to identify priority landscapes within four broad themes: *Conserve Working Landscapes; Protect Watersheds from Harm; Enhance Public Benefit;* and *Promote Urban and Community Forests.* The goal of the Statewide Response Plan is to identify how New Mexico will invest programmatic and personnel resources to address the priorities identified in the Statewide Strategy Plan. Specifically, the Statewide Response Plan delineates how federal funding and other resources will be invested to address national and state priorities; describe how the proposed activities will meet national State and Private Forestry program objectives; identify these items in a timeline for implementation; describe the resources necessary for the State Forester to address the recommended actions; identify stakeholders and their roles; and outline a monitoring plan and an adaptive management strategy.

Leveraging Existing Partnerships and Opportunities

Currently the Forestry Division collaborates with a broad array of partners to accomplish a variety of goals. These include many groups and agencies within the state. A few important partners are the Soil and Water Conservation Districts, the New Mexico Association of Counties, the New Mexico Municipal League, New Mexico's 22 tribal governments, and many other state, federal and private organizations. These partnerships have worked toward the development of hazardous fuel reduction grants, community and county wildfire risk planning, and wildfire risk mitigation education and public outreach.

The New Mexico Forestry Division partners on many forest restoration projects throughout the state. For example, on the Socorro District, division staff have partnered with the Bureau of Land Management, the State Land Office, private landowners, the New Mexico Department of Game and Fish, conservation organizations and others to improve forest health conditions on Hunting Unit 16E south of Magdalena, New Mexico. Activities include prescribed burning, thinning, erosion control, and habitat improvement and partners coordinate planning and assist with funding, staffing and implementation of treatments to affect habitat at a landscape level. With strong collaborative partners and demonstrated success, the Forestry Division successfully secured competitive grant funding to expand and enhance this project.

This type of coordination can be found across the state, but on the Bernalillo District, the Wildland Urban Hazardous Fuels treatment program can point to success under tragic circumstances. Targeted as a priority project in 2006, the Forestry Division focused State Severance Funding to treat thousands of areas in the Manzano Mountains southeast Albuquerque. The project was spearheaded by the Claunch-Pinto Soil and Water Conservation District and included many partners including the New Mexico Water Trust Board, State Parks, and the Natural Resources Conservation Service (NRCS). Within two years, the area saw three large fires with extreme fire behavior. Landowners who participated in the project generally saved their buildings and forests. Those landowners who did not treat their properties and were within the fire perimeter suffered extreme losses.

Coordination isn't confined to the backwoods. The Division has a progressive Urban Forestry program targeted at New Mexico's communities. A recently funded competitive grant is providing start-up funds to establish a forester position for the South Central Resource Conservation & Development District (RC&D) to improve community protection work in Lincoln and Otero County. Cooperators include both counties, the Village of Ruidoso, the Forestry Division, the NRCS, and community and industry organizations. The forester position will escalate on-going Wildland Urban interface projects to truly have landscape scale impacts.

Building New Partnerships to Address Priority Landscape Issues

The State Assessment and the Strategy Plan identify many thousands of priority acres that are in critical need of management attention. These acres far exceed the current and expected budgets of the Forestry Division and the many agencies that have collaborated on this effort. Additionally, the wood products and increased forage that would be generated from managing these forestlands do not currently offset the management costs under current market scenarios. As a result of these factors, the Forestry Division is fostering and developing new and existing partnerships to address forest management, restoration, and conservation challenges in the state through 2015 and beyond.

Action Items by Forestry Division Program

The Forestry Division districts cover wide swaths of the state encompassing anywhere from two to eight counties and highly variable landscapes diverse in their human communities, wildlife, plant assemblages, and in the way they use their resources. For example, the Chama District includes highly forested Rio Arriba County and the western half of Taos County with many acres of private, tribal and federal forest land. The District also serves San Juan County whose land jurisdiction is dominated by the Navajo Nation, contains the fossil fuel rich San Juan Basin, and also includes the forested Chuska Mountains. Due to the size and diversity of the Forestry Division districts, the Statewide Response Plan more explicitly highlights action items by Forestry Division Program area rather than by district. These Program areas include: Forest and Watershed Management, Community Forestry, Wildland Fire Management, and Capacity Development. The action items identified align with the Forestry Division's Strategic Plan and guide the on-the-ground work at the districts. The State Assessment and Priority Landscape Analysis by District (Appendix B) also guide on-the-ground work of the districts.

Forest and Watershed Management

The Forestry Division's objective for Forest and Watershed Management is to provide technical assistance and promote sound forest and watershed management toward statewide ecological balance. Thirteen action items have been identified to accomplish this objective:

- Private Land Stewardship: Helping landowners manage their natural resources through technical assistance, training, funding and other support.
- Assistance to Tribal and public land managers: Work collaboratively toward shared goals and objectives at the policy and project levels.

- Commercial Timber Harvest Regulations: Serve as the regulatory agency to ensure commercial timber harvest activities on private and state lands comply with harvest regulations.
- Hazardous Fuels Projects: Develop, implement, and identify funding for hazardous fuels reduction projects on private and state lands.
- Insects and Disease Outbreaks: Identify and manage for existing and potential insect and disease outbreaks that affect or endanger forest health.
- Forest and Watershed Conservation Practices: Develop and provide leadership on land conservation practices.
- Natural Resource Planning: Assist landowners with natural resource planning including the development of plans.
- Post Rehabilitation: Develop and implement methodologies for forest and woodland rehabilitation after major insect or disease outbreaks, or catastrophic wildfire.
- Family Forest Owners: Assist family forest owners in the management or conservation of their forestlands.
- Facilitate Interagency and Nongovernmental Organization Coordination: Engage with the broad array of natural resource land managers and stakeholders in New Mexico on a variety of topics.
- Protection and Acquisition of Ecologically Unique Habitats: Identify, develop and implement conservation strategies for ecologically unique areas and habitats.
- Rare and Endangered Plant Research and Recovery: Locate, identify, and manage New Mexico's rare and endangered plant communities.
- Appropriate Management Response (AMR) to Manage for Ecological Balance: Provide leadership and engage with agency and organizational partners to evaluate AMR for the state's diverse landscapes.

Community Forestry

The Forestry Division's Urban and Community Forestry Program's objective is to empower New Mexico communities to protect, enhance, and utilize their forest resources. Seven action items have been identified to accomplish this objective:

- Multi-Jurisdictional Stewardship Projects: Promote and develop projects including multiple ownerships that benefit communities along social, watershed, or landscape boundaries.
- Wildland Urban Interface (WUI): Promote awareness, education, and action to reduce wildland fire risk in the WUI.
- Economic Development (Woody Products Utilization) and Community Education: Promote forest product utilization and business development and planning alongside community outreach and education efforts.
- Community Wildfire Protection Planning (CWPP): Implement, maintain, and refine New Mexico's Community Wildfire Protection Plans at the community and county scales to ensure compliance with and access to Health Forest Restoration Act funds.
- Re-Leaf Program: Increase private funding and support sustainable community forestry program development.
- Seedling Program: Offer low-cost seedlings to landowners to plant for reforestation, erosion control, wind breaks, energy efficiency or Christmas tree plantations.
- Community Forestry Program: Provide leadership that inspires and supports community forestry programs in New Mexico cities, towns and villages. Provide essential program components, including Technical Assistance, Funding Support, Leveraging Partnerships, and Leadership at the

local, state and national levels.

Wildland Fire Management

The Forestry Division's Wildland Fire Management Program's objective is to provide for fire fighter safety and community protection while promoting natural resource benefit. The Forestry Division develops qualified, equipped fire fighters to safely and effectively suppress and manage fire. Two main action items including seven corollary actions have been identified to accomplish this objective:

- Pre-Fire Planning: Provide resources and assistance to Volunteer Fire Departments using Joint Powers Agreement to assess and improve fire department capacity; address issues of preparedness and prepositioning; work toward wildland fire fighter training; promote wildland fire prevention in the media; and use the federal excess personal property program to procure additional equipment from the USDA Forest Service.
- Wildland Fire Suppression: Suppress wildland fire primarily on state and private lands in coordination with other wildland fire suppression entities.

Capacity Development

The Forestry Division's Capacity Development Program is divided among three objectives. (1) lead and participate in a wide range of planning efforts to identify priorities, capitalize on opportunities, and increase cooperation among partners; (2) partner with a wide variety of entities to leverage resources for increased results; and (3) increase public awareness and understanding of important ecological health issues to ensure lasting public support. Three action items have been identified for the first objective for the program:

- Convene and facilitate statewide meetings of natural resource land managers (Fire Planning Task Force).
- Lead statewide planning efforts on issues of complexity and concern (Forest and Watershed Health Coordinating Group).
- Develop planning tools to support and streamline planning processes (Ecosystem Restoration & Maintenance Community Plan).

Three action items have also been identified for the program's second objective:

- Forest Health Project Labor: Develop additional labor force through partnership with the state's Corrections Department (Inmate Work Camp), Youth Conservation Corps, etc.
- Partner with other EMNRD divisions on task forces that cross Division responsibilities.
- Partner with other state departments and institutions (Forest and Watershed Restoration Institute, Environment, Agriculture, Soil and Water Conservation Districts, Historic Preservation Department) and with federal land management or resource agencies and Tribes and Pueblos.

Five action items have been identified for the third objective:

- Convene public meetings for input and consensus building.
- Maintain an on-going public relations effort to keep the public informed of activity, issues and news.

- Participate in public events and forums (Tree Care Workshops, Forestry Camp, Conservation Days).
- Develop public outreach materials that provide consistent information and messages.
- Provide a single point of contact for the media in emergency situations.

Statewide Assessment Monitoring, and an Adaptive Approach

This Statewide Assessment and Strategy and Response Plans are focused on providing tools, information, and concepts for developing and prioritizing management projects across the landscape. The objective is to maximize existing resources to benefit the people and natural resources of New Mexico. Perhaps the most challenging task is to document how this is happening and how effectively resource management activities are meeting desired goals and objectives. Part of the challenge lies in the reality that many of the visions and strategies outlined in this document (including the appendices) require funding to implement. In the absence of budgets, setting specific, measurable goals is unrealistic here. In addition, the Strategy and Response Plans identify the need for collaborative, landscape scale projects that involve multi-partners from all levels of government, organizations, and individuals. Each partner brings their own monitoring requirements to the table. Thus, specific monitoring plans are best adopted at the project level.

This section on monitoring and utilizing an adaptive approach identifies processes for using measures to track accomplishments and to adapt implementation strategies by collecting and responding to feedback. Since the Strategy and Response Plan addresses Forestry Division activities, information on Division tools and goals for monitoring and adaptation are discussed. A second objective of this section is to recommend a process that will revisit this assessment, regularly address data gaps, and incorporate new knowledge in the on-going efforts to prioritize and guide landscape scale approaches. As with the actual projects, these activities are also tied to available funding and budgets and can only be accomplished as resources allow.

As mentioned in the introduction, the Forestry Division is guided by a Strategic Plan developed and approved annually by the Energy, Minerals, and Natural Resources Department. All Division activities are tied to this strategic plan and insure that Division activities are focused and guided by existing statutes and authorities. State accomplishments and targets are reported to the Governor based on this format which has four major categories: Forest and Watershed Management; Community Forestry; Wildland Fire Management; and Capacity Development. During the development of this Assessment and Strategy and Response Plans, the Division strategies were cross walked with the four modified national themes (Conserve Working Landscapes, Protect Watersheds from Harm, Enhance Public Benefits from Natural Resources and Promote Urban and Community Forests) to insure integration between the documents. The measures identified and presented in the matrix on the next pages will be used to set annual goals based on funding and track accomplishments.

One of the key elements to monitor for this plan is the availability of new data. The Division anticipates significant increases in current Forest Inventory & Analysis (FIA) data that may justify additional analysis to identify new areas of concern for collaboration. Other efforts are in process to fill additional data gaps identified in this plan.

The New Mexico Resource Treatment Map will also serve as a key instrument for tracking on the ground projects. Future analysis comparing areas with project activities with areas with identified priorities will provide a check for how effective this process has been in guiding efforts to priority areas.

A final indication of the success of this process lies in the use of the products of the Assessment and the references in upcoming projects descriptions to this document. Early indications are that the data layers may have multiple applications for many users.

Alignment with State and Private Forestry Program Objectives

Table 3. Strategy & Response Plan Alignment with adapted national S&PF Redesign themes.

The following matrix illustrates alignment between S&PF Redesign objectives and The Forestry Division's Statewide Assessment and Strategy and Response Plans by connecting State and Federal programs, partners, and geospatial resources with programmatic themes and objectives.

Theme; Goal; Objective; Strategy* (note some strategies encompass multiple goals and are duplicated)	Priority Landscape Areas	Programs in New Mexico	Partners	Measures	Timeline				
					2011	2012	2013	2014	2015
Theme: Conserve Working Landscapes									
Goal: Forestry Division Area: Forest and Watershed Management									
Objective: Identify and conserve high priority landscapes	Map 12: Areas with high development potential, fragmentation risk, and SAP priority				x	x	x	x	x
Strategy: Protect and acquire ecologically unique habitats		Rare plant program; Forest Legacy; State programs (NLPA; LCIA; NHCA); Farmland/Rangel and conservation programs	Natural Heritage - UNM; Land Trusts; Conservation organizations; Landowners; Federal and State Agencies	Rare Plant Program-Endangered species monitored, recovery actions taken; Conservation easements acquired	as funding and landowner opportunity become available				

Theme; Goal; Objective; Strategy* (note some strategies encompass multiple goals and are duplicated)	Priority Landscape Areas	Programs in New Mexico	Partners	Measures	2011	2012	2013	2014	2015
Goal: Forestry Division Area: Community Forestry									
Objective: Actively and sustainably manage forests and watershed with economic potential.	Map 13: Areas with high development potential, fragmentation risk, and economic potential				x	x	x	x	x
Strategy: Economic Development (Woody Products Utilization) Community Education, Rangeland Management		Southwest Sustainable Forests Partnership (SWSFP); Woody biomass utilization; Economic Development; EQIP; Tree Farm (Third Party Certification); Conservation Education (all programs); Invasive Plants program	SWSFP; New Mexico Forest Industry Assoc.; Forest Industry Businesses; Tribal enterprises; NM Rangeland Improvement Task Force; NRCS & Conservation Organizations	Landowner, entities, and Businesses assisted evaluated and trained	as funding and opportunity permits				

Theme; Goal; Objective; Strategy* (note some strategies encompass multiple goals and are duplicated)	Priority Landscape Areas	Programs in New Mexico	Partners	Measures	Timeline				
					2011	2012	2013	2014	2015
Theme: Protect Watersheds From Harm									
Goal: Forestry Division Area: Forest and Watershed Management, Community Forestry, and Wildland Fire Management									
Objective: Restore fire-adapted lands and reduce risk of wildfire impacts	Map 14 & 16: Areas with high risk of uncharacteristic wildfire				x	x	x	x	x
Strategy: Non-federal lands hazardous fuels projects (NFL)		NFL Hazardous Fuel Reduction; Collaborative Forest Landscape Restoration Program (CFLRP); EQIP; Cooperative Forest Health	landowners; SWCDs; Tribes; State and Federal Agencies; Counties; Communities	Number of acres treated and maintained	continue to work with the federal agencies and other partners to develop strategic projects; monitor projects and evaluate when funding is available				
Strategy: Western State Fire Assistance WUI Hazardous fuels projects		State Fire Assistance	Western State Fire Managers; Landowners; SWCDs; Tribes; State and Federal Agencies; Counties; Communities	Number of acres treated and maintained. Number of Communities listed in CARS	continue to work with Western State Fire Managers; Forest Service and other partners to develop strategic projects; develop maintenance plans				

Theme; Goal; Objective; Strategy* (note some strategies encompass multiple goals and are duplicated)	Priority Landscape Areas	Programs in New Mexico	Partners	Measures	2011	2012	2013	2014	2015
Strategy: Community Wildfire Protection Plans		CWPP; State Programs	NMAC; BLM; NM Fire Planning Task Force	Number of communities listed in CARS. number of Communites showing progress toward becoming protected.	x	x	updates to CWPPs as needed		
Strategy: Fire Department Capacity Building		VFA; RFA; ISO fire Grant; Inoperability grant	FS; DOI agencies; NM Fire Marshal (PRC);NM Fire Planning Task Force; Dept. Homeland Security	Equipment placed, training provided, number of new FDs.	continual				
Strategy: Volunteer Fire Assistance		VFA	FS	Increased capacity for FDs	annually evaluate program effectiveness; when possible, continue to combine DOI's RFA with VFA				

Theme; Goal; Objective; Strategy* (note some strategies encompass multiple goals and are duplicated)	Priority Landscape Areas	Programs in New Mexico	Partners	Measures	2011	2012	2013	2014	2015
					Timeline				
Strategy: Fire Planning		Community Risk Assessments (CAR); Area Operations plans; Fire management plans (Fire Use) Resource Mobilization Plan (RMP)	Landowners; federal agencies; RFD; MFD	Plans generated	update local operating and CAR plans annually; RMP biannually				
Strategy: Preparedness/Prepositioning		RMP; Prevention; Emergency Funds	FEMA; DHS; GSD; State Agencies; Federal agencies	Local operating plans developed and implemented	annually review emergency funds expenditures; every two years, review and adjust the RMP and annually review preparedness				
Strategy: Fire Fighter Training		State Fire Assistance; RFA; VFA; Ready Reserve; IQS	FS; DOI agencies; NM Fire Marshal (PRC); Dept. Homeland Security; NWCG;	Number of non federal firefighters trained	continual				

Theme; Goal; Objective; Strategy* (note some strategies encompass multiple goals and are duplicated)	Priority Landscape Areas	Programs in New Mexico	Partners	Measures	2011	2012	2013	2014	2015
Strategy: Prevention (Smokey)		Firewise; Living with Fire; Education Programs	Smokey Bear State Park; FS; DOI agencies; Dept. Homeland Security	Number of individuals, communities & HOAs trained; number of presentation presented	monitor, evaluate and update program as needed				
Strategy: Federal Excess Personal Property (FEPP)		FEPP	FS	Number of Inspections made, number of FEPP vehicles on inventory and operational	x	x	in the process of eliminating program		
Strategy: Suppression		Firre preparedness; fire suppression	RFD; MFD; Federal land management agencies; SWCG	Number of acres protected	continual				
Goal: Forestry Division Area: Forest and Watershed Management & Community Forestry									
Objective: Identify, manage and reduce threats to forests and ecosystem health	Map 15: Areas most susceptible to insect and disease outbreaks.				x	x	x	x	x
Strategy: Insect and Disease Outbreaks		Coop Forest Health - Aerial Survey; Forest Health Specialist	NMSU; FS; Landowners	Number of acres surveyed	annual flight survey, ground surveys				

Theme; Goal; Objective; Strategy* (note some strategies encompass multiple goals and are duplicated)	Priority Landscape Areas	Programs in New Mexico	Partners	Measures	2011	2012	2013	2014	2015
Strategy: Forest Health Project Labor: develop additional labor force through partnership with Inmate Work Camp, Youth Conservation Corps, etc.		IWC; YCC; Forestry Camp	YCC; NM Corrections Department; NM Forest & Watershed Health Institute; NM Dept of Labor	Number of forest workers trained and certified	IWC & Forestry Camp - Continual; YCC when funding is available				
Strategy: Collect updated Forest Inventory Analysis data for New Mexico		Forest Management	FS - RMRC, Tribal Natural Resource Depts. BLM	Data updated	x	x	x	As funding is available	
Theme: Enhance Public Benefit from Natural Resources									
Goal: Forestry Division Area: Forest and Watershed Management and Community Forestry									
Objective: Protect and enhance water quantity	Map 18: Areas with high risk to water supply				x	x	x	x	x
Strategy: Forest and Watershed Conservation practices		Forest Management, Forest Harvest Rules (BMPs), Conservation Seedling program, Tree Farm (Third Party Certification)	landowners; NM Environment Dept.; State Engineer's Office; other state agencies; NRCS; SWCDs; RC&Ds	Permits issued, permits closed out, projects implemented number of acres treated.	continual				

Theme; Goal; Objective; Strategy* (note some strategies encompass multiple goals and are duplicated)	Priority Landscape Areas	Programs in New Mexico	Partners	Measures	2011	2012	2013	2014	2015
Strategy: Urban Forestry Program: collect spatial data needed to map green infrastructure of cities managing or developing a UCF		Community & Urban Forestry, GIS program	Tree NM; ABQ-Parks Dept.; Municipal League	Number of communities assisted	As funding is available				
Objective: Protect and enhance water quality	Map 19: Areas with high risk to water quality				x	x	x	x	x
Strategy: Forest and Watershed Conservation practices		Forest Management; Forest Harvest Rules (Best Management Practices); Conservation Seedling program; Tree Farm (Third Party Certification)	Landowners; NM Environment Dept.; State Engineer Office; other state agencies; NRCS; SWCDs; RC&Ds	Permits isssued, permits closed out, projects implemented. Number of acres treated.	continual				
Strategy: New Mexico Re-Leaf Program		Community & Urban Forestry	Schools, Tree NM, Municipal League, SWCDs, ABQ Parks Dept., Keep NM Beautiful, NMAC, Tax & Revenue Dept., FS	Number of projects implemented; number trees planted.	as funding is available				

Theme; Goal; Objective; Strategy* (note some strategies encompass multiple goals and are duplicated)	Priority Landscape Areas	Programs in New Mexico	Partners	Measures	Timeline				
					2011	2012	2013	2014	2015
Strategy: Urban Forestry Program: collect spatial data needed to map green infrastructure of cities managing or developing a UCF		Community & Urban Forestry, GIS Program	Tree NM; ABQ-Parks Dept.; Municipal League; FS	Number of communities assisted	as funding is available				
Goal: Forestry Division Area: Community Forestry and Wildland Fire Management									
Objective: Assist communities in planning for and reducing wildfire risk	Map 16: Areas with high risk of uncharacteristic wildfire				x	x	x	x	x
Strategy: Community Wildfire Protection Plans		CWPP, State Programs	NMAC; BLM; NM Fire Planning Task Force; Local Government-Public Land Managers	Number plans updated	x	x	updates to CWPPs as needed		
Strategy: Fire Department Capacity Building		VFA; RFA; ISO fire Grant; Inoperability grant	FS; DOI agencies; NM Fire Marshal (PRC);NM Fire Planning Task Force; Dept. Homeland Security	Equipment placed, training provided, number of new FDs.	monitor effectiveness, evaluate and update program as needed				
Strategy: Volunteer Fire Assistance		VFA	FS	Increased capacity for FDs	monitor effectiveness, evaluate and update program as needed				

Theme; Goal; Objective; Strategy* (note some strategies encompass multiple goals and are duplicated)	Priority Landscape Areas	Programs in New Mexico	Partners	Measures	Timeline				
					2011	2012	2013	2014	2015
Goal: Forestry Division Area: Community Forestry and Wildland Fire Management									
Objective: Maintain and enhance the economic benefits and values of natural resources	Map 22: Areas where wildfire risk could negatively impact the economic potential of forests, woodlands, and rangelands				x	x	x	x	x
Strategy: Commercial Timber Harvest Regulations		Harvest Rules; Forest Management; forest conservation technical assistance	landowners; State Agencies; Local Government; NRCS	Permits issued, permits closed out with a 208.	continual				
Strategy: Fire Planning		Fire Preparedness; Fire Management; CWPPs; Firewise; Homeowners Assessments	RFD; MFD; local government; landowners; Fire Planning Task Force;	Number of plans developed	continual				

Theme; Goal; Objective; Strategy* (note some strategies encompass multiple goals and are duplicated)	Priority Landscape Areas	Programs in New Mexico	Partners	Measures	2011	2012	2013	2014	2015
Strategy: Seedling Program		Conservation Seedling Program	landowners; NMSU (Mora Research Center); CSU; Private Nurseries; FS	Number of seedlings sold	monitor and evaluate annually, adjust when needed				
Strategy: Post Disturbance Rehabilitation		Conservation Seedling Program; IWC	Landowners; NRCS; SWCDs; NMSU; Local Government-Public Land Managers	Number of rehab projects assisted	when applicable				
Strategy: Assistance to Tribal and public land managers		Conservation Seedling Program; cooperative forest health; forest conservation technical assistance; Tree Farm (Third Party Certification); invasive plants; UCF; NM Forest Re-Leaf; IWC; forest industry & biomass; law enforcement;	Tribal landowners; tribal government; state and federal agencies; local government; SWCDs; NMSU; NM Water Trust Board	Number of land managers assisted	continual				

Theme; Goal; Objective; Strategy* (note some strategies encompass multiple goals and are duplicated)	Priority Landscape Areas	Programs in New Mexico	Partners	Measures	2011	2012	2013	2014	2015
Strategy: Natural Resource Planning		Forest Management; Forest conservation technical assistance; Conservation Seedling Program; Fire Management; Invasive Plants; Cooperative Forest Health; Tree Farm (Third Party Certification)	Landowners; FS; NRCS; NMSU; local government-public land managers	Number of plans developed	continual				

Theme; Goal; Objective; Strategy* (note some strategies encompass multiple goals and are duplicated)	Priority Landscape Areas	Programs in New Mexico	Partners	Measures	2011	2012	2013	2014	2015
Goal: Forestry Division Area: Forest and Watershed Management and Community Forestry									
Objective: Protect, conserve and enhance wildlife habitat	Map 20: Areas of high biodiversity that are also providing recreational opportunities				x	x	x	x	x
Strategy: Multijurisdictional Stewardship projects		NFL Hazardous Fuel Reduction; State Fire Assistance (WUI); EQIP; Cooperative Forest Health; Urban and Community Forestry	State and federal agencies; private landowners; tribes; SWCD; local government-public land managers	Number of projects conducted; number acres treated	as funding and opportunity permits				
Strategy: Rare and endangered plant research and recovery		Rare plant program; Natural Heritage-UNM	Landowners; USF&W; communities; FS; UNM; BLM; NM Game & Fish	Rare Plant Program-Endangered species monitored, recovery actions taken	continual				

Theme; Goal; Objective; Strategy* (note some strategies encompass multiple goals and are duplicated)	Priority Landscape Areas	Programs in New Mexico	Partners	Measures	2011	2012	2013	2014	2015
Strategy: Natural Resource Planning		Forest Management; Forest conservation technical assistance; Conservation Seedling Program; Fire Management; Invasive Plants; Cooperative Forest Health; Tree Farm (Third Party Certification)	Landowners; FS; NRCS; NMSU; local government-public land managers; state land managers	Number of plans developed, number of landowners assisted	continual				

Theme; Goal; Objective; Strategy* (note some strategies encompass multiple goals and are duplicated)	Priority Landscape Areas	Programs in New Mexico	Partners	Measures	Timeline				
					2011	2012	2013	2014	2015
Goal: Forestry Division Area: Forest and Watershed Management and Community Forestry									
Objective: Connect people to landscape and engage them in SAP activities	Map 21: Areas where stewardship opportunities exist alongside biodiversity landscapes				x	x	x	x	x
Strategy: Private Land Stewardship - helping landowners manage their natural resources through technical assistance, training, funding and other support.		Forest Management; Forest conservation technical assistance; Conservation Seedling Program; Fire Management; Invasive Plants; Cooperative Forest Health; Tree Farm (Third Party Certification)	Landowners; FS; NRCS; NMSU	Number of stewardship plans developed	continual				

Theme; Goal; Objective; Strategy* (note some strategies encompass multiple goals and are duplicated)	Priority Landscape Areas	Programs in New Mexico	Partners	Measures	2011	2012	2013	2014	2015
Strategy: Multi-jurisdictional Stewardship Projects		NFL Hazardous Fuel Reduction; State Fire Assistance (WUI); EQIP; Cooperative Forest Health; Urban and Community Forestry	State and federal agencies; private landowners; tribes; SWCDs; local government-public land managers	Number of projects conducted; number acres treated	as funding and opportunity permits				
Strategy: Family Forest Owners		Tree Farm (Third Party Certification); Forest conservation technical assistance; Conservation Seedling Program;	Landowners; tribal landowners	Number of forest landowners assisted or certified as Tree Farmers	continual				
Strategy: Re-Leaf Program		Community & Urban Forestry	Schools; Tree NM; Municipal League; SWCDs; ABQ Parks Dept.; NM Clean & Beautiful Affiliates; NMAC; Tax & Revenue Dept.	Number of projects	continual				

Theme; Goal; Objective; Strategy* (note some strategies encompass multiple goals and are duplicated)	Priority Landscape Areas	Programs in New Mexico	Partners	Measures	2011	2012	2013	2014	2015
Strategy: Seedling Program		Conservation Seedling Program	Landowners; NMSU (Mora Research Center); CSU; private nurseries; FS	Number of seedlings sold	monitor and evaluate annually, adjust when needed				
Goal: Forestry Division Area: Forest and Watershed Management and Community Forestry									
Objective: Manage and restore trees, forests and ecosystems to mitigate and adapt to global climate change	Map 22: Areas of high biodiversity at high risk of forest health issues and a high degree of climate change exposure				x	x	x	x	x
Strategy: Facilitate Interagency and nongovernmental organization coordination		Fire Management; Forest & Watershed Health Plan Implementation; Forest Management; Urban & Community Forestry	Fire Planning Task Force; Coordinating Committee; Urban Forest Council; Tree Planting Advisory Committee; Stewardship Coordinating Committee	Number coordination meetings conducted	continual				

Theme; Goal; Objective; Strategy* (note some strategies encompass multiple goals and are duplicated)	Priority Landscape Areas	Programs in New Mexico	Partners	Measures	2011	2012	2013	2014	2015
Strategy: Appropriate Management Response (AMR) to manage for ecological balance		Forest conservation technical assistance; Forest Management; Fire Management; NRCS Programs (EQIP, WHIP, etc.); Woody Biomass Utilization	State & Private Forestry; Tribal partners; Soil and Water Conservation Districts; landowners	Number of planned and unplanned responses	continual; adjust when needed				
Strategy: Forest and Watershed Conservation practices		Forest conservation technical assistance; Forest Management; Fire Management; NRCS Programs (EQIP, WHIP, etc.); Woody Biomass Utilization	Soil & Water Conservation Districts; industry; hub groups; landowners; federal & state technical partners;	Number of acres restored	continual; monitor effectiveness when possible				

Theme; Goal; Objective; Strategy* (note some strategies encompass multiple goals and are duplicated)	Priority Landscape Areas	Programs in New Mexico	Partners	Measures	2011	2012	2013	2014	2015
Strategy: Natural Resource Planning		Forest conservation technical assistance; Forest Health Initiative; NRCS Programs (EQIP, WHIP, etc.)	Soil & Water Conservation Districts; landowners; federal & state technical partners;	Number of communities, landowners and businesses assisted.	continual				
Theme: Promote Urban and Community Forests									
Goal: Forestry Division Area: Forest and Watershed Management and Community Forestry									
Objective: Empower communities to develop and sustain healthy community and urban forests	Map 20: Enhance Public Benefit from Natural Resources: Biodiversity with Economic Potential				X	X	X	x	x
Strategy: New Mexico Forest Re-Leaf		Community & Urban Forestry; Tree City USA; Tree Campus USA; Arbor Day programs	TPAC; Schools; Tree NM; Municipal League; SWCDs; ABQ Parks Dept.; NM Clean & Beautiful Affiliates; NMAC; Tax & Revenue Dept.	Projects implemented and communities affected	monitor and evaluate annually, adjust when needed				

Theme; Goal; Objective; Strategy* (note some strategies encompass multiple goals and are duplicated)	Priority Landscape Areas	Programs in New Mexico	Partners	Measures	2011	2012	2013	2014	2015
Strategy: Urban Forestry Program - collect urban forest health data for communities managing or developing a UCF program		Community & Urban Forestry; NM Re-leaf; Tree City USA	Urban Forest Council; Tree NM; Municipal League; ABQ Parks Dept.; NMAC	Number of urban forests inventoried and assessed	as funding and opportunity permits				
Strategy: Increased community awareness, outreach programs, and ongoing programs can be used to champion the value of trees and urban forests.		Community & Urban Forestry; Tree City USA; Arbor Day programs	TPAC; NM Centennial Foundation; Tree NM; Municipal League; SWCDs; NM Clean & Beautiful Affiliates; NMAC	Number of communities using "Plan Smart, Rethinking Green" tool kit	x	x	x	x	x
Strategy: increase the number of communities that are developing or managing their community forests. Recognition programs, such as Tree City, Tree Line, and Tree Campus USA will be used to recognize communities, utilities, colleges and universities that are building a sustainable community forestry program.		Community & Urban Forestry; Tree City USA; Tree Line; Tree Campus USA	Urban Forest Council; Schools; Tree NM; Municipal League; NM Clean & Beautiful Affiliates; NMAC	Number of Tree USA communities; number of Tree Line utilities; number of colleges working on becoming Tree Campus USA	continual; adjust when opportunity permits				

Theme; Goal; Objective; Strategy* (note some strategies encompass multiple goals and are duplicated)	Priority Landscape Areas	Programs in New Mexico	Partners	Measures	2011	2012	2013	2014	2015
					Timeline				
Strategy: New Mexico Re-Leaf Program - increase funding potential		Community & Urban Forestry	TPAC; Urban Forest Council; Keep NM Beautiful, NMAC, Tax & Revenue Dept.; Municipal League,	Number of new funding sources	continual; when opportunity permits				

References

BBC Research & Consulting. 2008. The economic impacts of hunting, fishing and wildlife watching in Colorado. Colorado Division of Wildlife. Prepared by BBC Research & Consulting, Denver, CO.

Berrens, R., J. Talberth, J. Thacher, and M. Hand. 2006. Economic and community benefits of protecting New Mexico's inventoried roadless areas. Center for Sustainable Economy, Santa Fe, NM.

Brown, T. C. 1991. Streamflow needs and protection in wilderness areas. Pages 161-172 in C. Payne, J. M. Bowker, and P. C. Reed, editors. *The economic value of wilderness*. SE-GTR-78. USDA Forest Service, Southeastern Forest Experiment Station, Asheville, NC.

Chicago Climate Exchange. 2009. http://www.chicagoclimatex.com Last access April 27, 2010

CRC & Associates. 2007. Recreational visitors to New Mexico. Bernalillo, NM.

Enquist, C., E. Girvetz, and D. Gori. 2008. Conservation implications of emerging moisture stress due to climate change in New Mexico. The Nature Conservancy, Santa Fe, NM.

Ernst, C. 2004. Protecting the source: Land conservation and the future of America's drinking water. Trust for Public Land, Washington, D.C.

Evans, A. M. 2008. Synthesis of knowledge from woody biomass removal case studies. The Forest Guild, Santa Fe, NM.

Evans, A. M., M. DeBonis, E. Krasilovsky, and M. Melton. 2007. Measuring community capacity for protection from wildfire. Forest Guild, Santa Fe, NM.

FAO. 2004. A review of carbon sequestration projects. Food and Agriculture Organization, Rome, Italy.

Graham, D. W., and V. H. Smith. 2004. Designed ecosystem services: application of ecological principles in wastewater treatment engineering. *Frontiers in Ecology and the Environment* 2(4):199-206.

IAFWA. 2002. Economic importance of hunting in America. International Association of Fish and Wildlife Agencies, Washington, D.C.

Krieger, D. 2001. Economic value of forest ecosystem services: a review. Wilderness Society, Washington, D.C.

La Rouche, G. P. 2001. Birding in the United States: A demographic and economic analysis. 2001-1, US Fish and Wildlife Service, Washington, D.C.

Loomis, J. 2005. Updated outdoor recreation use values on National Forest and other public lands. PNW-GTR-658, USDA Forest Service, Pacific Northwest Research Station, Portland, OR.

Lubowski, R. N., A. J. Plantinga, and R. N. Stavins. 2006. Land-use change and carbon sinks: Econometric estimation of the carbon sequestration supply function. *Journal of Environmental Economics and Management* 51(2):135-152.

Miller, R. K., and S. K. Albert. 1993. Zuni cultural relationships to piñon-juniper woodlands. Pages 74-78 in E. F. Aldon and D. Shaw, editors. *Managing Piñon-Juniper Ecosystems for Sustainability and Social Needs*. RM-GTR-236. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Santa Fe, NM.

Morgan, T. A., T. Dillon, I. Charles E. Keegan, A. L. Chase, and M. T. Thompson. 2006. The four corners timber harvest and forest products industry, 2002. RMRS-RB-7, USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO.

Neeff, T., L. Eichler, I. Deecke, and J. Fehse. 2007. Update on markets for forestry offsets. Centro Agronómico Tropical de Investigación y Enseñanza, Turrialba, Costa Rica.

New Mexico Department of Game and Fish. 2006. Comprehensive wildlife strategy for New Mexico. Santa Fe, NM.

New Mexico Environment Department. 2010. *Onsite sewage management in New Mexico*. http://www.nmenv.state.nm.us/fod/LiquidWaste/ Last accessed April 2010

New Mexico Water Quality Control Commission. 2009. New Mexico non-point source management program. Surface Water Quality Bureau, Watershed Protection Section, Santa Fe, NM.

New Mexico Water Quality Control Commission. 2010. 2010-2012 State of New Mexico CWA §303(d)/§305(b) integrated list & report. Santa Fe, NM.

Norwick, J., D. Garcia, and B. Torgersen. 1993. Commercial leases and permits for piñon nut harvesting. Pages 25 -25 in E. F. Aldon and D. Shaw, editors. *Managing Piñon-Juniper Ecosystems for Sustainability and Social Needs*. RM-GTR-236. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Santa Fe, NM.

O'Brien, R. A. 2003. New Mexico's forest resources, 2000. RMRS-RB-3, USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO.

Perlack, R. D., L. L. Wright, A. F. Turhollow, R. L. Graham, B. J. Stokes, and D. C. Erbach. 2005. Biomass as feedstock for a bioenergy and bioproducts industry: The technical feasibility of a billion-ton annual supply. U.S. Department of Energy, U.S. Department of Agriculture, Oak Ridge, TN.

Postel, S., and S. Carpenter. 1997. Freshwater ecosystem services. Pages 195-214 *in* G. E. Daily, editor. *Nature's services: Societal dependence on natural ecosystems*. Island Press, Washington, D.C.

Richards, K. R., and C. Stokes. 2004. A review of forest carbon sequestration cost studies: A dozen years of research. *Climatic Change* 63(1-2):1-48.

Ruddell, S., R. Sampson, M. Smith, R. Giffen, J. Cathcart, J. Hagan, D. Sosland, J. Godbee, J. Heissenbuttel, S. Lovett, J. Helms, W. Price, and R. Simpson. 2007. The role for sustainably managed forests in climate change mitigation. *Journal of Forestry* 105(6):314-319.

Schmidt, Kirsten M.; Menakis, James P.; Hardy, Colin C.; Hann, Wendel J.; Bunnell, David L. 2002. Development of coarse-scale spatial data for wildland fire and fuel management**.** RMRS-GTR-87. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky MountainResearch Station.

Sedell, J., M. Sharpe, D. Apple, M. Copenhagen, and M. Furniss. 2000. Water and the Forest Service. FS-660, USDA Forest Service, Washington, D.C.

Smail, R. A., and D. J. Lewis. 2009. Forest-land conversion, ecosystem services, and economic issues for policy: A review. PNW-GTR-797, USDA Forest Service, Pacific Northwest Research Station, Portland, OR.

Snider, G., P. J. Daugherty, and D. Wood. 2006. The irrationality of continued fire suppression: an avoided cost analysis of fire hazard reduction treatments versus no treatment. *Journal of Forestry* 104(8):431-437.

Stewart, I.T., D.R. Cayan and M.D. Dettinger. 2004. Changes in snowmelt runoff timing in western North America under a "business as usual" climate change scenario. *Climate Change* 62:217-232

Sweeney, B. W., T. L. Bott, J. K. Jackson, L. A. Kaplan, J. D. Newbold, L. J. Standley, W. C. Hession, and R. J. Horwitz. 2004. Riparian deforestation, stream narrowing, and loss of stream ecosystem services. *Proceedings of the National Academy of Sciences* 101(39):14132-14137.

US DOE. 2009. *Impacts of a 25-percent renewable electricity standards as proposed in the American Clean Energy and Security Act discussion draft*. SR/OIAF/2009-04. Energy Information Administration, Office of Integrated Analysis and Forecasting. http://www.eia.doe.gov/oiaf/servicerpt/acesa/index.html Last accessed April 27, 2010

US DOI, Fish and Wildlife Service and US DOC, US Census Bureau. 2008. *2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.* http://www.census.gov/prod/2008pubs/fhw06-nat.pdf.
 Last accessed April 30, 2010.

van Kooten, G. 2009. Biological carbon sequestration and carbon trading re-visited. *Climatic Change* 95(3):449-463.

van Kooten, G. C., and B. Sohngen. 2007. Economics of forest ecosystem carbon sinks: A review. *International Review of Environmental and Resource Economics* 1(3):237-269.

Wayburn, L. 2009. Forests in the United States climate policy: A comprehensive approach. Lincoln Institute of Land Policy. https://www.lincolninst.edu/pubs/dl/1678_893_WAYBURN%20Final.pdf. Last accessed April 30, 2010.

Westerling, A.L., H.G. Hidalgo, D.R. Cayan, and T.W. Swetnam. 2006. Warming and earlier spring increase western U.S. forest wildfire activity. *Science* 313 (5789): 940 - 943.

Western Forestry Leadership Coalition. 2010. Threats to Western Private Forests: A Framework for Conserving and Enhancing the Benefits from Private Working Forests in the Western U.S. Western Forestry Leadership Coalition. http://www.wflccenter.org/news_pdf/359_pdf.pdf. Last accessed April 30, 2010.

Appendices

Appendix A: National Guidance for Statewide Assessments and Strategies

Appendix B: Landscape Priorities by EMNRD Forestry Division District

Appendix C: New Mexico Spatial Analysis Project

Appendix D: Forest Legacy in New Mexico

Appendix E: Letters of Support

Redesigning
State and Private Forestry

The U.S. Forest Service (USFS) and National Association of State Foresters (NASF) have assembled a State & Private Forestry (S&PF) Redesign Board to review current trends affecting trees and forests and to consider the most effective roles for state and federal government in sustaining forest benefits.

The purpose of a new approach to S&PF is to shape and influence forest land use on a scale and in a way that optimizes public benefits from trees and forests for both current and future generations.

The Redesign Approach
The members of the Redesign Board have taken on their organizations' unified commitment to sustaining a diverse range of public benefits from forests. The Board has developed a corresponding strategy, including guiding principles and components of change. The Board is sharing this strategy with S&PF partners, stakeholders, and employees, in the hopes of stimulating dialogue and encouraging feedback.

Components of Change
The S&PF Redesign includes the following Components of Change:

NATIONAL THEMES
Three National Themes will help focus federal investments on issues, challenges, and opportunities which, if addressed, will lead to significant progress in providing diverse and sustainable public benefits from trees and forests for current and future generations.

Each theme includes associated key actions and strategies, designed to further define and communicate the S&PF Redesign approach to these priorities.

Conserve working forested landscapes

Actions: Reduce the rate of conversion of forested landscapes and inform decisions about which landscapes should be conserved as working forests.

Strategies: Promote markets for forest products and environmental services; implement tax policies, easements and other planning tools; promote social and economic incentives of forests.

Protect forests from harm

Actions: Reduce threats to forest health and productivity, including uncharacteristic wildfire, insects and disease, and invasive species.

Strategies: Restore fire-adapted forests; monitor, assess, and treat forest insect and disease pathogens; eradicate or control invasive species through prevention, early detection, and rapid response.

Enhance benefits from trees and forests

Actions: Enhance public benefits associated with forests, such as clean air and water, fish and wildlife habitat, open space, recreation, renewable supplies,

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Redesigning
State & Private Forestry

The purpose of a new approach to S&PF is to shape and influence forest land use on a scale and in a way that optimizes public benefits from trees and forests for both current and future generations.

National Themes:
Conserve working forested landscapes

Protect forests from harm

Enhance benefits from trees and forests

FOCUS
PRIORITY
OUTCOME

economic attributes, and climate change mitigation; reduce the risks to communities from uncharacteristic wildfire.

Strategies: Encourage urban forestry, support watershed planning, enhance community fire protection capabilities, link environmental health with community well-being.

NATIONAL ASSESSMENT

A National Assessment will identify forest conditions, trends, and opportunities across ownerships. Key elements of the assessment will include wildfire risk, insect and disease impacts, and threats of conversion. This geospatial, interactive tool will help identify priority landscapes and demonstrate progress. The National Assessment will eventually include a partner-accessible Web-based database.

STATE ASSESSMENTS & RESPONSE PLANS

State Forest Resource Assessments will define forest benefits and services, comprehensively assess threats and opportunities, and delineate critical forest resource landscapes. State Response Plans will describe how a state proposes to invest competitive federal dollars, in combination with other available resources, to address the S&PF National Themes along with key issues identified in their own state assessments.

COMPETITIVE RESOURCE ALLOCATION

An increasing percentage of S&PF funds will be competitively disbursed according to national program guidance and desired outcomes. The competitive process will be conducted through USFS/NASF efforts in the Northeast, Southeast, and West. Initial competitive allocation processes (target: 15% of S&PF funds) will be adopted in 2008. The amount of competitively allocated funds is targeted to increase by 10% each year for the next 5 years.

PROGRAMS & STAFFING

S&PF will move towards adopting a more flexible and adaptive organization, designed to address dynamic challenges and opportunities. Greater emphasis will be placed on sharing talent across organizations. Decisions regarding programs and staffing will rely on input from Federal and state personnel, Tribes, partner organizations, the forestry community, and other interested parties.

DEMONSTRATING AND COMMUNICATING RESULTS

Accountability for making meaningful progress toward the National Themes will be a key component of the S&PF Redesign. New emphasis will be placed on improving our collective ability to demonstrate and communicate accomplishments. As an example, an annual S&PF Report Card will be produced to roll up visual, quantifiable, and anecdotal demonstrations of progress and success.

INTEGRATED PROGRAM DELIVERY

S&PF will seek to better integrate our programs with other complementary federal programs in order to better meet the needs of non-Federal landowners and other S&PF customers.

Where Can I Get More Information?

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Chama District

First established in 1959, Forestry Division's Chama District's land base includes San Juan and Rio Arriba Counties, and the west half of Taos County. This area includes 357,000 acres of private commercial forestland and 88,000 acres of state and private non-commercial forestland. The District's primary focus is to assist landowners in developing responsible and sustainable management strategies for their forest resources. The District also works on many cross-border projects with state and federal agencies in Colorado. The District Office is located along US84/64 at the NM512 turnoff, 10 miles south of Chama.

The Assessment identified 172,000 acres (approximately half) of forest and woodlands within the District as priority working landscapes (Map B-1). Priority working landscapes include large, un-fragmented blocks of the landscape with high economic potential and are at risk of development. The largest focus of timber resources on this district lies along the southern extent of the San Juan Mountain Range, formed over 65 million years ago. The District works with private forestry consultants, private landowners, tribal agencies and non-profit collaborative watershed groups to combine ideas and management strategies that will benefit local resources and economic value.

Since the decline of the commercial timber industry in the early 2000's, harvests have steadily slowed down. The District actively supports initiatives for developing wood products industries that utilize small diameter trees and shrubs. In the next five years, district staff hope to facilitate over a thousand acres commercially harvested annually for wood products such as excelsior products, erosion waddles, fence posts, hand peeled latillas and vigas, handcrafted specialty products (corbels and carved posts, etc.) and landscaping material. In addition, the District assists landowners with traditional timber harvests, continuing to support long-established, small sawmills producing beams and dimensional lumber in northern New Mexico. The District supports increasing uses of wood as biomass to produce heat and energy. In addition to traditional firewood for heating homes, the District is encouraging using commercial and domestic wood boilers that burn pellets and chips. Forest restoration projects generate thousands of stems of small-diameter roundwood cut during mechanical thinning projects. The District continues to look for ideas and opportunities, such as partnering with the New Mexico Department of Transportation to build snow fences from roundwood or develop mulching for road projects.

The region around Chama was originally part of the Tierra Amarilla Land Grant, but is now divided into many different and diverse ranches, wildlife areas, and tribal trust lands. Due to over a century of fire exclusion, the contemporary forest stand structure generally is denser and dominated by shade-tolerant and small-diameter trees. The challenge over much of the district is to assist landowners in converting forests in the Wildland Urban Interface (WUI) to vigorous forests with a stand structure of fewer, healthier trees that is resistant to devastating crown fires. Wildland Urban Interface covers approximately 1.35 million acres (17 percent) in the District (Map B-2). Furthermore, the Assessment predicts housing density will increase across approximately 560,000 acres (Map B-3), exacerbating the challenges of managing WUI areas. The District works with multiple agencies, local WUI Corporations, and local volunteer fire departments to protect forest resources from wildfires. The district goal is to

provide Rio Arriba County with necessary resources to train all eighteen Volunteer Fire Departments to National Wildland Coordinating Group (NWCG) standards for Firefighter 1. This will allow Rio Arriba County to improve their effectiveness and safety while fighting wildfires. The county will also be able to sign on as a cooperating agency on the Statewide Resource Mobilization Plan, allowing county fire resources to be used in emergency wildland fire situations throughout the nation.

Outside of the WUI areas, fuels management goals are complex and include multiple landowners and opportunities. For example, area refuges owned and managed by the New Mexico Department of Game and Fish provide opportunities for county agencies to assist with prescribed burning for resource benefit. Forest management activities such as thinning and timber sales balance multiple objectives including wildlife habitat improvement, fuel reduction, and recreational opportunities. With possible Sudden Aspen Decline affecting the northern portion of the district, Chama District staff are studying the effect of various practices by local landowners to limit ungulate populations in aspen dominated stands.

The Assessment identified 18 priority watersheds at high risk of water quality impairment or in need of restoration (Map B-4). A majority of these watersheds are in the Farmington area. Chama district personnel work closely with partners in the San Juan Basin such as the San Juan Watershed Woody Invasive Initiative (SJWWII) working group and the San Juan Collaborative Weed Management Area (SJCWMA) working group to apply various funding sources to combat woody invasive species and noxious weeds. These plants inhibit native vegetation and diminish water quality and supply. SJWWII will be studying the movement and effects of the Tamarisk Beetle that was introduced in neighboring states in north-western New Mexico.

Partnerships and collaboration are key operational components for District activities. 2010 will be the first year that the Chama District joins forces with the Upper Chama Soil and Water Conservation District (SWCD) through a Joint Powers of Agreement to conduct Hazardous Fuel Treatments, WUI thinning, and similar projects in the area around Chama. Other agreements in place are with Santa Clara Pueblo, Northern Rio Grande Rural Conservation and Development, East Rio Arriba SWCD and San Juan SWCD for treatments on state and private land in the interest of protecting residents and resources. Recent discussions with an emerging working group, Cebolla/Nutrias Watershed Group, have spurred discussions between local landowners/ranchers, and NRCS State Conservationist, USFS Regional Forester, Chama District staff, and other state and federal agencies to find ways to manage the landscape. Building on these and other collaborations will prove to be both challenging and rewarding pathways toward the shared goal of "Management Without Boundaries."

## Map B-1. Chama District Priority Working Landscapes

High Priority
High/Medium Priority
Medium Priority
Medium/Low Priority
Low Priority

SCALE 1:2,000,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
The priority layer was created in 2009
by TNC in NM. The data atlas describing
the input models and associate layers
can be found on http://allaboutwatersheds.org.
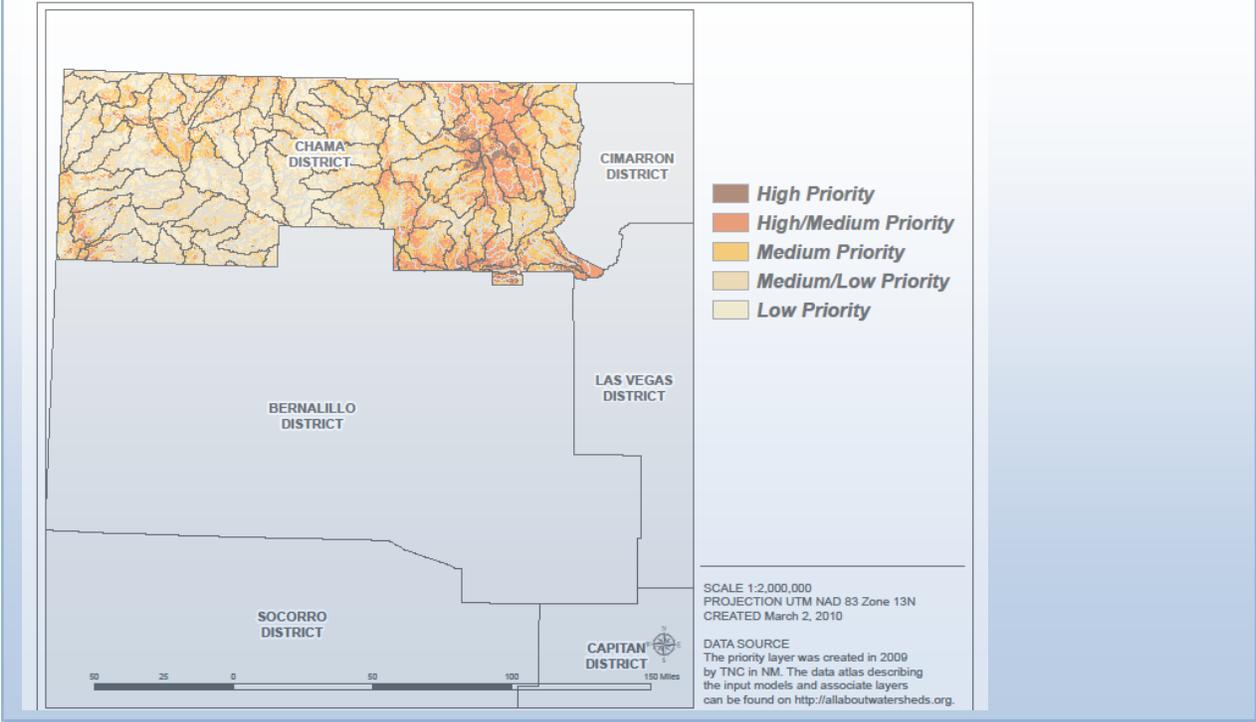
Map B-2. Chama District Wildland Urban Interface

Wildland Urban Interface

SCALE 1:2,000,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
The priority layer was created in 2009
by TNC in NM. The data atlas describing
the input models and associate layers
can be found on http://allaboutwatersheds.org.
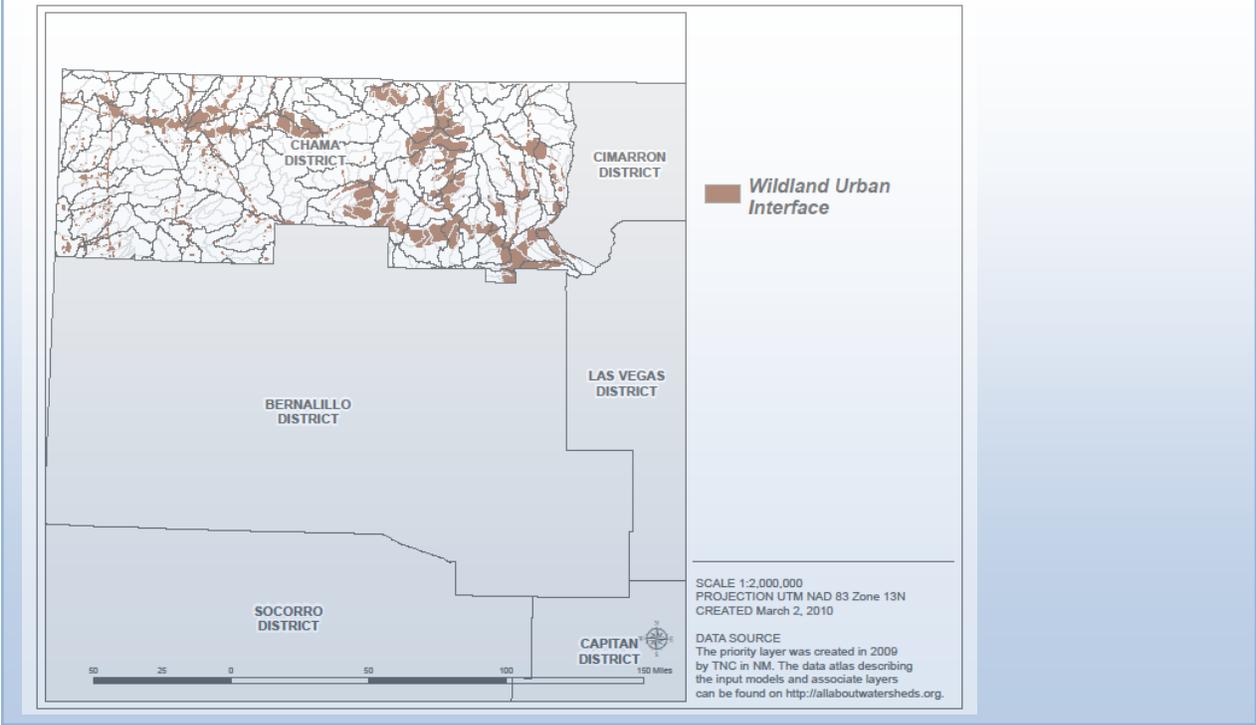
Map B-3. Chama District Development Potential
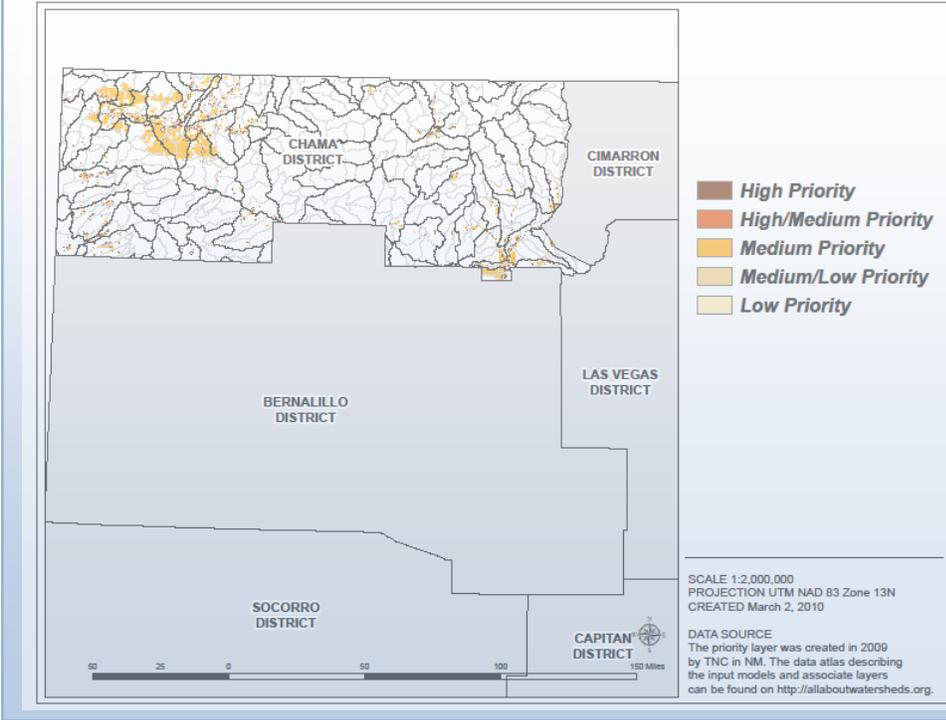
Map B-4. Chama District Priority Watersheds for Enhancing and Protecting Water Quality
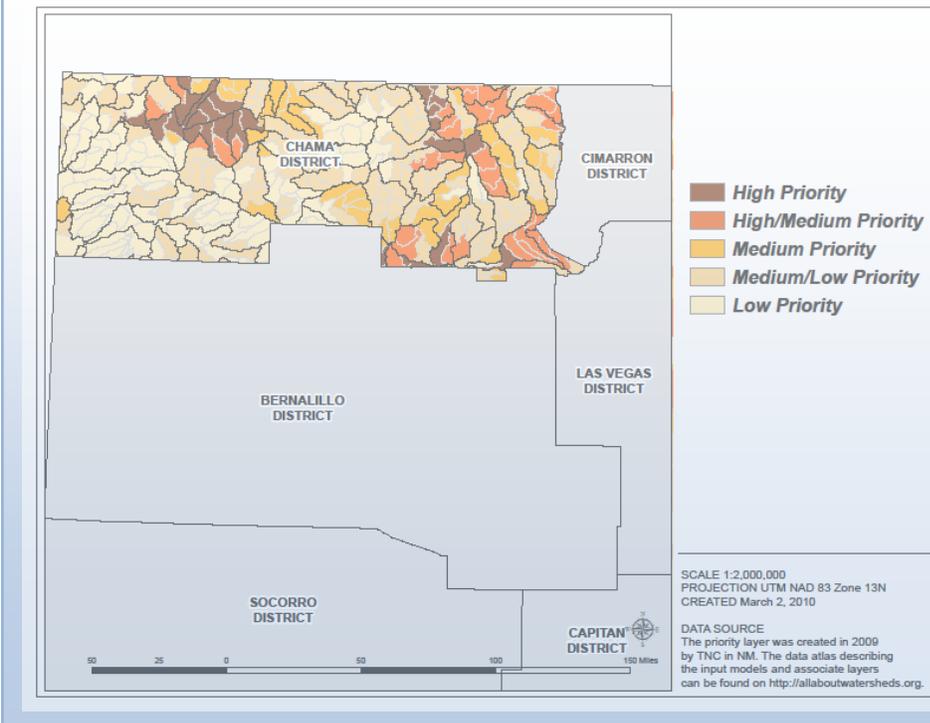
Cimarron District

The Cimarron District shares the distinction with the Chama District as one of the inaugural district offices established in 1959. The District office was originally established in Cimarron, but as the workload expanded and more space was needed, the office was relocated to Ute Park circa 1962. As the Division's northeastern New Mexico district office, Cimarron covers approximately 5.6 million acres with 60 percent or 3.36 million acres of state and private commercial forest land. The Cimarron District consists of Taos County east of the Rio Grande, and all of Colfax and Union Counties. Vegetation is diverse, ranging from the alpine zone at the highest elevations to the plains zone (western shortgrass ecosystem) at lower elevations and including vast forests and woodlands in between. The major towns include Taos, Raton and Clayton. The highest point in New Mexico, which is Wheeler Peak is located in within the Cimarron District in Taos County. Major travel routes include Interstate 25, which runs north and south and US Highway 64, which runs east and west.

The District plays a major role in monitoring activity in private timber sales and commercial harvest. Much of the area serviced by the Cimarron District consists of large private ownerships that include the Vermejo Park Ranch, Philmont Scount Ranch and the Express UU Bar Ranch. The District provides technical assistance to all woodland owners and promotes best management practices to ensure healthy ecosystems. Forest landowners implement a variety of practices including forest and watershed restoration, fuels mitigation, and timber sales.

With such a large acreage of forests, the District faces considerable forest health issues. The Assessment identified approximately 1.8 million acres of forests at some risk to insect and disease outbreaks within the District (Map B-5). Of the areas at risk to insect and disease, 450,000 acres were predicted to have high susceptibility to insect and disease outbreaks. Over the decades, the District has assisted private landowners with recurring outbreaks of Spruce Budworm (SPW). Although the Division participated in major SPW spray projects in the 1970's, today's defensives focus on silvicultural treatments that provide for tree vigor and maintain forests dominated by species that are not key SPW hosts.

The District also plays a critical role in protecting upper watershed health and condition. The Assessment identified 19 priority watersheds important for protecting and enhancing water supply (Map B-6). The major watersheds the District currently works in include the Sugarite Watershed, which is located northeast of Raton, the Cimarron Watershed, the Canadian Watershed and the Red River Watershed. The District implements projects with partners that include the Cimarron Watershed Alliance (CWA), soil and water conservation districts from Taos, Colfax and Union Counties and other watershed-based groups. The CWA is currently spearheading a project along the Ponil Creek that includes three landowners (Vermejo Ranch, Philmont Scout Ranch and the Chase Ranch), the NM Department of Game and Fish and the Carson National Forest to provide post-fire (Ponil Complex – 2002) watershed treatments to reduce erosion and restore function to the creek. The project is funded through the New Mexico Environment Department's 319 grant program.

Most recently, the District has partnered with the City of Raton, the Division's Forest and Watershed Health Office, and the State of Colorado to implement a Western Competitive Grant funded project in

the Sugarite Watershed on both sides of the Colorado-New Mexico state line. A major focus of the Sugarite project is to monitor the treatments for effectiveness and develop adaptive management strategies to inform long-term, land-owner driven maintenance and expanded implementation. Project partners hope the public exposure of the Sugarite Restoration will inspire similar stewardship projects with other large area landowners.

One of the greatest threats to water quality and supply is risk of uncharacteristic wildfire. The Assessment delineated approximately 580,000 acres at high risk of uncharacteristic wildfire (Map B-7). To offset this risk, the District continues to work with both municipal and county fire departments. Funding from state and federal grants is used to assist fire departments in the purchase of equipment and training of personnel. To enhance the fire protection effort, the Division has Joint Powers Agreements for Fire Suppression with the municipal and county fire departments throughout the state, and has most recently added Taos, Colfax and Union counties. The Cimarron District also contains large areas of Fire Regime Condition Class (FRCC) 2 and 3 adjacent to at-risk communities such as Black Lake, Angel Fire and Red River.

The district has recently received American Recovery and Reinvestment Act (ARRA or stimulus) funds to address four major project areas in the district: Angel Fire, Red River, Black Lake, and Canadian River Riparian Restoration. The resort community of Angel Fire, on the south end of the Moreno Valley, is densely populated and located in steep forested canyons. The project will make travel routes safer for evacuations in the event of wildfire by thinning within and adjacent to road right-aways. The Red River Project links various efforts over the year to create a true fuel break over multiple jurisdictions. The Black Lake area project is consists of 350 acres of thinning and meadow restoration on lands owned by the New Mexico State Land Office. The Canadian River Riparian Restoration Project includes tamarisk control, clean up of standing dead stems, and planting of native riparian vegetation.

There is also a high risk for large, fast-moving wildfires in communities in the grasslands located on the eastern part of the District. Some of these communities include Capulin, Des Moines, and Clayton. In the next five years, the district would like to have all Union County fire departments trained in wildland fire, issuing red-cards to qualified firefighters, designating community wildland fire coordinators, and maintaining identifiable and auditable training and experience records.

Much of the forested landscape with increased risk from uncharacteristic wildfire also faces increased development pressure (Map B-8). As such, the District works with area communities regarding the spread of development and provides homeowners with technical advice on how to create defensible areas around their mountain homes to protect against wildfire. The District is actively working on preparing Community Wildfire Protection Plans (CWPP) for those communities. CWPPs are already in place for all three counties served by the District as well as several at-risk communities. Work in educating homeowners on fire safety in those communities continues through the use of the Firewise program. The District now has seven nationally recognized Firewise communities that include Taos Pines, Cimarron and Ute Park.

Forest industry continues to support the local economy in the area. District staff enforce timber harvest regulations on private timber sales, generally on three to ten sales each year. Goals for the future include public outreach and compliance assistance for landowners in the eastern portion of the state commercially harvesting firewood in the piñon-juniper woodlands.

The District supports the American Tree Farm System by providing inspections and information to private landowners. The District Timber Management Officer was recently recognized at the national level for outstanding support to the program. One of the Tree Farm projects has been the establishment of a Demonstration Forest at Philmont Scout Ranch. The national high adventure base, owned and operated by the Boy Scouts of America, is visited by 25,000 people each year. The Demonstration Forest was initiated eight years ago, and programs and opportunities continue to expand around the project. For example, the newly established Visiting Forester Program provides for interaction between volunteer foresters and scouts from across the nation to share and learn about forestry, ultimately increasing forestry education throughout the country.

Map B-5. Cimarron District Forest Health: Susceptibility to Insect and Disease Outbreaks
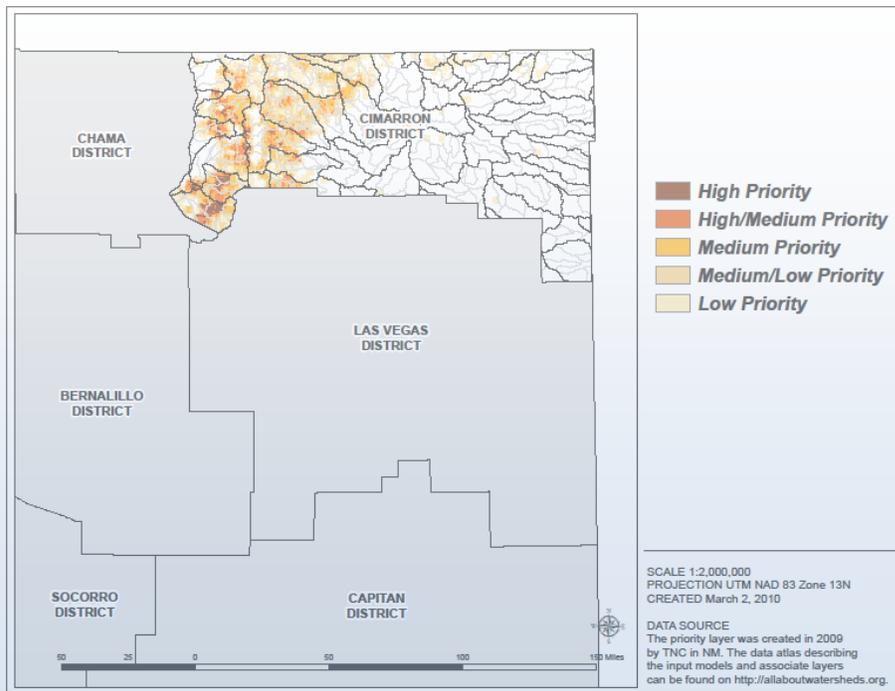
Map B-6. Cimarron District Priority Watersheds

Legend:
- High Priority
- High/Medium Priority
- Medium Priority
- Medium/Low Priority
- Low Priority

SCALE 1:2,000,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
The priority layer was created in 2009
by TNC in NM. The data atlas describing
the input models and associate layers
can be found on http://allaboutwatersheds.org.
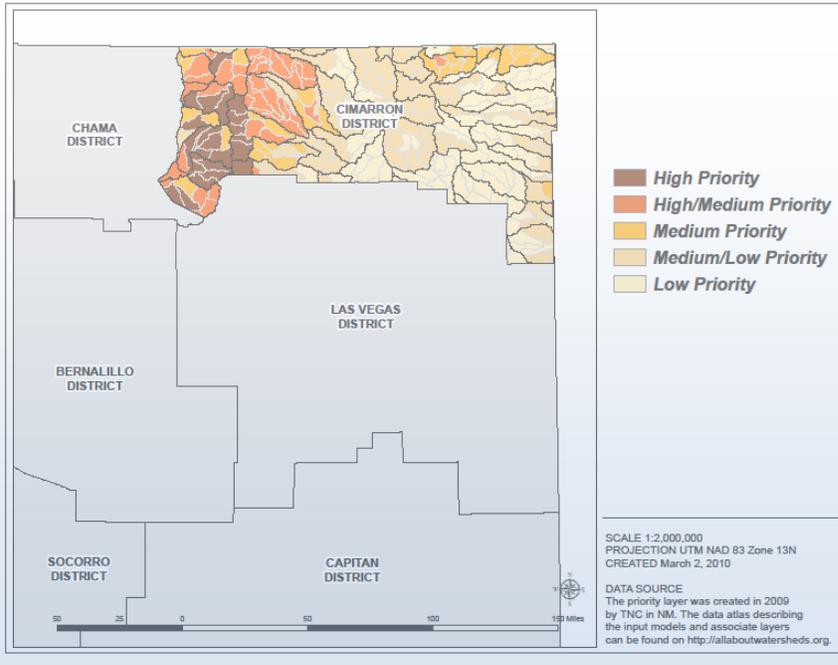
Map B-7. Cimarron District Wildfire Risk

Legend:
- High Priority
- High/Medium Priority
- Medium Priority
- Medium/Low Priority
- Low Priority

SCALE 1:2,000,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
The priority layer was created in 2009
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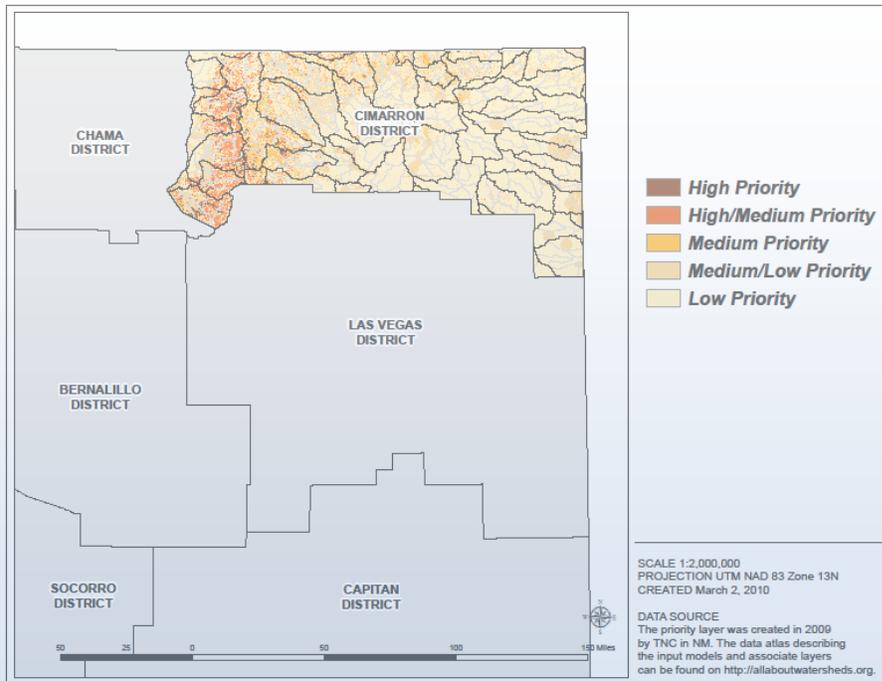
Map B-8. Cimarron District Development Potential in proximity to Wildfire Risk

Development Potential
Predicted Increases
in Housing Density

Wildfire Risk
High Priority
High/Medium Priority
Medium Priority
Medium/Low Priority
Low Priority

SCALE 1:2,000,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
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by TNC in NM. The data atlas describing
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can be found on http://allaboutwatersheds.org.

Socorro District

The Socorro District was originally established as the Magdalena District and located in Magdalena, NM in 1960. It was located in part to service the large amounts of state and private lands in western Socorro, northern Sierra, and Catron Counties. The original district extended from the Mexican border to the Gallup/Jemez country until the Bernalillo District was created in the 1980's. The office moved to Socorro in the early 1980s because adequate office space was not available in Magdalena for the growing staff. The District currently spans the entire southwest corner of the state and includes seven counties: Catron; Dona Ana; Grant; Hidalgo; Luna; Sierra and Socorro. Vegetation types range from Rio Grande Bosque, desert grasslands, extensive piñon/juniper woodlands, ponderosa pine/mixed conifer clad mountains and limited areas of sub-alpine forest. The Gila National Forest (and it's 6 ranger districts), and the Magdalena Ranger District of the Cibola National Forest account for thousands of acres of national forest lands within the district as well as two BLM districts (Las Cruces and Albuquerque) which hold jurisdiction over a large percent of the desert grasslands and piñon/juniper woodlands. Both of these agencies are major cooperators with the district and are the key to meaningful watershed scale forest and rangeland restoration projects that the district staff is involved in.

The District contains five major cities: Socorro, Truth or Consequences/Williamsburg, Las Cruces, Deming, and Silver City, and, and numerous smaller towns, all of which are expected to expand substantially by 2030. As these cities grow, they will put a greater pressure on the private lands intermingled with national forest and BLM lands for development, recreation, open space and infrastructure needs. The Assessment delineated 600,000 acres that are expected to experience an

increase in housing density (Map B-9). Twenty-six percent (157,000 acres) of the increased development is predicted to be the conversion of undeveloped or rural housing density to higher exurban or suburban housing densities (shown as high priority in Map B-9).

The District focuses programs in three equally critical management areas: forest restoration, fire management assistance, and forest products industry development. These areas are integrated and goals and accomplishments in each area enhance the others. For example, the assessment identifies 1.3 million acres with high degree of susceptibility to insect and disease outbreaks (Maps B-10). Programs addressing this threat, often address wildfire risk, involve local fire agencies, and create products for industry.

The District Cooperators include several large landowners (Double H Ranch -RMEF), Adobe Ranch, Ladder Ranch, Farr Ranch, Luera Ranch, Diamond A Ranch, Horse Springs Ranch, etc.) whom are very active in forest restoration activities, long-term conservation easements and the management of wildfires for resource benefit. Several small to medium size ranches have been involved with various kinds of forest technical cost share assistance (Forest Health Initiative (FHI), Forest Land Enhancement Program (FLEP), Forest Incentive Program (FIP), Stewardship, Wildland-Urban Interface (WUI) and Hazardous Fuels) as well as NRCS programs over the years. Multiple small land owners have been involved with various WUI grants to reduce wildfire danger and improve forest health. The District works with 9 SWCD's, 2 RC&D's, and County Governments which serve as fiscal agents where applicable to facilitate these grants and projects.

The Unit 16E Watershed project provides a collaborative opportunity that is multi-jurisdictional in scope, implementation, and funding. This is the first of what the District hopes are many large scale projects involving multi-jurisdictional collaborations. The ideal is that partners mutually designate a logical large landscape area for collaborative interagency emphasis, focus planning and landowner outreach in the area, implement projects by pooling funding and resources, and insure community-based capacity is in place for long-term monitoring and maintenance. The forest restoration goal for the District is to have a few of these projects in both the initial and implementation phases and a growing number of areas in the long-term maintenance category, until ultimately all landscapes have been addressed and restored.

On top of these larger projects, the district staff is constantly responding to calls from small landowners who want forestry technical assistance on a multitude of natural resources issues. The District is also involved in urban and community forestry projects and is always looking for ways to help communities and their citizens protect and expand these vital areas.

Like most of the Southwest, riparian areas on the Socorro District occupy relatively small areas, and yet provide extremely valued habitats. These areas are threatened in many areas of the district due to development, irrigation diversions, deteriorated upper watershed conditions, and dense stockings of woody species (both in the riparian corridor and the upland areas that contribute runoff and sediment to riparian ecosystems) The District has been working with various landowners and agencies to establish watershed restoration projects that include all ownerships and work to stabilize and rehabilitate these critical areas of the landscape. Map B-12 emphasizes areas in the upper watersheds of the Gila, San

Francisco, Mimbres, Animas, Alamosa and Little Colorado as well as the Rio Grande that are important for economic growth and that contribute to ecosystems services. Approximately 5.8 million acres were identified in this map as priority areas with the potential to enhance public benefit from natural resources.

The District addresses forest restoration issue through involvement with community organizations and collaborations with other government agencies. One example is the "Save our Bosque Taskforce," in which the District has participated in since its creation in 1994. The Task Force has worked to protect and restore areas of the Rio Grande Bosque in Socorro County outside of the two flagship U. S. Fish & Wildlife refuges (Bosque del Apache and Sevilleta). This includes the development of 17 Rio Grande riverside parks, the Socorro Nature area, as well as the restoration of over 500 acres of privately held Rio Grande Bosque Other cooperative projects include the development of CWPP action groups and the associated prioritization of treatment areas in all areas of the District.

The Assessment mapped 1.7 million acres at risk of uncharacteristic wildfires (Map B-11). In addition to fuel projects to reduce risk, the district also focuses on wildland fire suppression capacity. The district's fire management goals are to support each county in building capacity in order to be included in the Statewide Resource Mobilization Plan (RMP). This includes having adequate training, equipment and record-keeping. The first priority is to insure the "mountain" counties of Catron, Grant and Socorro meet and maintain this goal. The next priority for the district is Sierra, Hildalgo, Dona Ana, and Luna counties.

With many of the forest health and fire management goals hinging on the ability to economically thin trees in the forests and woodlands, the District is committed to helping build forest products industries. The key goal is to help potential entrepreneurs develop industries that fit the scale of the *available* natural resources, equipment and technology, personnel for woods operations, and markets for products that insure sustainability. One role the district serves is to help network to match small operations that can maximize the utilization of wood fiber by working together. The district vision is to have at least five small operations working in the district in the next five years independent of public sector subsidies.

Map B-9. Socorro District Development Potential
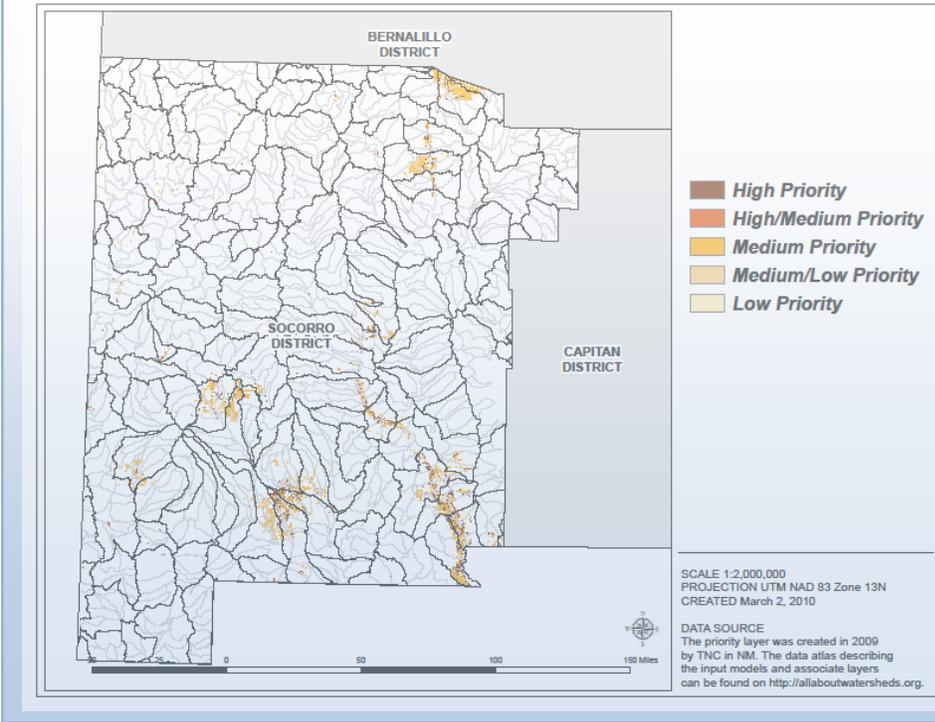
Map B-10. Socorro District Forest Health: Susceptibility to Insect and Disease Outbreaks
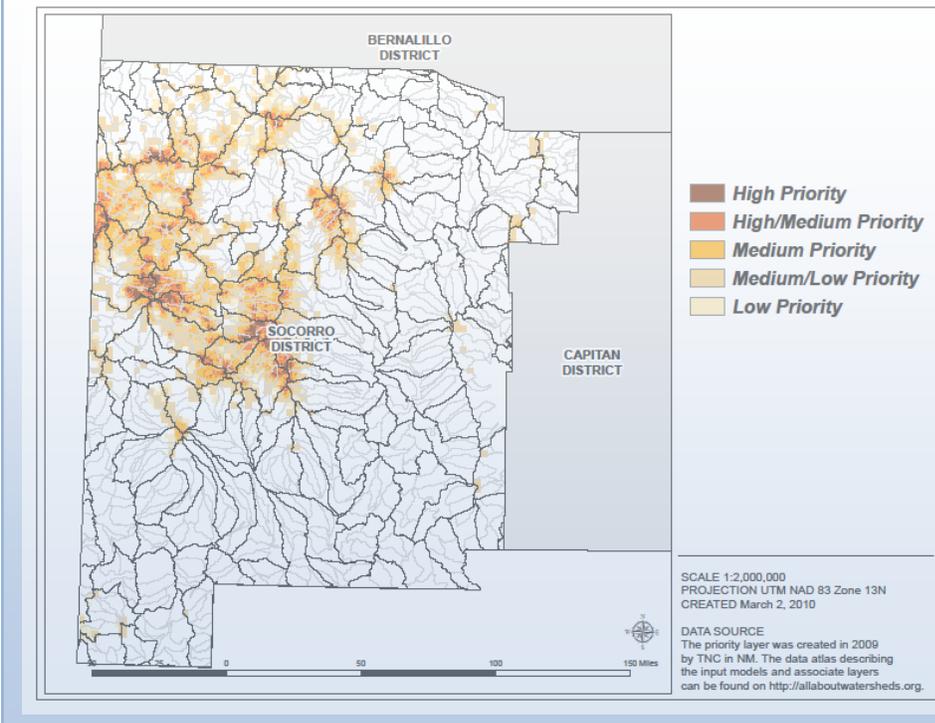
Map B-11. Socorro District Wildfire Risk
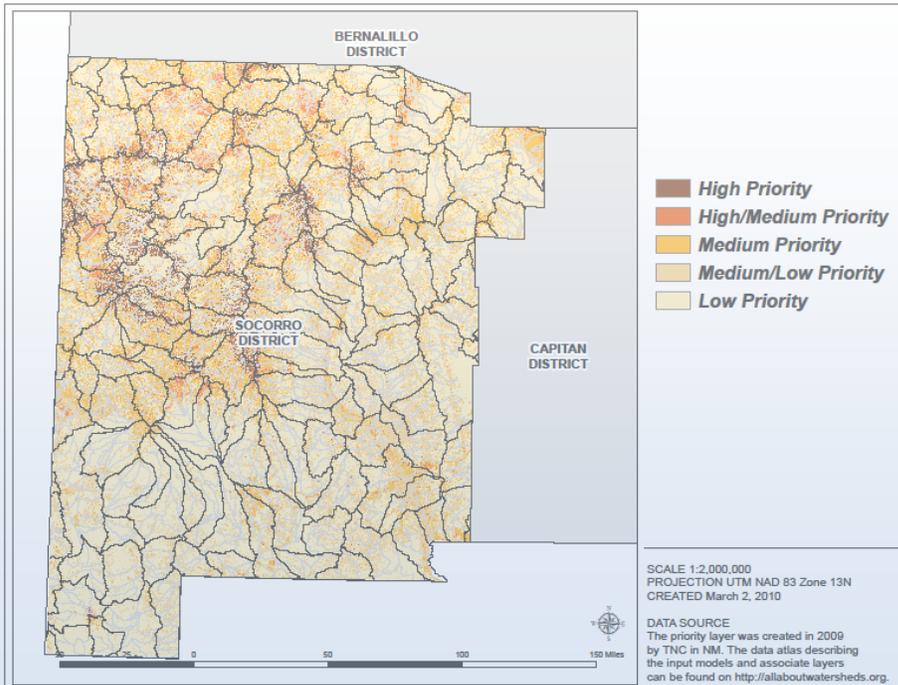
Map B-12. Socorro District Enhancing Public Benefit from Natural Resources
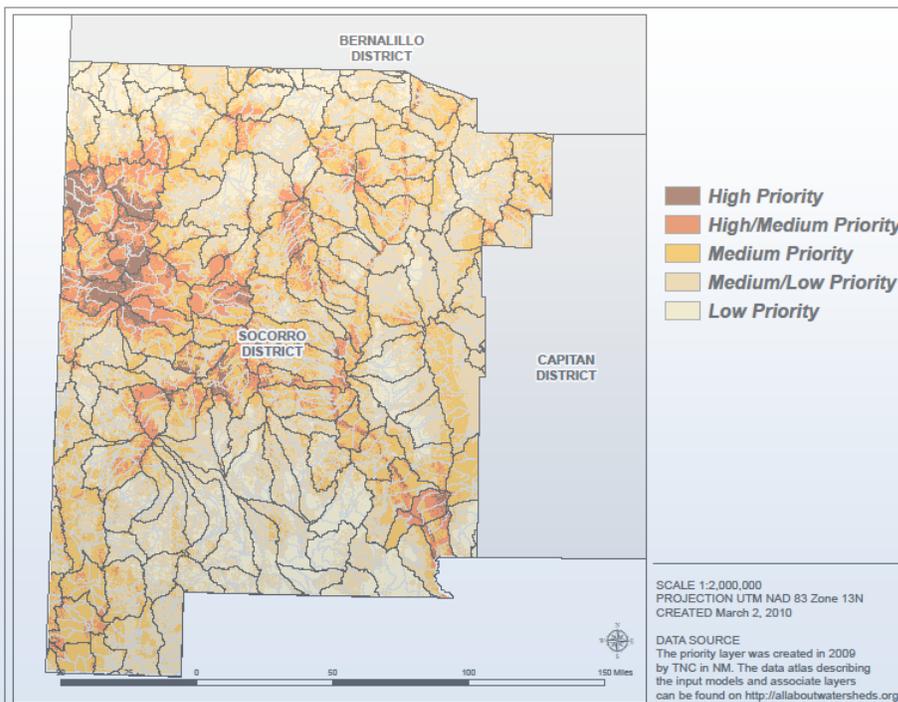
Las Vegas District

Originally established in 1963, the Las Vegas District Office is located at the south end of Storrie Lake State Park, just north of the city of Las Vegas. The District is comprised of approximately 10.2 million acres within the following six counties: San Miguel; Mora; Quay; Curry; Guadalupe and Harding. The majority of the land (8.5 million acres or 83%) is in private ownership. State land includes one million acres (10%), the final seven percent (710,000 acres) is federally owned. The District includes the Carson and Santa Fe National Forests and the Kiowa National Grasslands, which are part of the Cibola National Forest. The District covers a wide array of landscapes from the southern Rockies, the Sangre de Cristo Mountains, through the mesa country and out into the eastern plains of New Mexico to the Texas border.

The primary goals of the District are to work with cooperators in order to help improve forest and watershed health and to encourage the successful growth of businesses that depend on forest resources. The Las Vegas District has spent years developing productive relationships with local municipalities, private landowners, and various land management agencies and organizations. This base of cooperation provides a platform for assisting landowners manage their lands for healthy forest conditions through tree removal in such way to expand utilization of woody biomass and small diameter timber.

The focus in the western portion of the District tends to be on forest health while the focus in the eastern plains varies from community forestry to agroforestry to developing Community Wildfire Protection Plans (CWPP) focused on mitigating large, fast moving grassland fires. The diversity of landscapes gives the District opportunities to offer a great variety of support to these communities.

District partners include the Las Vegas Wood Cluster, Soil and Water Conservation Districts (SWCD), Resource Conservation and Development Councils, USDA Natural Resources Conservation Field Offices, Cannon Air Force Base, and each of the county's commissions and municipal councils. These partners focus on projects that will improve forest health and bolster economic opportunities in area communities. Such partnerships are leading to fruitful collaborations. For example, San Miguel County purchased land near a railroad siding for a new Northern New Mexico Wood Park. Local business owners are spearheading the effort to locate various wood industries there to provide markets for all sizes of wood fiber and be able to ship wood products via rail. Meanwhile, the Natural Resources Conservation Service and area SWCDs are working with the District on a Cooperative Conservation Partnership Initiative (CCPI) grant to treat private forest lands in the Gallinas and Tecolote watersheds. The same partners are in the planning stage for a similar project for Mora County.

While forest health issues impact less than three percent of the entire district, it is a critical concern for the forest areas. The District contains approximately, 685,000 acres of forest of which 220,000 acres are at high risk of insect and disease outbreaks (Map B-13). Much of the private forestlands in San Miguel and Mora counties are in mid-size parcels. Although there are subdivisions with smaller lots, most of the district cooperators own between 10 and 500 acres of forest land. In areas where insect risk is high, treatment effectiveness depends on multiple landowner participation. The opportunities for outreach

and projects are immense. For example, more Forest Health Initiative (a US Forest Service funded program primarily to reduce bark beetle risk) projects occur on this District than elsewhere in the state.

The District serves as the focal point for the Division's Invasive Weed Program. Locally the Tierra y Montes SWCD actively implements programs to map and treat invasive plants in forest areas. The District also coordinates grants throughout the state for forest and woodland projects. Working closely with the New Mexico Department of Agriculture's weed specialist and various weed management areas throughout the state, this program is part of an integrated, multi-agency effort to curb the spread of non-native, noxious plants.

Risk of uncharacteristic wildfire is another key management concern in the District. The Assessment mapped approximately 569,000 acres at high risk to uncharacteristic wildfire (Map B-14). Each county has an approved and signed Community Wildfire Protection Plan (CWPP) and the District is in the process of working closely with these counties in the development of treatment areas as identified within each CWPP. Fire has been a significant threat in the forests, as evidenced by large oak brush fields on old fire scars. The eastern portion of the district is dominated by grasslands where wildfires tend to be frequent, fast-moving and have posed serious threats to many communities, including Roy, Tucumcari, and Clovis. Fire breaks require maintenance on a shorter cycle, and many of the eastern CWPPs address the need for establishing and maintaining vegetation practices that provide fire breaks.

The Assessment predicted 40% of the District as having high economic potential (Map B-15). The production of local timber products has been an important source of income for many generations of landowners. Of these areas identified with economic potential for forest resources, the prospective economic potential for woody biomass resources far exceeds that of timber resources. The Assessment delineated 345,000 acres of forests with potential for biomass versus 73,000 acres for timber resources. Today, an immense amount of small-diameter materials needs to be removed from the forest to restore ecosystems to healthy conditions with reduced fire risk. The Northern New Mexico Park, mentioned earlier, is just one of the many efforts in the area to utilize wood. Commercial firewood operations range from single operators to large businesses. Specialty products, such as flooring and furniture, also support area businesses. The District's vision is to capitalize on green market opportunities with specific emphasis on small-diameter trees. This includes identifying the entry process, helping establish market differentiation, identifying market share and visibility, and public awareness.

All project success depends on strong public support and understanding of District goals. The District encourages landowner participation in the American Tree Farm System, which has resulted in many outreach programs including the Bartley Demonstration Forest in Rociada, New Mexico. District personnel assist with statewide programs such as Forestry contests for Future Farmers of America (FFA) and New Mexico Forestry Camp, and well as local projects including an annual Earth Day Celebration spearheaded by the Tierra y Montes SWCD.

Map B-13. Las Vegas District Forest Health: Susceptibility to Insect and Disease Outbreaks

CHAMA DISTRICT

CIMARRON DISTRICT

LAS VEGAS DISTRICT

BERNALILLO DISTRICT

SOCORRO DISTRICT

CAPITAN DISTRICT

High Priority
High/Medium Priority
Medium Priority
Medium/Low Priority
Low Priority

SCALE 1:2,000,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
The priority layer was created in 2009
by TNC in NM. The data atlas describing
the input models and associate layers
can be found on http://allaboutwatersheds.org.

50   25   0   50   100   150 Miles

Map B-14. Las Vegas District Wildfire Risk

CHAMA DISTRICT

CIMARRON DISTRICT

LAS VEGAS DISTRICT

BERNALILLO DISTRICT

SOCORRO DISTRICT

CAPITAN DISTRICT

High Priority
High/Medium Priority
Medium Priority
Medium/Low Priority
Low Priority

SCALE 1:2,000,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
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can be found on http://allaboutwatersheds.org.

50   25   0   50   100   150 Miles

Map B-15. Las Vegas District Economic Potential
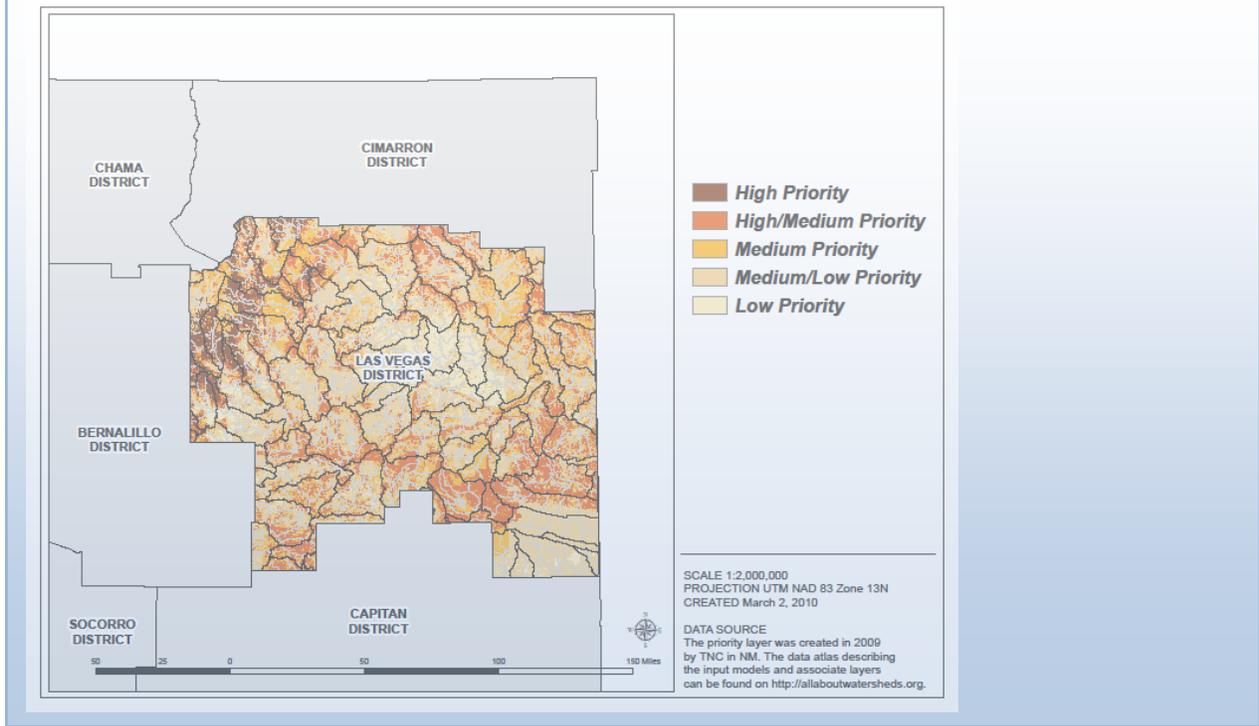
Capitan District

Established in 1965, the Capitan District spans the southeast corner of the state and includes Lincoln, Otero, Chaves, De Baca, Roosevelt, Lea and Eddy Counties. The District provides technical assistance to landowners and has wildland fire suppression responsibilities that cover 30,877 square miles encompassing 8,591,874 acres of private, non-federal and non-municipal lands. The District staff provides assistance to its cooperators on forest and watershed health and fire safety issues across the seven county areas.

The Capitan District also manages Smokey Bear Historical Park. The Park exhibits include a historical timeline of the Smokey Bear fire prevention program, the history of Smokey Bear from poster concept to finding the cub in the Capitan Mountains and then to his final resting place at the Park. Other park exhibits offer informational panels on fire's role in a forested ecosystem.

The District's greatest challenge is risk of wildfire. Because of the diverse range of climate and fuels in the Southeast portion of New Mexico, the District experiences year-round fire potential not common in the rest of the state. In the past ten years, the District has suppressed 10,058 wildfires that have burned over 2.5 million acres and threatened over 2,000 structures. These wildfires have costs the State of New Mexico over $86 million in suppression funds. This does not include the costs associated with impacts to watersheds, wildlife habitat, forest products industry, and tourism that were also experienced across many communities as a result of these fires.

Using the Wildfire Risk layer, the Assessment delineates 1.7 million acres at high risk of uncharacteristic wildfire (Map B-16). This constitutes 38% of the priority acres (4.8 million) indentified for the entire State. This lens, though appropriate for other regions of the state, fails to emphasize the serious threat of the grassland fires that occur in the east portion of the district. These extensive grass fuels ignite quickly and spread rapidly across the landscape, as evidenced by modeling rate of spread (ROS) with Landfire data (Map B-17). For this statewide assessment, this ROS layer was combined with other fire behavior factors including crown fire potential and flame lengths, which emphasized the overall threat/priority ranking of areas dominated by forest and shrublands in comparison to grasslands.

Experience in the grassland shows that fires are often frequent, fast-moving and have posed serious threats to many at-risk communities Since 2000, the communities of Tatum, Lovington, and Hobbs have all been threatened by large, fast moving wildfires. Some of these fires destroyed structures after entering the municipal boundaries where no completed fuel mitigation projects were in place to slow the fire's progression. Local volunteer fire departments often provide initial attack suppression for this large fire activity. Fire department capacity is important to the safety and success of these incidents. For this reason, the state sets a high priority for providing suppression resources and education tools to these communities. The District goal is to train and qualify 50 percent of the area's 104 volunteer fire departments in Wildland Firefighting within the next five years.

Forest health issues within the Sacramento Mountains are another critical management concern for the District. Thirty-one percent of the forested areas within the District (516,000 acres) are at high risk to insect and disease outbreaks (Map B-18). Forests at risk of insect and disease are often in need of fire mitigation projects to reduce fuels. Several programs and projects are used to address these double concerns, and often involve collaboration with adjoining agencies including the Lincoln National Forest and the Mescalero Apache Tribe.

A key element to successful landscape scale treatments is a forest industry that utilizes small diameter woody material. The District continues to assist the local forest products industry in building capacity for woody biomass utilization. The Assessment mapped 2.1 million acres with high economic potential in the District (Map B-19). Almost 10 percent (64,000 acres) of the economic potential from timber resources within New Mexico fall within the District. The potential from biomass resources encompasses an additional 525,000 acres.

The ecological health and economical health of the region are joined with the solution of utilizing small diameter woody material. The District mitigates fire and forest health issues through active interagency collaborative projects. For example; the Greater Ruidoso Area and Otero County Working Groups provide valuable input to forest and watershed health related issues and prioritize hazardous fuels mitigation projects around communities at risk to catastrophic wildfire. The District, with the Lincoln National Forest and other interagency partners are implementing a Collaborative Forest Landscape Restoration Program project that mitigates fire risks while providing jobs.

The District also contains substantial rangelands, 1.7 million acres of which are identified as having high productivity and either currently or could in the future play an important role in economic growth. The

District is forming a similar local working group on the east side of the District to prioritize and attract funding for projects to protect communities. These fuel types require maintenance on a shorter cycle that has not historically been funded by traditional wildfire protection programs. All of the counties on the east side of the District have approved Community Wildfire Protection Plans with priority areas identified. As in the forested environment, resource management of rangeland conditions can mitigate fire behavior.

Multiple communities on the District lack local expertise, sufficient funding and resources to maintain healthy community forests. Utilizing competitive grant funding through State & Private Forestry, the District and the State's Urban and Community Forestry Program Manager have worked with area communities to develop a new position for a Rural Communities Forester. The position is hosted with a local Resource Conservation & Development office that can utilize multiple funding sources to build long-term program stability. The position will serve two high priority counties within the District and will assist communities in developing local programs and projects that address forest health, wildland fire risk mitigation, and improved management of community forests.

Map B-16. Capitan District Wildfire Risk
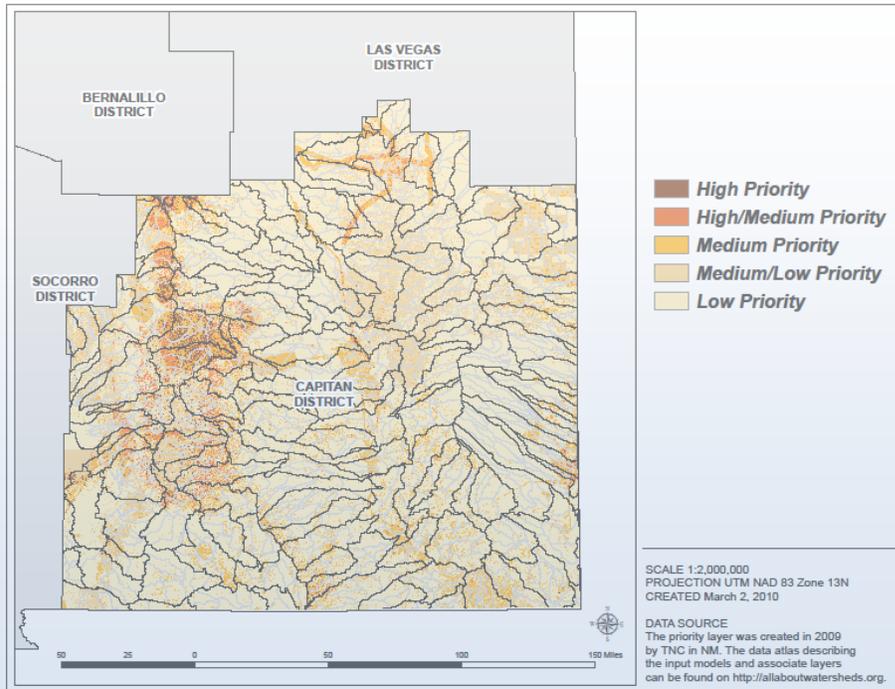
Map B-17. Capitan District Wildfire Rate of Spread

LAS VEGAS DISTRICT
BERNALILLO DISTRICT
SOCORRO DISTRICT
CAPITAN DISTRICT

Extreme ROS
Medium/High ROS
Low ROS

SCALE 1:2,000,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
The priority layer was created in 2009
by TNC in NM. The data atlas describing
the input models and associate layers
can be found on http://allaboutwatersheds.org.

50 25 0 50 100 150 Miles

Map B-18. Capitan District Forest Health: Susceptibility to Insect and Disease Outbreaks

LAS VEGAS DISTRICT
BERNALILLO DISTRICT
SOCORRO DISTRICT
CAPITAN DISTRICT

High Priority
High/Medium Priority
Medium Priority
Medium/Low Priority
Low Priority

SCALE 1:2,000,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
The priority layer was created in 2009
by TNC in NM. The data atlas describing
the input models and associate layers
can be found on http://allaboutwatersheds.org.

50 25 0 50 100 150 Miles

Map B-19. Capitan District Economic Potential

SCALE 1:2,000,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
The priority layer was created in 2009
by TNC in NM. The data atlas describing
the input models and associate layers
can be found on http://allaboutwatersheds.org.
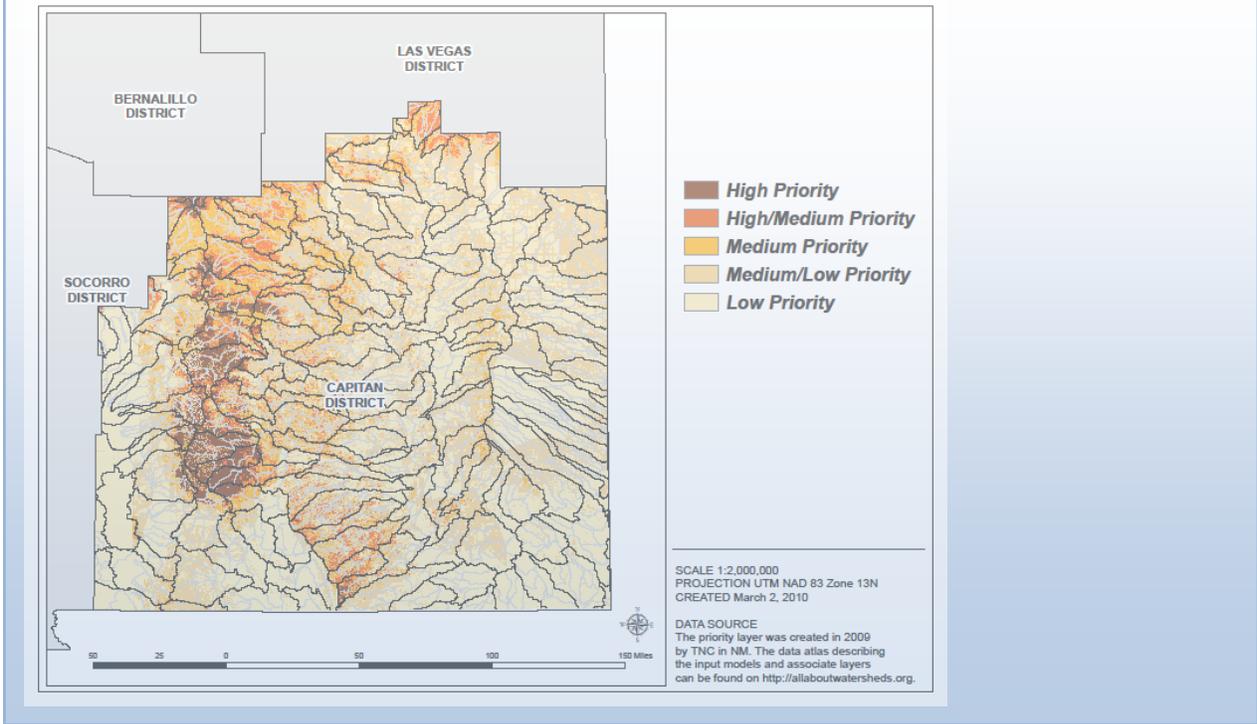
Bernalillo District

The Bernalillo District was established in 1983 to serve Cibola, McKinley, Valencia, Bernalillo, Sandoval, Torrance, Los Alamos and Santa Fe Counties. The District, in west-central New Mexico, totals 6.6 million acres consisting of 160,000 acres of commercial forest; 1.54 million acres of piñon-juniper and bosque woodland; and 4.9 million acres of non-forested watershed.

Each year the Bernalillo District assists hundreds of landowners and fire department members by providing field visits, written management plans, design and cost sharing of forest conservation practices such as thinning and tree planting projects, workshops on forest and watershed health, and fire training. The District also reviews commercial harvesting activity on private lands to assure compliance with state harvesting regulations. Each year, there are 200-300 wildland fires occurring on state and private lands within the district, in addition to district personnel assisting state wide with firefighting efforts.

Bernalillo District partners with county and municipal fire departments to build wildfire suppression capacity. A significant number of Resource Mobilization Plan (RMP) resources are present in the district and are available to respond to incidents both within the state and out-of-state. The district hopes to continue to develop partnerships and increase the capabilities of existing partners in firefighting capabilities.

Commercial forestry activities are economically viable in Cibola, McKinley, Sandoval, Torrance and Santa Fe Counties. With additional development of small diameter markets, the other counties could include

forestry activities in their economies. As with other districts in the state, small diameter markets will also serve to increase the area of healthy forests adding to more sustainable landscape conditions. Wood industries groups exist in two counties already and both have connections with neighboring counties to work on developing industry dialog.

Three areas of forestry activities focus over the past decade of the Bernalillo District are the East Mountains including lands ranging from the Santa Fe county line to the town of Mountainair; the Jemez Mountains from Los Alamos to Cuba; and the Zuni Mountains from Grants to just shy of the Gallup area. Each of these areas while having unique forestry challenges, have been district focus areas due to the demands of the private forest owners residing in the areas.

The East Mountains is a large bedroom community of the Albuquerque area and is best described as a large exurban forested residential area. Progressively to the south the landscape becomes more rural in nature with larger tracts but sharing similar forestry challenges. A number of Land Grants exist in the area each with varying forestry issues. This area has a large common boundary with two ranger districts of the Cibola National Forest with each of these districts working on common forestry challenges with the adjacent private land. A challenge for the Bernalillo District is to help to coordinate the efforts of the ownerships to make the multijurisdictional forestry efforts create the greatest positive impact on the landscape.

Although some consider the Jemez Mountains as a bedroom community to Los Alamos, Santa Fe and surrounding communities, this trend isn't as dominant as it is in the East Mountains. The forestry cliental in the Jemez Mountains also includes some significantly sized in holdings where larger scale forestry practices take place. The district also enjoys partnerships with other state lands where joint projects have been completed and are in progress. New Mexico State Lands, New Mexico State Parks, New Mexico State Monuments and New Mexico Game and Fish properties are all examples of these partnerships. The District also coordinates with two ranger districts of the Santa Fe National Forest to create maximum positive forestry impacts on the landscape.

The Zuni Mountains are located in both Cibola and McKinley Counties, and the region is generally a rural landscape. The Districts primary focus in this mountain range is in assisting larger scale landowners with forestry and logging practices. Although some Wildland Urban Interface communities exist in this range the bulk of the work is with tracts of land of 100 – 4,000 acres.

The Bernalillo District faces challenges when it comes to wildland fire management. Fire department capabilities within the district vary from very capable to departments in dire need of equipment and training. Federal partners are strong and provide good coverage in most areas local departments are lacking. The overall program has room for improvement.

The Bernalillo District faces intense development pressures. The district currently is home to 1.1 million of the 1.9 million residents of the State. Approximately 25 percent of the District is expected to increase in housing density by 2030. The District has been involved with numerous sub-division development projects by providing input on how to manage growth to mitigate wildfire risk in the wildland urban interface. Wildland urban interface is, in fact, a major focus for the District. The Assessment predicted

approximately half a million acres of undeveloped or rural areas to be converted to higher density exurban or suburban housing densities (see Table 2 for density descriptions) in the next 30 years. An additional 1.1 million acres of rural, exurban and suburban areas are also expected to increase their densities (Map B-20).

Approximately 10 percent of the District (600,000 acres) is considered priority working landscapes in need of protection. Map B-21 shows working landscapes in the District with high development potential and economic potential and where fragmentation of native vegetation is considered at high threat.

Most of the largest cities within the state fall within the Bernalillo District boundaries, including Albuquerque, Santa Fe, Rio Rancho, Belen, Los Lunas, Gallup and Los Alamos. The Assessment identified 20 watersheds of high importance for protection and enhancement of water quality and 21 watersheds of high importance for protection and enhancement of water supply within the District (Maps B-23 and B-22, respectively). Data to support detailed strategic planning for the Division's Urban Forestry Program are lacking, and investment in developing these data needs is critical for evaluating how the Program could best contribute to enhancing public benefit from natural resources.

With an already large, existing population and high potential for growth, risk of wildfire is a concern for the District. The Assessment identified more than 1.1 million acres at risk of uncharacteristic wildfire (Map B-24). Much of the landscape at risk of uncharacteristic wildfire falls in watersheds with high potential for economic growth (Map B-25). The economic potential model identifies approximately 1.5 million acres where forests, woodlands, and rangelands play a major role in local or state economic growth or could in the future. Of these priority acres, the potential for economic growth within the recreation market makes up the largest component (1 million acres).

With the majority of the State's population residing within the Bernalillo District, urban and community forestry projects and public outreach are also high priorities. The District helped establish and continues to support the Backyard Tree Program in the East Mountains, the East Mountain Interagency Fire Protection Association, and the New Mexico Forestry Camp.

Map B-20. Bernalillo District Development Potential

Legend:
- High Priority
- High/Medium Priority
- Medium Priority
- Medium/Low Priority
- Low Priority

SCALE 1:2,000,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
The priority layer was created in 2009
by TNC in NM. The data atlas describing
the input models and associate layers
can be found on http://allaboutwatersheds.org.
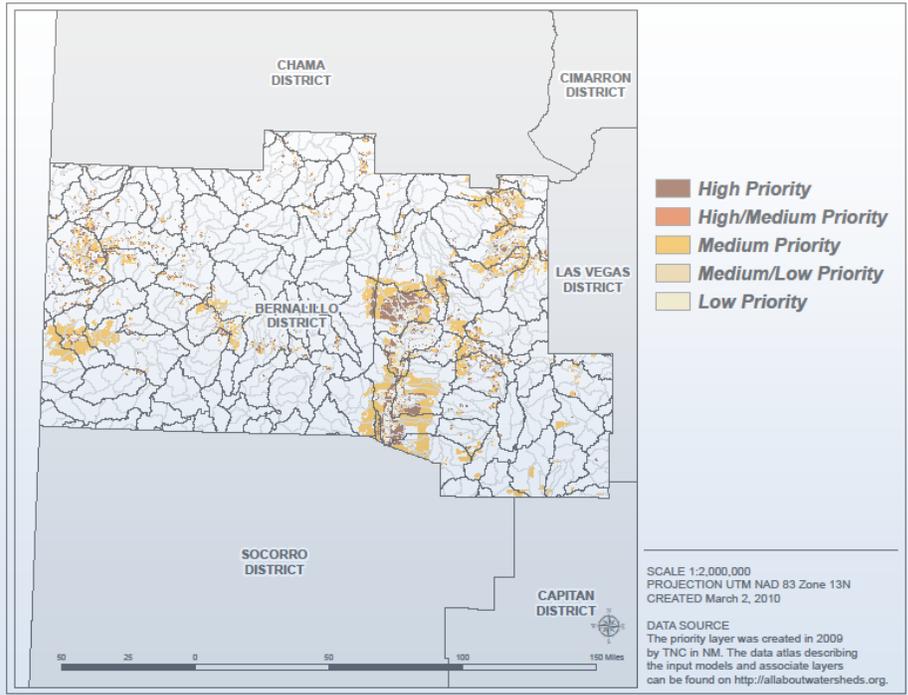
Map B-21. Bernalillo District Priority Working Landscapes

Legend:
- High Priority
- High/Medium Priority
- Medium Priority
- Medium/Low Priority
- Low Priority

SCALE 1:2,000,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
The priority layer was created in 2009
by TNC in NM. The data atlas describing
the input models and associate layers
can be found on http://allaboutwatersheds.org.
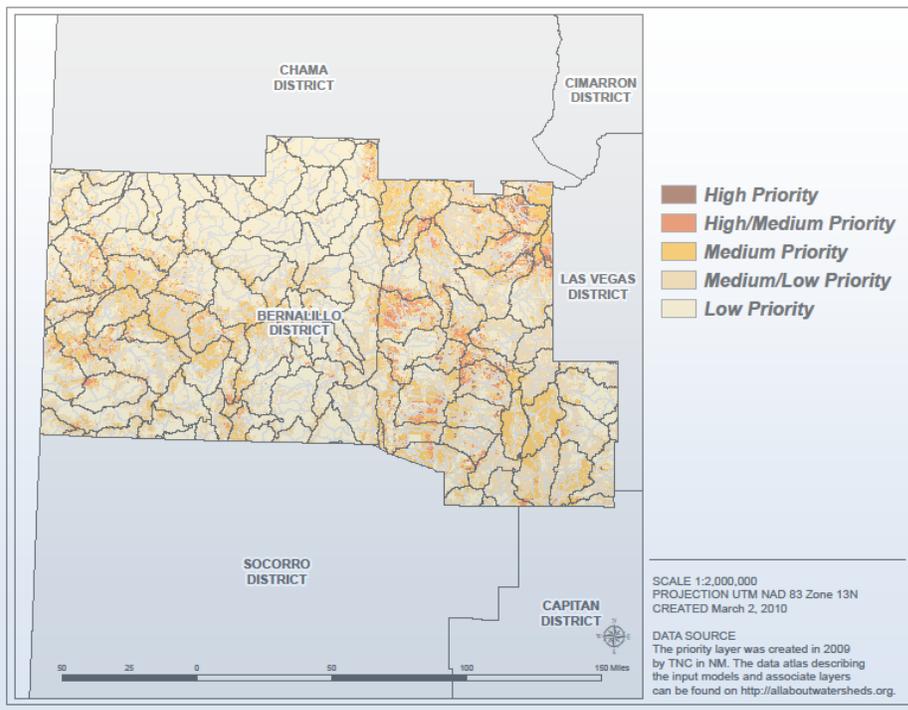
Map B-22. Bernalillo District Priority Watersheds for Enhancing and Protecting Water Supply
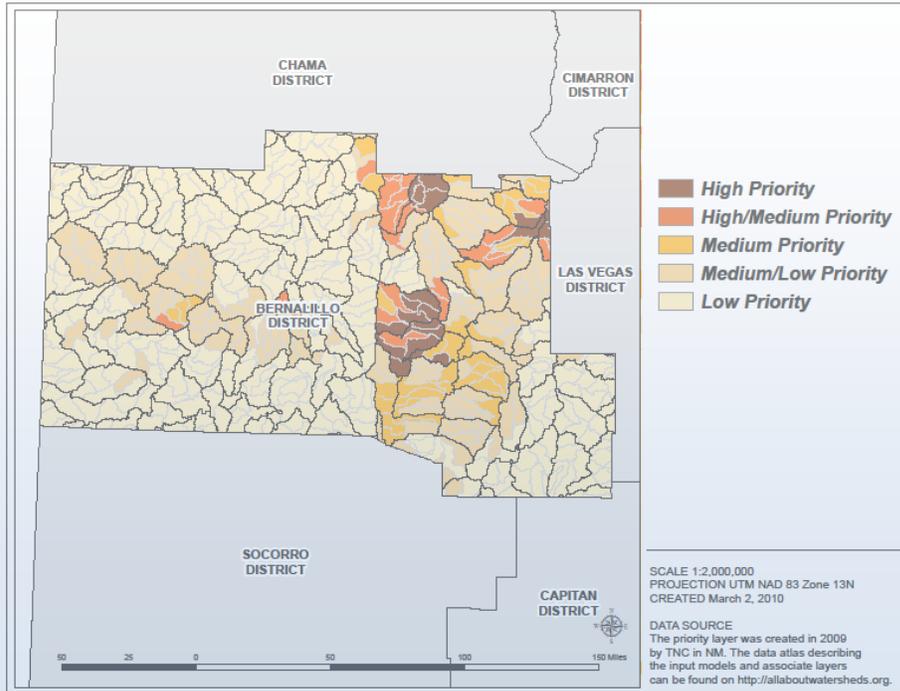
Map B-23. Bernalillo District Priority Watersheds for Enhancing and Protecting Water Quality

Map B-24. Bernalillo District Wildfire Risk

Legend:
- High Priority
- High/Medium Priority
- Medium Priority
- Medium/Low Priority
- Low Priority

SCALE 1:2,000,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
The priority layer was created in 2009
by TNC in NM. The data atlas describing
the input models and associate layers
can be found on http://allaboutwatersheds.org.
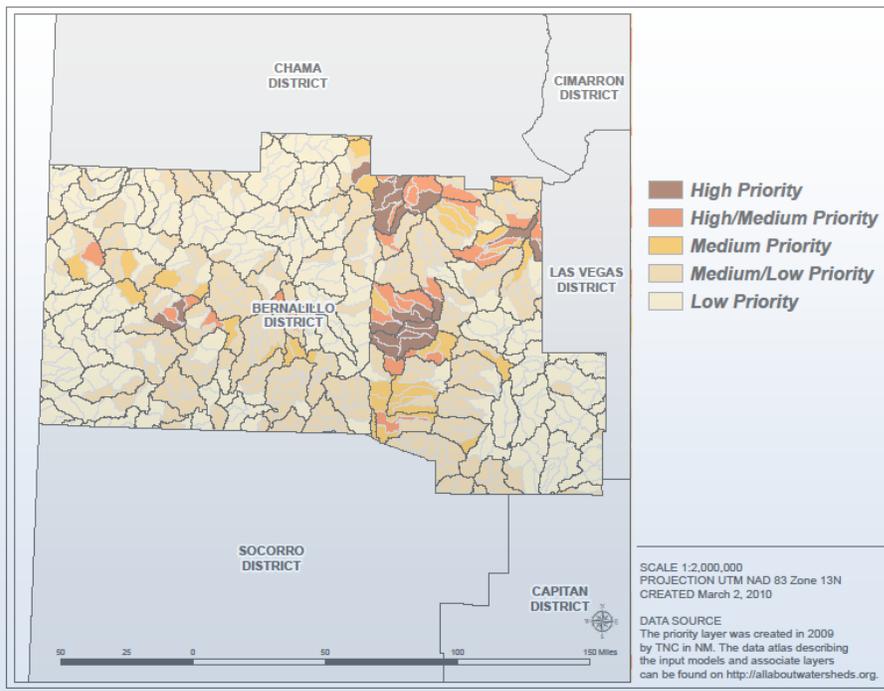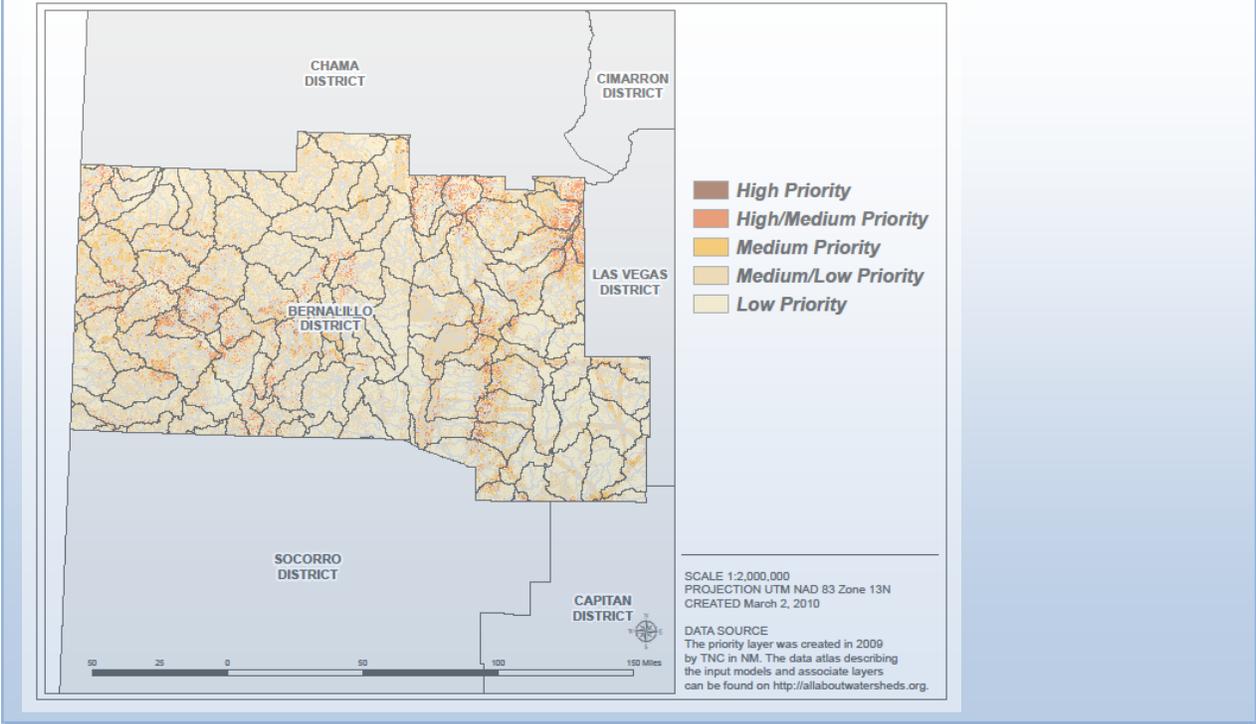
Map B-24. Bernalillo District Economic Potential

Legend:
- High Priority
- High/Medium Priority
- Medium Priority
- Medium/Low Priority
- Low Priority

SCALE 1:2,000,000
PROJECTION UTM NAD 83 Zone 13N
CREATED March 2, 2010

DATA SOURCE
The priority layer was created in 2009
by TNC in NM. The data atlas describing
the input models and associate layers
can be found on http://allaboutwatersheds.org.
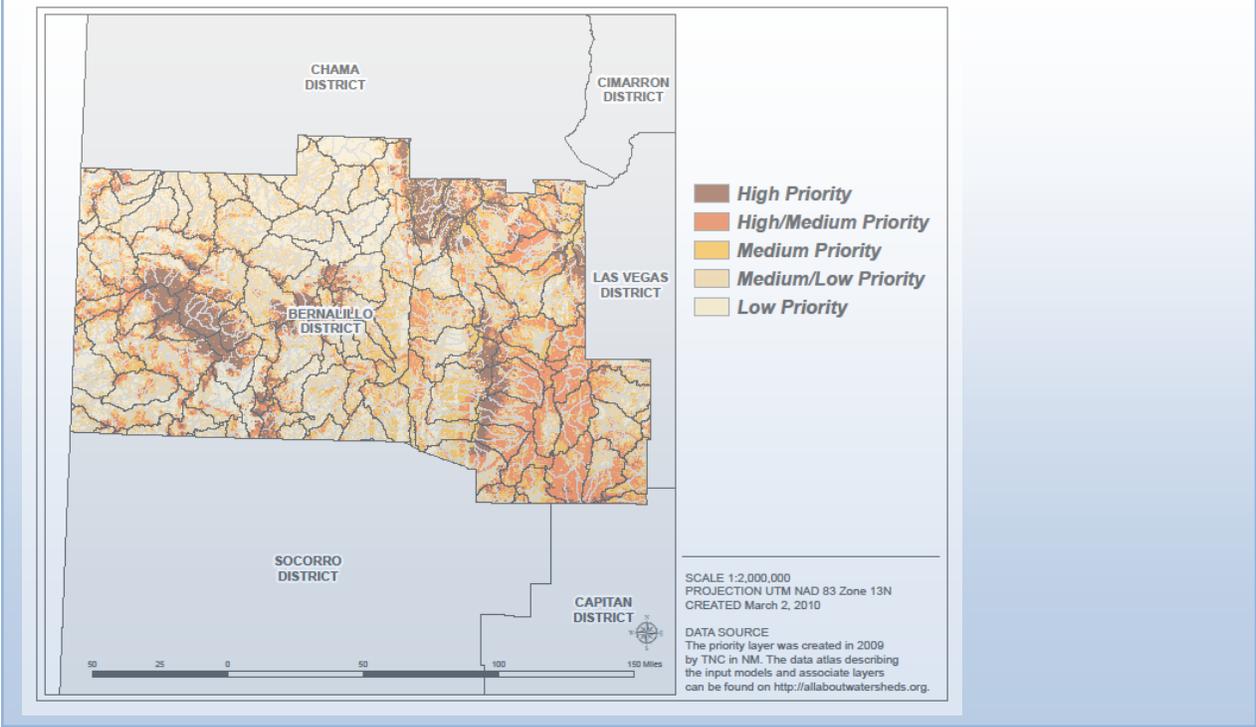
Appendix C: New Mexico Stewardship Spatial Analysis Project (SAP) Analysis

The Spatial Analysis Project (SAP) is a GIS-based strategic management tool that allows participating State forestry agencies to identify and spatially display important forest lands (rich in natural resources, vulnerable to threat), tracts currently under Forest Stewardship Plans, and areas of opportunity to focus future Forest Stewardship Program efforts. The New Mexico SAP Project was completed in 2007 by Earth Data Analysis Center; the methodology was written by Kim Slezak of Slezak Consulting.

Forest Stewardship Spatial Analysis Project

New Mexico Methodology

March 2007

Updated and Revised August 2008

KP Slezak Consulting, Kimberly Slezak

Project Summary

The Spatial Analysis Project (SAP) is a nationwide effort to identify the "Stewardship potential" of a given piece of land using a standardized geographic information system (GIS) model for analysis. The pilot was developed by the GIS staff of four state forestry agencies (Connecticut, Maryland, Massachusetts and Missouri) and the U.S. Forest Service, State and Private Forestry program. Twelve factors were identified to help identify the "Stewardship potential" of a given piece of land. The factors were differentiated into two groups: resource potential and resource threats.

Certain lands within any state are not eligible for inclusion in the Forest Stewardship program. Land use / land cover factors which identify these areas are open water, urban areas and publicly owned lands. A mask was created to exclude these areas from the analysis.

Once the 12 factors were identified, each state determined the relative importance of each of the criteria based on their state-specific conditions. The New Mexico Forest Stewardship Advisory Committee ranked and assigned an average weight for each of the criteria. The 12 layers were then combined in a GIS overlay analysis which took into account the weight factors. An extra layer, Agro-forestry was discussed and weighted, but was not able to be created. The Committee decided not to recalculate the weights as each individual layer would still hold their relative weight. The Earth Data Analysis Center (EDAC) at the University of New Mexico was hired to gather the data and run the analysis.

The final product was a single data layer which represents the suitability of the land for inclusion in the Forest Stewardship Program. Possible values from this analysis range from 0 to 5, with a value of 5 representing the highest level of suitability. Actual values for New Mexico ranged from 0 to 3.8599. A 'natural breaks' classification algorithm was used to break the values into low, medium and high classes and the raster reclassified to have values 1 – 3.

In order to understand where the Forest Stewardship Program had been previously implemented, the property boundaries for ownerships with a Stewardship plan were digitized and a GIS layer created Stewardship plan polygons were then overlaid on the Stewardship potential layer to assess Stewardship efforts to date.
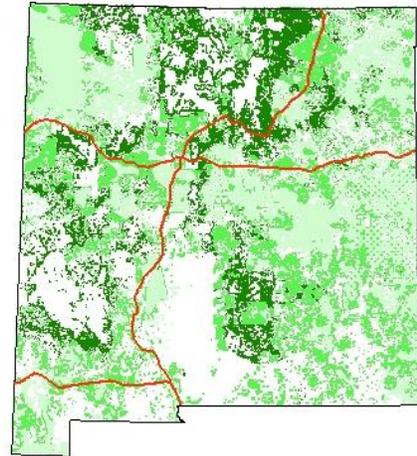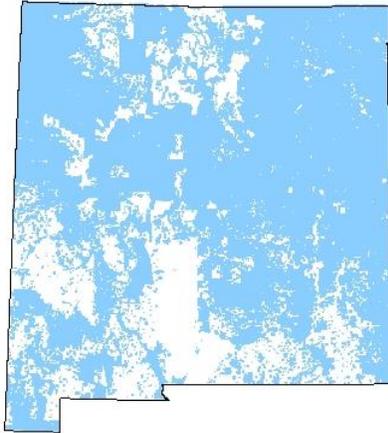
Analysis Mask - The analysis mask identifies those cells within the state extent that will be considered when performing an operation or function on data sets. Setting an analysis mask means that processing will only occur on selected locations and that all other locations will be assigned values of NoData. For the purpose of the SAP analysis, the mask includes all areas that are eligible for Forest Stewardship Program inclusion. These are areas that are **not** urban/developed areas, public ownership, and open water. The mask was created by combining a grid of NLCD suitable areas and a grid of privately owned lands. The NLCD values of 11, 12, 21, 22, 23, 31, and 32 received a NoData value and the remaining NLCD values received a 1. Private lands in the grid received a value of 1. The mask is produced when the rasters are combined using the weighted overlay tool. The analysis mask layer is used as several of the environment settings, so this layer will be the first to be modeled and run to save some process steps in the analysis.

Resource Potential layers
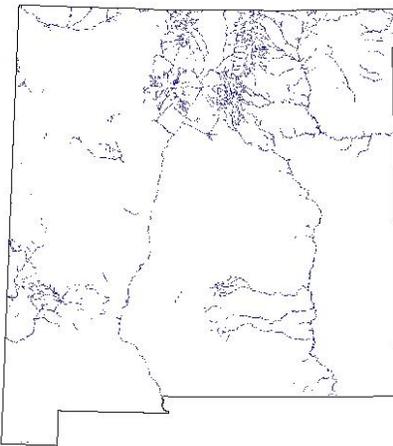
Riparian Zones - Riparian zones were created by buffering (300 feet each side) the Rivers feather class (ESRI dataset; 1:24,000 scale. The buffers are shown in blue on the map at below left.

Priority Watersheds - These watersheds are considered priorities as they are listed on the NM Environment Department's Category 1 watersheds for non-point pollution. Watershed polygons are the 11 digit U.S. Geological Survey Hydrologic Unit shapefiles. Source scale for this data is 1:24,000. The priority watersheds are shown in blue on the map.
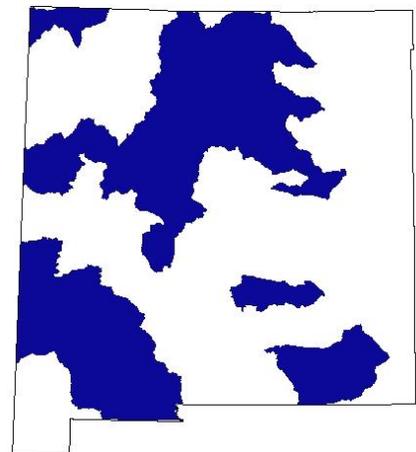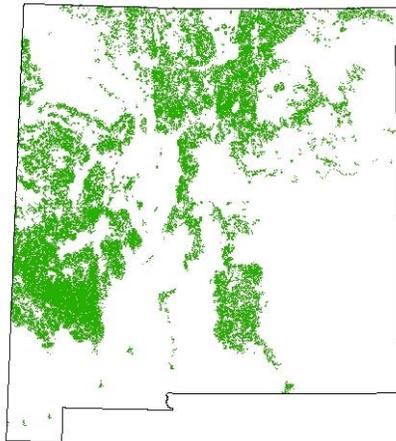
Forest Patch Size - The goal of the forest patch size layer is to determine a minimum patch size for the state and emphasize management of these forested areas. Large continuous patches of forest generally create higher wildfire hazard in New Mexico than in most of the pilot SAP states. Management activities are focused on improving or maintaining forest health and reducing hazardous rules and fire risk. Five NLCD classes were used to create a "forest" layer: deciduous forest, coniferous forest, mixed forest & woodland, shrubland, and woody wetlands (NLCD classes 41, 42, 43, 51, 91). All forest polygons less than 10 acres in size were deleted to reduce noise in the analysis, and because the minimum size tract eligible for the Stewardship Program is 10 acres. Then a buffered (100 feet) road layer was then subtracted from the forested layer. The result is the forest patch layer. The result is shown at here in green.

Threatened and Endangered species - Individual plant and animal records for either state or federal listed species from the Natural Heritage Database were used to represent areas of biological importance. The data was converted to a grid with occurrences per area ratings of 0 to 5. These areas are shown at in shades of purple. Most of the state is classified as 0 (light purple), the darker purple colors do not display well at the scale of this map.
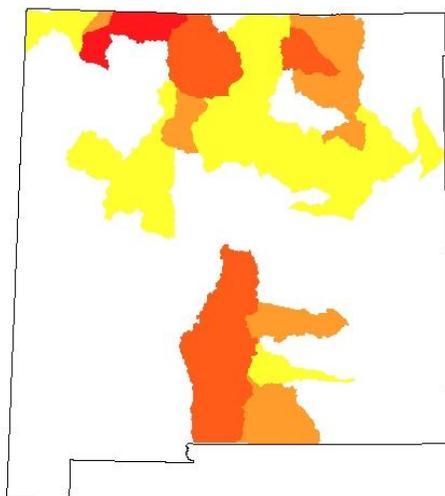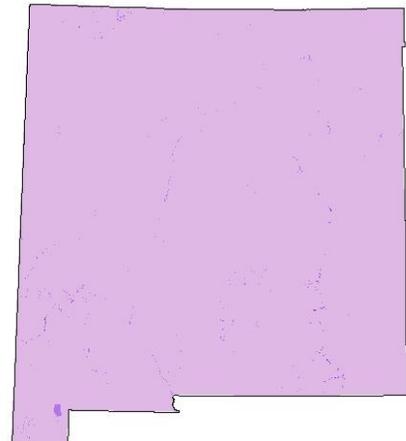
Public Drinking Water Supply Areas -Shapefile was acquired from the New Mexico Environment Department for all public water supplies and filtered for surface supplies. Source scale for this data is 1:24,000. A grid was made for the number of surface supplies per watershed, ranging from 0 to 5, shown at the right.

Private Forest Lands - Five NLCD classes were used to create a "forest" layer: deciduous forest, coniferous forest, mixed forest & woodland, shrubland, and woody wetlands (NLCD classes 41, 42, 43, 51, 91). All forest polygons less than 10 acres in size were deleted to reduce noise in the analysis, and because the minimum size tract eligible for the Stewardship Program is 10 acres. The analysis mask was set in the Analysis Properties of the model, so the resulting gird is only areas of Stewardship Suitability, i.e. private land.
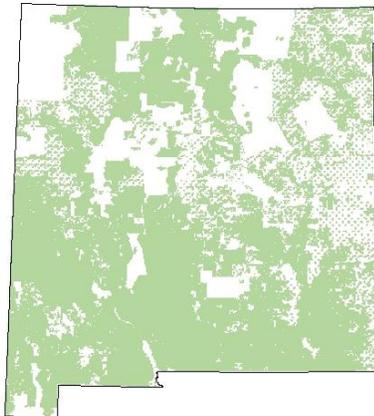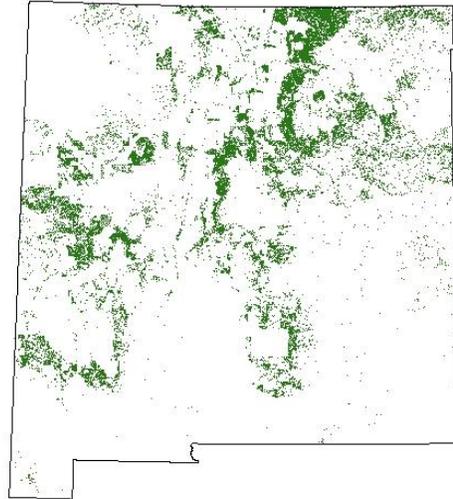
Proximity to Public Lands - A half-mile buffer (800 meters) of public lands was created from the Bureau of Land Management Surface Ownership layer (1:24,000) of all ownerships not private. These areas are shown at the left in green.

Wetlands - The data came from state Re-GAP vegetation information using code 61001 (forested wetlands) in the PRIMARY field. The vector layer was then converted to a raster with a cell value of 1 for the vegetation existing. These areas are shown at right in blue.
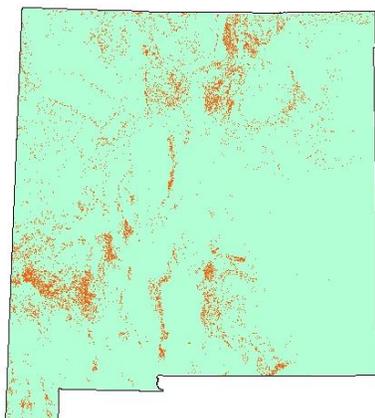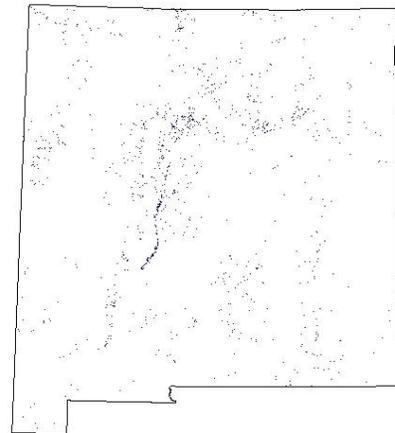
Topographic Slope - A statewide Digital Elevation Model (DEM) from the National Elevation Dataset (USGS) was used to create the percent slope layer. The grid was then reclassified to a value of 5 for slope between 0% and 35%, a value of 1 for 36 to 50% and 0 for all other values. The slope classification is the range of operability for mechanical and skyline harvesting in New Mexico. These areas are shown at right in orange (1) and blue (5).

Resource Threat layers:

Forest Health - USFS Forest Health Aerial Survey data from 1987-2005 was used to classify threat to New Mexico's forests using the severity of infestations over that time period. The areas of highest mortality and biggest threat to New Mexico forests are generally bark beetle epidemics, mainly *Ips* species, followed by *Dendroctonus* species.
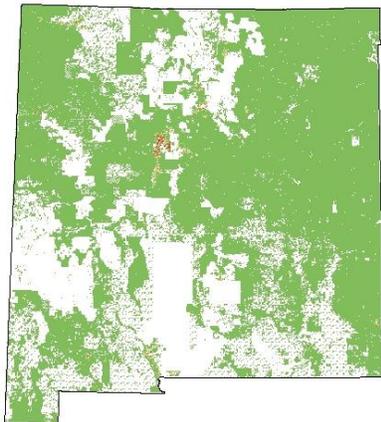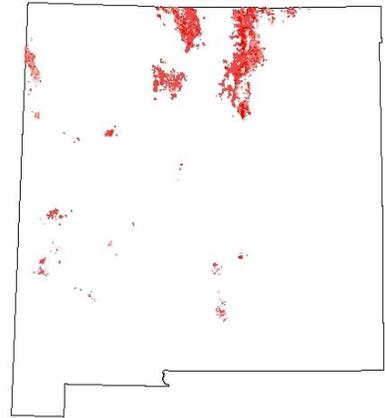

Developing Areas - Based on Colorado State University's Dr. David Theobald's housing density layer developed for the Forests on the Edge study. The data was produced from subtracting public lands and water areas from 2000 Census block data then calculating acres per house. Housing density was projected forward using current development trends. For the SAP analysis, 2030 density projections were subtracted from the 2000 density to determine areas under pressure from development. Lastly, the raster was reclassified so developing areas return a value of 1 while other areas return a 0 value.

Wildfire Assessment -This layer was created by reclassifying the 2005 New Mexico Hazard Assessment. The values in the assessment were reclassified to a range of values from 0 to 5 using natural breaks.
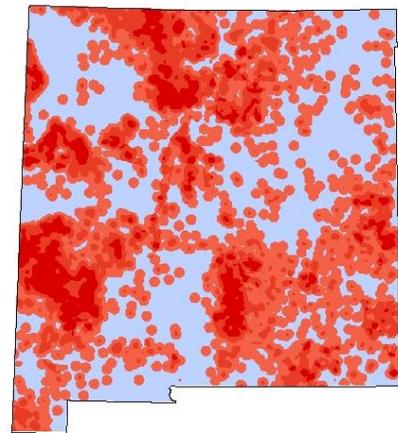
Other data

Agro-forestry was to be used with a low weight to capture all the windbreaks that were initially started with the first years' of Forest Stewardship and the Stewardship Incentives Program (SIP). Unfortunately, EDAC and Forestry Staff could not come up with a consistent or scientific way to gather the data into a GIS layer of small wooded areas and windbreaks.
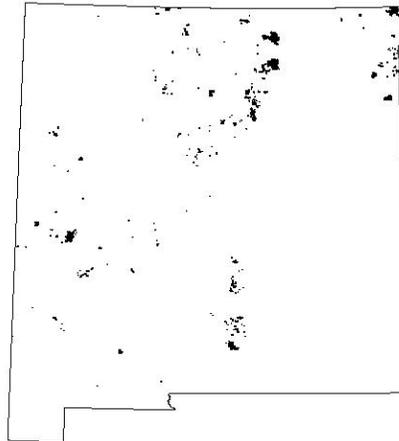
Stewardship Plan Ownership Boundaries - Entire tract boundaries for which a Stewardship Plan has been written since the beginning of the FSP implementation in1991 through 2006. Tract boundaries were compiled at a source scale of 1:24,000, and were screen digitized by EDAC. The Stewardship Plan tracts are shown at the left.

Weighting

Of the twelve criteria identified as contributing to the potential Stewardship Program benefit of a given piece of ground, some are more important than others. To account for differing levels of importance, New Mexico Forest Stewardship Advisory Committee (17), the State Forestry Timber Management Officers (6) and other Timber Staff (5) ranked the twelve criteria. The 28 people were asked to rank each factor from 1 to 12, with 1 being the most important. A mean response value was then calculated for each of the 12 factors. In order to give the most important factor the largest numerical value, the mean response for each factor was subtracted from the highest possible rank (12). The table on the right shows the final weights for each factor.

DATA LAYERS	WEIGHT IN MODEL
RESOURCE POTENTIAL	
RIPARIAN CORRIDORS	3%
PRIORITY WATERSHEDS	3%
FOREST PATCH SIZE	6%
THREATENED AND ENDANGERED SPECIES (PLANTS AND ANIMALS)	6%
PUBLIC WATER DRINKING SUPPLY (FROM SURFACE WATER)	12%
PRIVATE FOREST LANDS	12%
PROXIMITY TO PUBLIC LANDS	8%
WETLANDS	3%
SLOPE	5%
AGRO-FORESTRY	3%*
RESOURCE THREATS	
FOREST HEALTH (INCIDENCE OF INSECTS AND DISEASES)	12%
DEVELOPING AREAS (PROBABILITY OF INCREASE IN DEVELOPMENT)	12%
WILDFIRE ASSESSMENT (RISK)	15%

GIS Analysis

The GIS data representing each of the twelve factors was converted to the ESRI grid format with a cell size of 100 meters, an area representing just under two-and-a-half acres on the ground. The grid of each factor was converted to a 0, 1 format. For example, all the grid cells that fell within the private forested area were coded as a "1", while all the cells that were outside the areas of private forested areas were give the value "0" in that layer.

The analysis process is relatively straightforward. Each grid is multiplied by its weight value, so that the cells coded as "1" take on the weight value while all the "0" cells retain a value of 0. Because all twelve grids were derived from the same source, the grid cells of each layer line up exactly with the cells from all the other layers. The overlay analysis procedure uses this fact to create a final result grid whose individual cell values equal the sum of the values in the same location from all twelve layers.

Result grid values ranged from 0 to 3.86. The ESRI Spatial Analyst extension allows for the specification of an analysis mask. The analysis mask layer described above was used in this capacity to exclude areas of the state that don't meet eligibility criteria for inclusion in the Forest Stewardship Program (open water, public lands, urban areas, etc.). To make interpretation of results easier and allow for computation of area statistics, three data classes were established to group the continuous cell values: Low, Medium and High Stewardship Potential. There are several possible methods for establishing class

breaks. The Stewardship Committee decided to use the Natural Breaks classification algorithm available in Arc View. Class definition values for the New Mexico final results data are:

Low	0 - 1.1807
Medium	1.1807 - 1.8165
High	1.8165 - 3.8599

The final result grid was reclassified to an integer grid where 1 represents Low, 2 Medium, and 3 High.

Stewardship Plan Tract Digitizing

Stewardship plans are not collected centrally in New Mexico, but held within the landowners plan within a file at the District Office. Maps of each Stewardship plan tract drawn on a 1:24,000 scale topographic map were gathered from each office in the state. Tract boundaries were then "heads-up" digitized by the contractor, EDAC. Each tract was assigned the corresponding unique identifier of the property as used in the accomplishment reporting database.

Metadata

Metadata was produced for the stewardship plans feature class and the geodatabase attribute tables using the Federal Geographic Data Committee (FGDC) metadata editor in ArcCatalog. Metadata was produced to FGDC standards.

Results

The SAP results will provide priority areas for Forestry to target for Stewardship Program publicity and when talking to landowners regarding Forest Stewardship Plans and activities. However, no landowner requesting a Forest Stewardship Plan will be denied if they and the property qualify, no matter which potential for stewardship value is listed within SAP results.
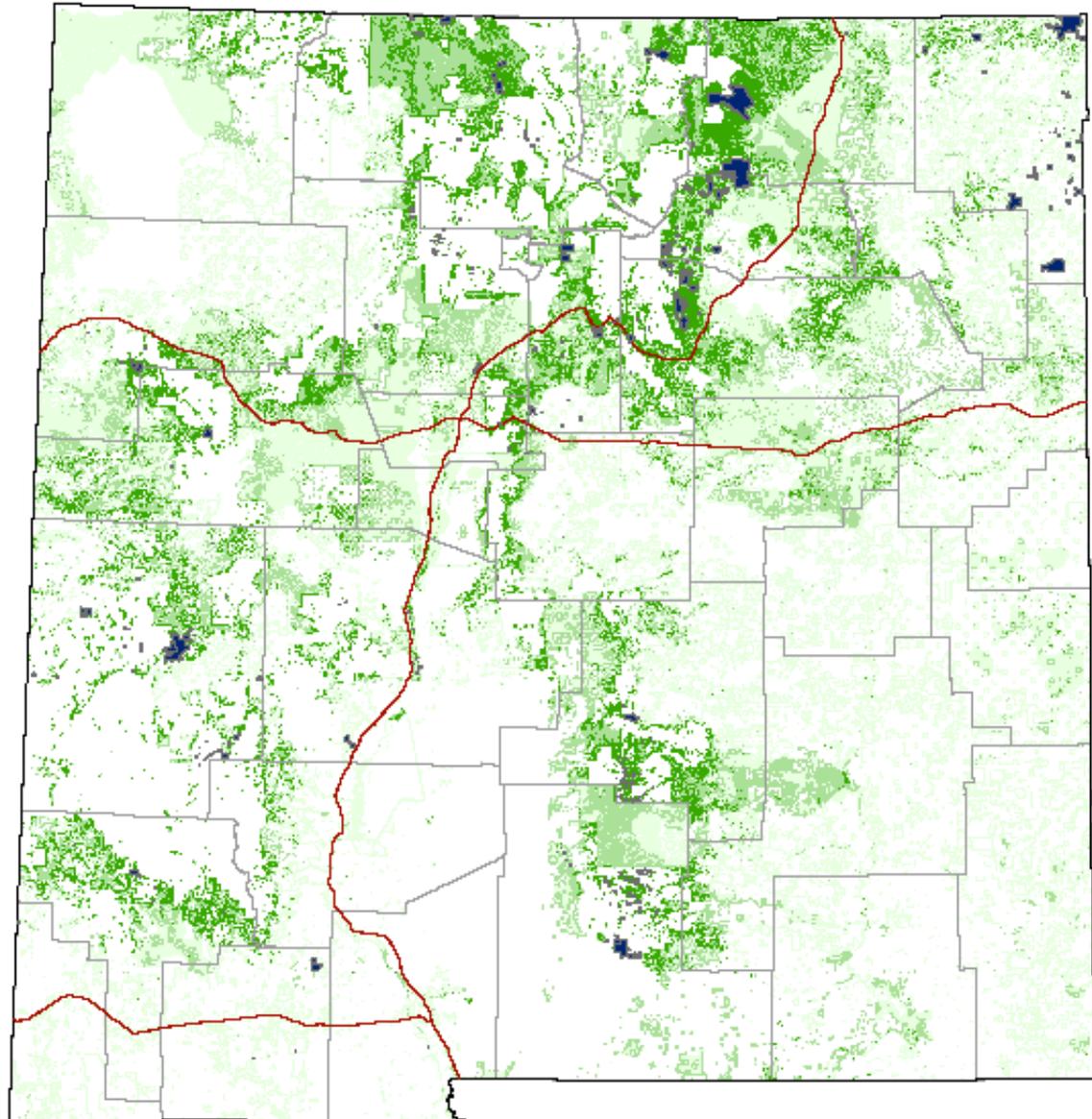
## New Mexico Spatial Analysis Project Results

Forest Stewardship Potential

- **High priority** (dark green)
- **Medium priority** (medium green)
- **Low priority** (light green)
- **Lands not eligible** (white)

- **Forest Stewardship Plans 1991-** (dark blue)
- **Interstates** (red line)
- **Counties** (outline)

0 15 30 60 90 Miles
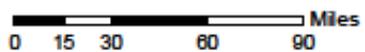
EMNRD

Datum: NAD83 Projection: UTM Zone 13N
No warranties are made regarding the accuracy of this data.
Produced by NM EMNRD Forestry Division, GIS

Appendix D: Forest Legacy in New Mexico

The United States Congress created the Forest Legacy Program in 1990 as part of the Farm Bill. Its purpose is to help landowners, state and local governments and land trusts identify and protect environmentally important forest lands that are threatened by present or future conversion to non-forest uses. Fragmentation of forest ownership, further subdivision, and development are the greatest threats to forest values and the rural cultures that depend upon them. The Forest Legacy Program will help assure that both traditional uses of private lands and the public values of New Mexico's forest resources are protected for future generations. All private forested land in New Mexico has been designated as part of the program and is a potential project site. The map below shows potential forest legacy sites in New Mexico.

Map C-1: Forest Legacy Priorities in New Mexico
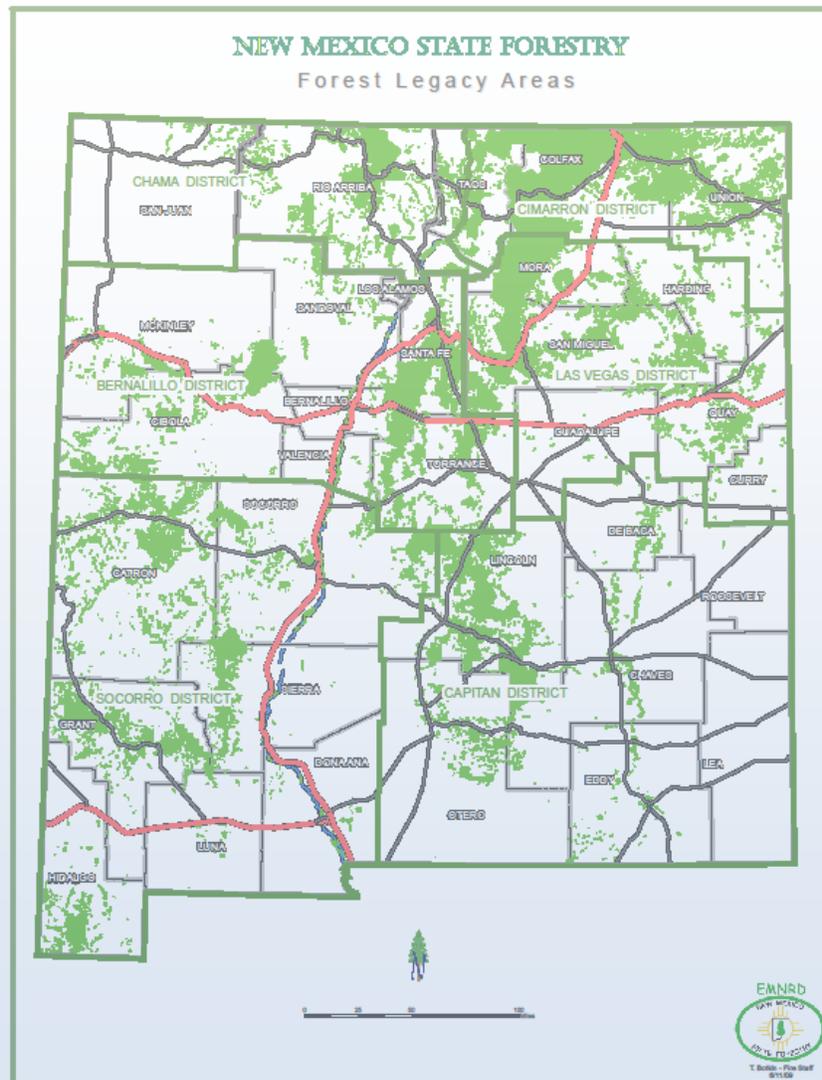
Appendix E: Cooperative Weed Management Areas

The New Mexico Energy, Minerals and Natural Resources Department (EMNRD), Forestry Division (Forestry Division) works to help Cooperative Weed Management Areas (CWMAs) address and treat noxious weeds in locations where noxious weed invasions threaten forested land.

The primary goal of the program is to increase local capacity to manage and prevent invasions of noxious weeds. This program provides cost-share funding from the USDA Forest Service, administered through the Division, for local CWMAs. This program emphasizes the use of existing CWMAs or the creation of new CWMAs. Locally-driven CWMAs have been shown to be the best vehicles for implementing weed management programs. CWMAs consist of cooperators including Soil and Water Conservation Districts, Local, State and Federal Agencies. The Forestry Division works closely with the New Mexico Department of Agriculture to support the efforts of CWMAs across the state.

Successful projects typically include several cooperating landowners, including private, state, federal and tribal lands. This program is directed to individuals and organizations involved with a CWMA. Projects typically include the following components:

- Public awareness and education;
- Prevention and early detection;
- Inventory and mapping;
- Planning and coordination;
- Integrated weed management; and
- Monitoring and evaluation.

EMNRD gives the highest priority to programs that apply integrated management practices and demonstrate partnerships and monitoring results. Projects must be linked to the New Mexico noxious weed list.

Map E-1: New Mexico Cooperative Weed Management Areas

New Mexico Cooperative Weed Management Areas
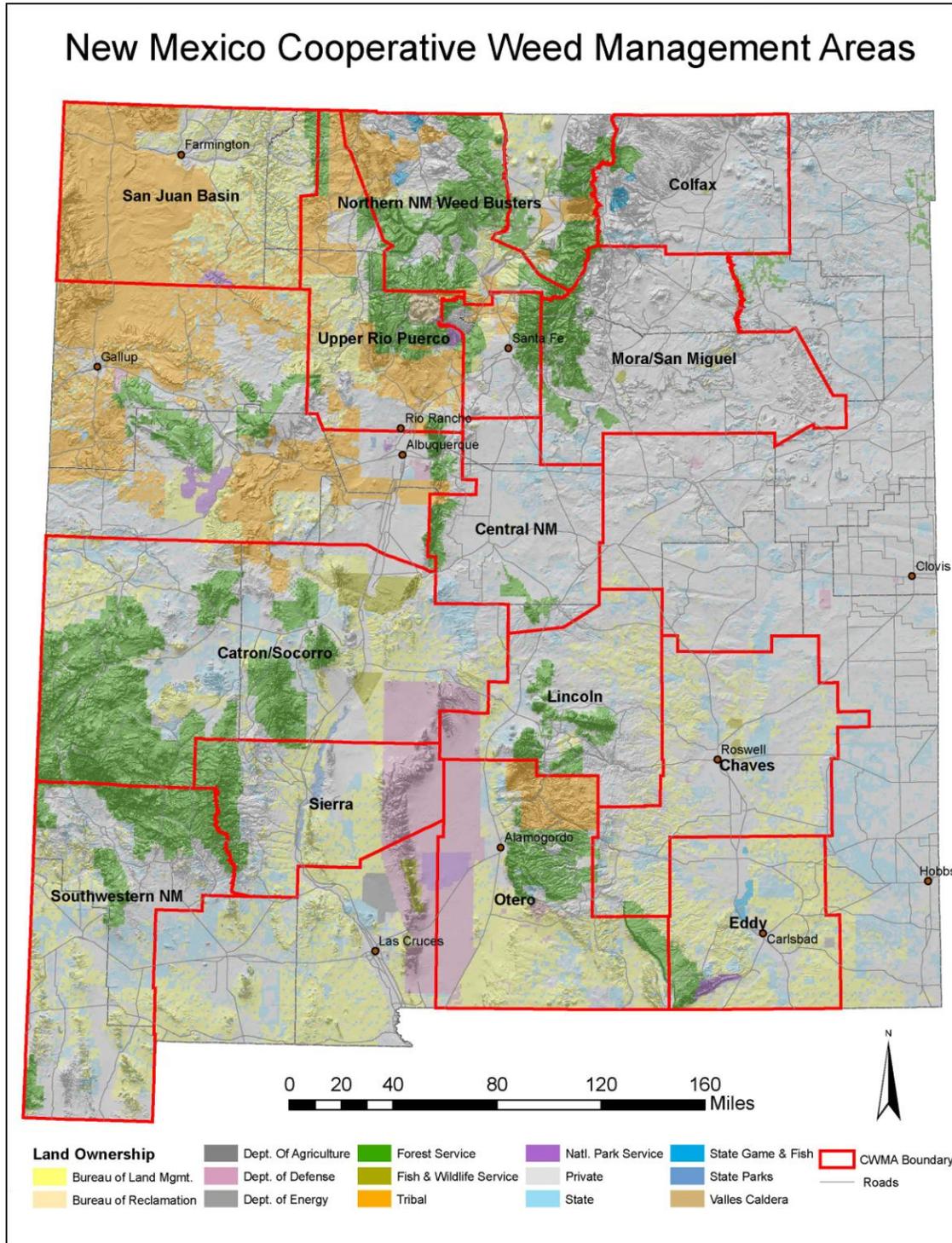
Appendix F: Letters of Support