Wildlife Doorways
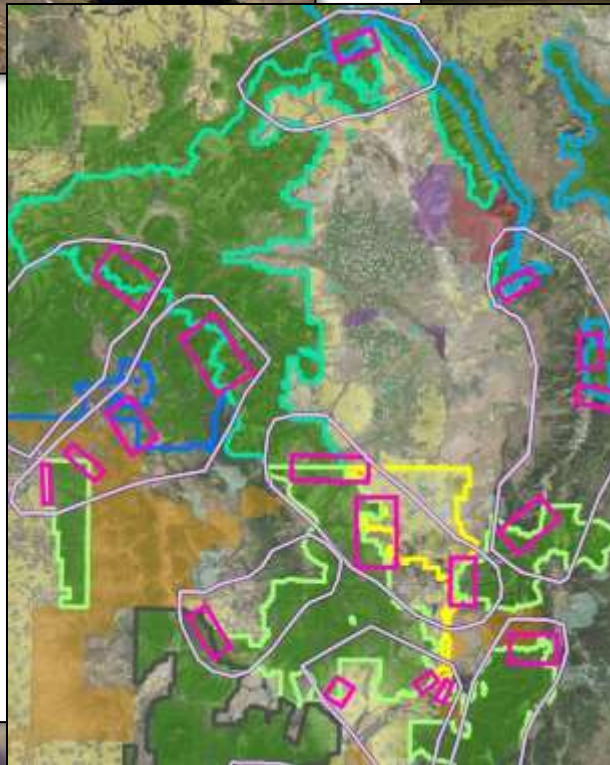
Supporting Wildlife Habitat Connectivity Across Borders
in the
Upper Rio Grande Watershed

March 2016

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Wildlife Doorways

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Upper Rio Grande Watershed

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Introduction

Wildlife habitat connectivity is widely regarded as a key to species conservation by providing for daily and seasonal movements as well as long-range dispersal and genetic interchange (Beier and Noss 1998; Rudnick et al. 2012). Yet, managing for connectivity in a multi-jurisdictional landscape presents unique challenges to public and private interests seeking to ensure long-term sustainability of wildlife populations. Species do not recognize jurisdictional boundaries as they move through landscapes, and over large multi-jurisdictional areas, the ecological, economic, social, and political issues become more complex with commensurate potential for larger impacts on species. Accordingly, solutions to these complex problems in wildlife conservation lie beyond isolated owner-by-owner planning and require a broader approach (Spies et al. 2002). To address this, most agencies are now taking more of an "all-lands" approach that includes attending to the impact of their activities on surrounding landscapes and ownerships and incorporating this into their long-term management plans. For example, the USFS need for landscape-scale wildlife habitat connectivity is encapsulated in the 2012 Planning Rule that requires plans "to maintain or restore the ecological integrity of terrestrial and aquatic ecosystems and watersheds in the plan area, including plan components to maintain or restore their structure, function, composition, and *connectivity*" (§ 219.8(a)) [emphasis added].

How this all-lands approach can be operationally applied to wildlife connectivity is not well defined. There are many elements that are important in maintaining connectivity such as habitat loss prevention and excessive fragmentation, but at the larger landscape scales, removing barriers and maintaining open corridors for wildlife movement is critical to the long-term well-being of wildlife species. Traditionally, wildlife habitat management has focused on core habitat areas that are often in the central management area of say a USFS national

forest or a BLM land unit, not at the periphery where there may be corridors or linkages to other core habitats in adjoining jurisdictions, particularly for wide-ranging species (e.g., elk, deer, mountain lion, etc.). As a result, the management of ecological conditions at these key boundary areas, or "wildlife doorways," that foster connectivity to the next administrative unit can receive a lower priority. This can inadvertently put the functionality of corridors and linkages at risk.[1] Accordingly, our purpose here is to explore the nature and extent of these wildlife doorways at unit boundaries in the context of overall wildlife movement areas, and to propose a framework for using them to support focused, multi-jurisdictional management at landscape scales to maintain wildlife habitat connectivity.

To do this, we use the Upper Rio Grande watershed, a region of north-central New Mexico and adjoining south-central Colorado, as an example of a large landscape where there are complex wildlife movements coupled with several federal units that are currently engaged in land and resource management planning (Figure 1). This affords the opportunity to address the structure of wildlife doorways using wildlife movement data and how the doorways and data might be integrated into the ongoing planning processes of multiple ownerships. Using a GIS, we compiled available data on wildlife patterns, provisionally identified significant "wildlife movement focal areas," and then delineated a set of provisional wildlife doorways where the movement areas crossed jurisdictional boundaries. We also have provided supplemental information on biodiversity elements and connectivity opportunities that may be useful to land managers in planning for the maintenance of ecological integrity and connectivity in the doorways and associated wildlife movement focal areas. The outcome is a provisional set of specific management areas that can be used strategically to enhance wildlife connectivity across jurisdictions at large landscape scales. This is a working model, one designed to support discussions with resource planners and biologists across jurisdictions on the efficacy and accuracy of specific focal areas and doorways and how to make operational use of them in the planning process.

Methods

We primarily took a focal-species approach per Lambeck (1997) because focal species, which historically have been mostly game species rather than endangered species, have the most readily available data for locating prospective wildlife corridors and linkages. We supplemented the species data with generalized naturalness-based models of animal movements that are not species specific (Krosby et al. 2015; Reed et al. 2012). We compiled all available spatial data on the occurrence and movement of species in the target region of northern New Mexico and southern Colorado (Table 1; see Appendix A for details on each dataset). The resulting data was quite heterogeneous and included direct species occurrences (living observations and road kill), expert-driven and analytical models of individual species movements and corridors, and the generalized habitat-based connectivity models (Figure 2).

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[1] Haber and Nelson (2015) state per the 2012 planning rule that "in particular, segments of the national forest boundary identified in [the wildlife linkages interface] remain critical interfaces that link wildlife habitat on both sides of the boundary."
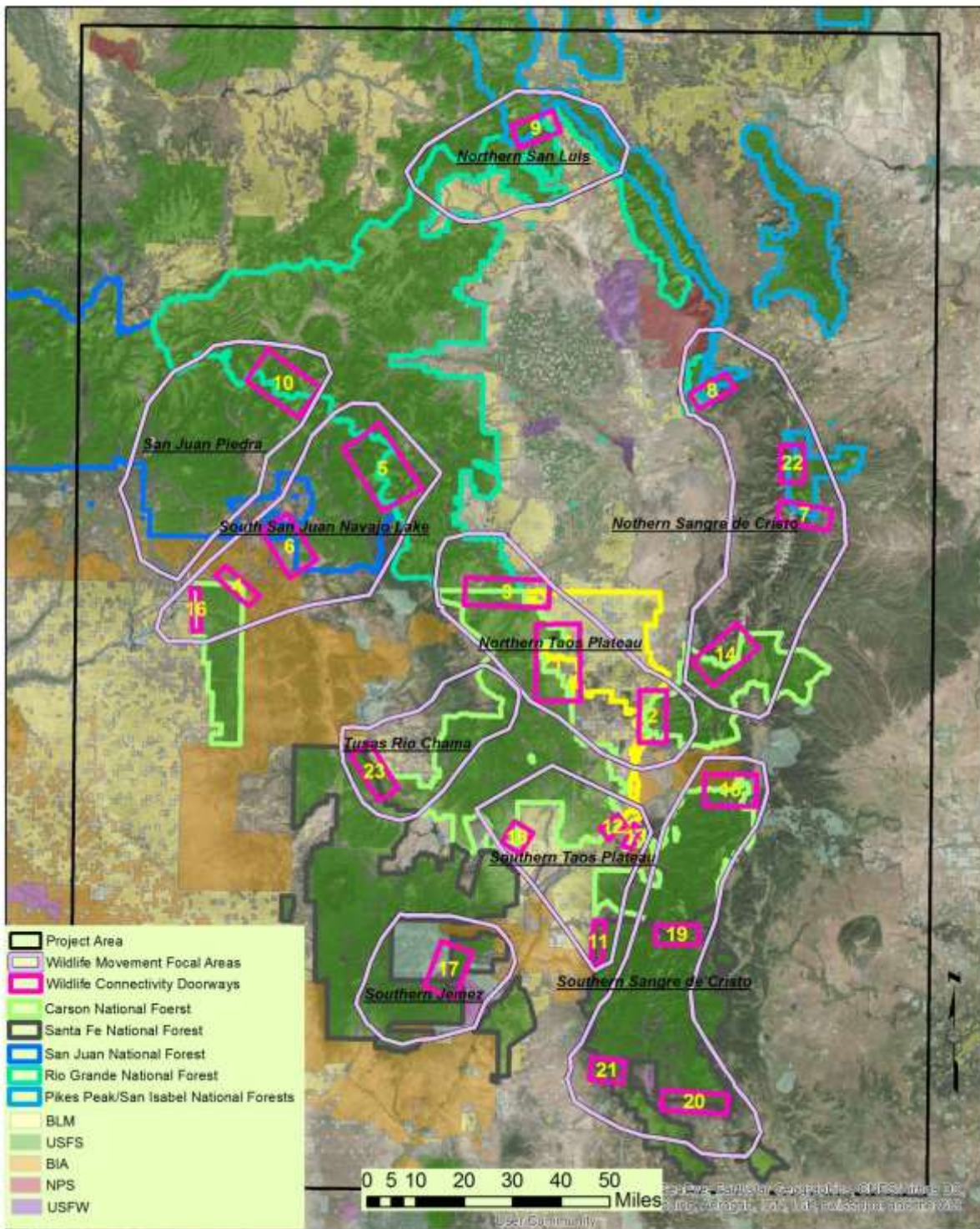
Figure 1. Overview of the distribution of eight Wildlife Movement Focal Areas and the associated 22 Wildlife Doorways with the project area.
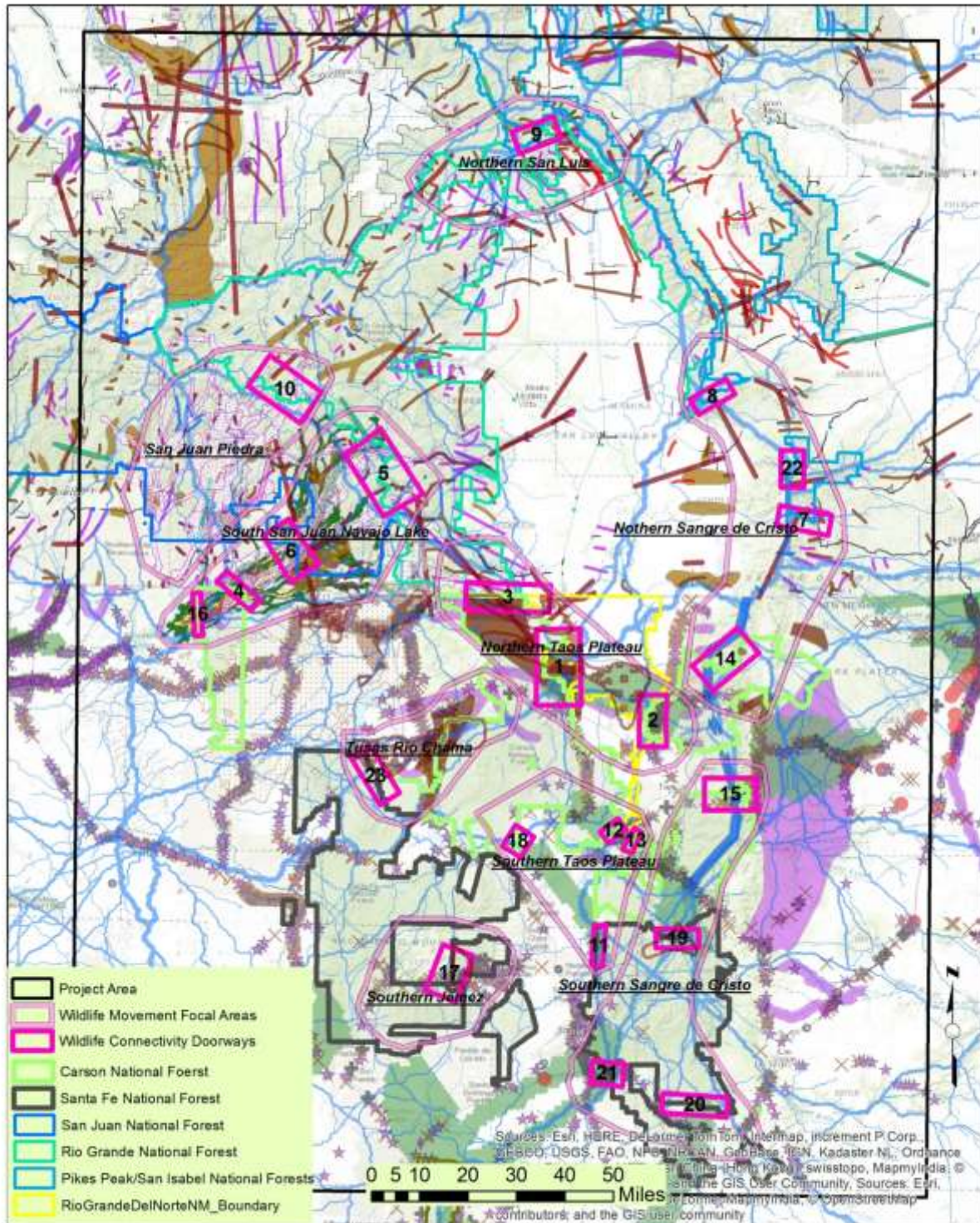
Figure 2. Overview of data used to delineate eight Wildlife Movement Focal Areas and the associated 22 Wildlife Doorways within the project area. See Table 1 and Appendix A for details on the datasets.

Table 1. Data sets compiled for the New Mexico-Colorado Wildlife Doorways project.

a) Wildlife movement data	Source
Bighorn Sheep Migration Patterns and Corridors	Colorado Parks and Wildlife
Elk Highway Crossings and Corridors	Colorado Parks and Wildlife
Mule Deer Movement, Highway Crossings, and Migration Corridors	Colorado Parks and Wildlife
Pronghorn Migration Corridors	Colorado Parks and Wildlife
All Species Movement Arrows	Southern Rockies Ecosystem Project
All Species Top Linkages	Southern Rockies Ecosystem Project
Mule Deer Migration Data	Sawyer 2011, 2013 (BLM, Others)
CHAT Wildlife Corridor (cougar)	NM Crucial Habitat Assessment Tool
Chama Peak Land Alliance Elk Migration	Chama Peak Land Alliance
Chama Peak Land Alliance Deer Migration	Chama Peak Land Alliance
NM Dept. of Game & Fish Big Game Movement	NM Dept. Game and Fish
WGA Pilot Project – Corridor Analysis NM-CO Border	NM Dept. Game & Fish; Reed et al. 2012
Colorado DOT Region 5 Wildlife Collision Data	Colorado DOT
New Mexico DOT Wildlife Collision Data	NM DOT
Taos Field Office Big Game Migration Corridors	BLM
b) Connectivity opportunity data	
Natural Heritage Species Data	Colorado Nat. Heritage Pgm./NHNM
Habitat maps and models	SWReGap; USFS Midscale
Colorado Potential Conservation Areas	Colorado Nat. Heritage Program
NM Conservation Opportunity Areas	NM Dept. Game & Fish
CHAT Species of Concern	NM Crucial Habitat Assessment Tool
CHAT Terrestrial Game Species	NM Crucial Habitat Assessment Tool
CHAT Sport Fish (Aquatic SERI)	NM Crucial Habitat Assessment Tool
CHAT Wetland/Riparian Areas	NM Crucial Habitat Assessment Tool
CHAT Ecosystems of Concern	NM Crucial Habitat Assessment Tool
CHAT Large Natural Areas (large intact land blocks)	NM Crucial Habitat Assessment Tool
CHAT Freshwater Integrity	NM Crucial Habitat Assessment Tool
Protected Areas (land use limitations)	Protected Areas Database-USGS
Relative Wildness in the United States	Wilderness Society

Given the heterogeneity, we did not attempt to normalize the data for analysis, but rather we took a preponderance-of-evidence approach to delineating broadly defined wildlife movement focal areas. That is, boundaries were drawn with heads-up digitizing around zones of high concentrations of wildlife movement and, for our purposes here, crossed at least one jurisdictional boundary. Within each focal area, one or more wildlife doorways were delineated where the data suggested wildlife corridors crossed jurisdictional boundaries. Doorways could occur within corridors or at their junctures with core habitats and had restricted areas and dimensions. They are intended to be relatively narrowly defined both in width and depth to help focus resource allocation on keeping corridors themselves open across ownerships. The widths should approximate that of the corridors and depths should be sufficient to capture both the boundary and enough area behind the doorways to be meaningful for habitat management. Here, they are rectangular in shape as a first approximation, but this is not a requirement—the depth could, with sufficient information, be

delineated along natural features (e.g., watershed boundaries, landforms, or habitat types) but not so large as to lose the connection to the doorway itself.

We assigned tiers to the focal areas based on whether they were directly relevant to ongoing resource planning initiatives. Tier 1 Wildlife Movement Focal Areas had at least two agencies that were actively engaged in planning (e.g., USFS and BLM); Tier 2 involved two forests engaged in planning (e.g., Carson N.F., Rio Grande N.F., or Santa Fe N.F), and Tier 3 involved one unit engaged in planning with doorways to other land ownerships not currently undergoing resource plan revision (both public and private neighbors).

The results are presented in a series of maps with associated spatial databases that can be used in workshop settings among resource managers to evaluate their accuracy and efficacy, and to provide a vehicle for gathering additional data and modifying areas and doorways. The goal is to provide the most current, comprehensive, accurate, and pertinent information as possible on wildlife movement and habitat connectivity at landscape scales that can be integrated into multi-agency resource management planning processes.

Results and Discussion

We identified nine provisional Wildlife Movement Focal Areas (WMFAs) with 21 potential Wildlife Doorways (WDs) within the target study area (Table 2). These were distributed among the three national forests (Rio Grande [RGNF], Carson [CNF], and Santa Fe [SFNF]) the BLM Rio Grande del Norte National Monument [RGdN], and the National Park Service Valles Caldera National Preserve [VCNP]) all of which are currently undergoing land and resource management planning processes (see Figures 1). The ownerships within focal areas also include private, Native American, and other ownerships. Jurisdictional structure varied from relatively simple configuration of national forest to national forest (e.g., CNF and SFNF in the Southern Sangre de Cristo WMFA), to multiple national forests and other agencies across regional administrative units and state lines (e.g., CNF, RGNF, BLM, and private in the Northern Taos Plateau WMFA). Within each WMFA, one to three potential wildlife doorways were delineated at jurisdictional boundaries. These are only initial approximations based on the confluence of wildlife movement patterns across a given WMFA. By design, the wildlife doorways were rectangular with the widest dimension along the jurisdictional boundary and ranged in area from approximately 10 to 145 sq. miles, with an average near 50 sq. miles. While WMFAs could be fairly large, the wildlife doorways delineated within them accounted for only 0.5% of the area. This is in keeping with the concept that wildlife doorways should be narrowly defined to provide a focus for management but sufficient in size to capture meaningful aspects of wildlife movements and habitat at landscape scales.

A detailed example of the utility of the wildlife movement focal area/wildlife doorways configuration is provided by the Northern Taos Plateau WMFA (Figure 3; Table 3a). The preponderance of evidence suggests that this is a major wildlife movement zone with high elk, mule deer, and pronghorn movements reflected by highway collision data points and expert-driven direct observations (multicolored lines and bands), along with a mountain-lion corridor model (light green zone), and a convergence of wildlife movement flow lines from a

generalized naturalness model (blue lines; Reed et al. 2012). The WMFA is also jurisdictionally complex. The northern reaches of the area start at the high elevations of the RGNF's South San Juan Wilderness in Colorado and continue down to the CNF's Cruces Basin Wilderness in New Mexico, crossing state lines (and USFS Regions 2 and 3, respectively). The area then extends southward and eastward across a high desert plateau managed in part by both the CNF and the BLM Rio Grande del Norte National Monument, out of the BLM land east to the Sangre de Cristo Mountains of the CNF (and others).

Table 2. Wildlife Movement Focal Areas (WMFA) and Wildlife Doorways identified for the Upper Rio Grande watershed study area. CNF = Carson National Forest; SFNF=Santa Fe National Forest; SJNF=San Juan National Forest; SINF=San Isabel National Forest; BLM+ Bureau of Land Management; BLM-RGdN=BLM Rio Grande del Norte National Monument; VCNP=Valles Caldera National Preserve; BAND=Bandelier National Monument, and Other = private, Native American, and State lands.

Focal Area ID	Wildlife Movement Focal Area	Doorway ID	Wildlife Doorway	Jurisdictions	Tier	Area (sq. miles)
1	Northern Taos Plateau	2	Cebolla Mesa	CNF, BLM-RGdN	1	60
		3	Cruces Basin	CNF, RGNF	1	98
		1	San Antonio Mtn	CNF, BLM-RGdN	1	144
2	Northern Sangre de Cristo	22	Cucharas	SINF, Other	3	36
		7	Purgatory	SINF, Other	3	46
		14	Red River	CNF, Other	3	82
		8	Sierra Blanca	RGNF, SINF, Other	2	32
3	Southern Sangre de Cristo	15	Angel Fire	CNF, Other	3	71
		20	Cow Creek	SFNF, Other	3	55
		21	Glorieta	SFNF, Other	3	31
		19	Southern Sangre Divide	CNF, SFNF	2	35
4	Southern Taos Plateau	11	Chimayo	SFNF, BLM,Other	3	20
		18	El Rito	CNF, BLM, Other	3	23
		12	Southern Taos 1	CNF, BLM	2	13
		13	Southern Taos 2	CNF, BLM, Other	2	10
5	South San Juan Navajo Lake	4	Jicarilla NE	CNF, Other	2	28
		16	Jicarilla West	CNF, BLM	2	15
		6	Pagosa	SJNF, BLM, Other	3	74
		5	South San Juan	RGNF, SJNF	2	144
6	Southern Jemez	17	Pajarito	SFNF, VCNP, BAND	3	68
7	San Juan Piedra	10	San Juan Piedra 1	RGNF, SJNF	2	103
8	Northern San Luis	9	Sheep Mtn	RGNF, SINF, BLM	2	43
9	Tusas Rio Chama	23	Rio Chama	CNF, SFNF, BLM	2	53

At each of these jurisdictional junctures we delineated a wildlife doorway that can provide a pivot for interagency management. That is, at a given doorway mutually agreed upon, management options can be explored beginning at the boundary and then extended away in both directions in a consistent fashion to ensure that the focal movement area remains as functional as possible. The wildlife doorways provide a starting point for agencies and other cooperators to collaboratively pinpoint wildlife connectivity needs and then build off of these doorways and across the larger wildlife movement area to identify effective management strategies to facilitate connectivity.

To support the collaborative planning and management activities suggested by wildlife doorways, connectivity opportunities can also be identified within a WMFA (Figure 4; Table 3b). These include land units with designated or proposed protections from habitat fragmentation such as wildlife refuges, wilderness areas (designated and agency recommended), Research Natural Areas (RNAs), etc., that can provide anchors for connectivity linkages across the landscape to doorways. There are also spatial models that identify large intact natural land blocks across the landscape irrespective of designation that help identify optimal linkages of landscape elements to maintain connectivity (e.g., CHAT Large Natural Areas; Wilderness Society Relative Wildness in the United States). In addition, more information on focal species, species of conservation concern and other sensitive species that might receive collateral benefits in the management of wildlife movement focal areas and doorways would help in setting priorities and optimizing resource allocations for maintaining wildlife connectivity across large landscapes.

Next steps

The results reported here for the Upper Rio Grande watershed are provisional, and a key next step is to work with resource planners and biologists on refining the focal areas and doorways themselves within the study area. A possible avenue to address this would be through small, data-driven meetings with practitioners from across jurisdictions to review the content, provide additional data on wildlife movement and habitat in their areas of interest, and discuss how to implement the concept in their respective planning processes. The outcomes would be integrated into the framework presented here in a way that best serves the planning process and to also provide a prototype for the implementation of the wildlife movement focal area/wildlife doorway concept elsewhere in multijurisdictional contexts.

Beyond this, there is a need for more data on wildlife habitat and movement to support adaptive management in the context of the wildlife movement focal area/doorways framework. Specifically, additional information on core habitat areas as well as wildlife movement would help to more precisely define the location and dimensions of the doorways and the focal areas. More field-based monitoring is needed to validate doorways and focal areas, identify bottlenecks, and directly support focused land management to ensure open doorways and un-fragmented corridors that sustain wildlife connectivity at a landscape scale.
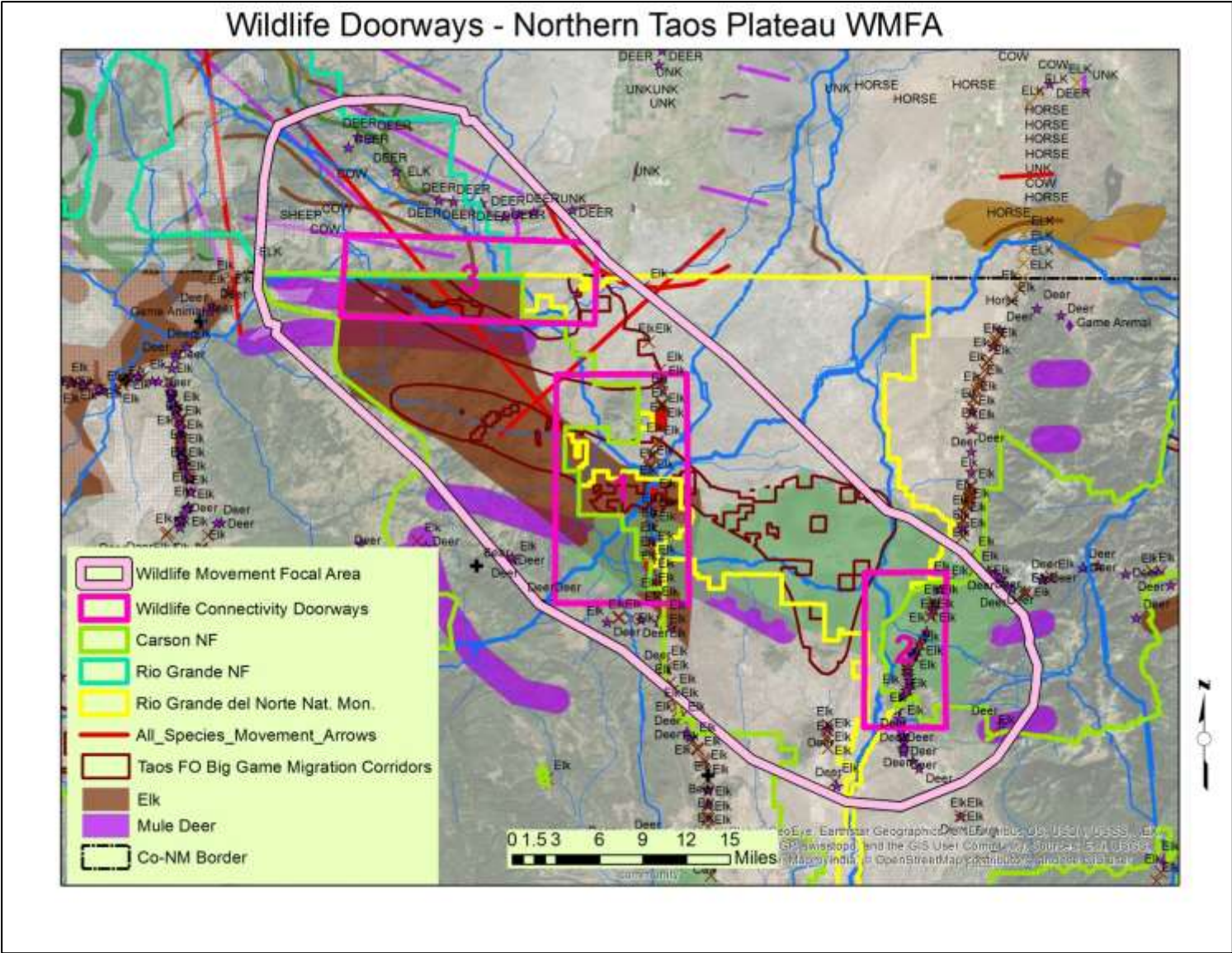
Figure 3. Three wildlife doorways were delineated within the Northern Taos Plateau WMFA based on a preponderance of evidence from multiple of data sources. Labeled points are from NMDOT and CODOT crash data. See text and Table 3a for details.
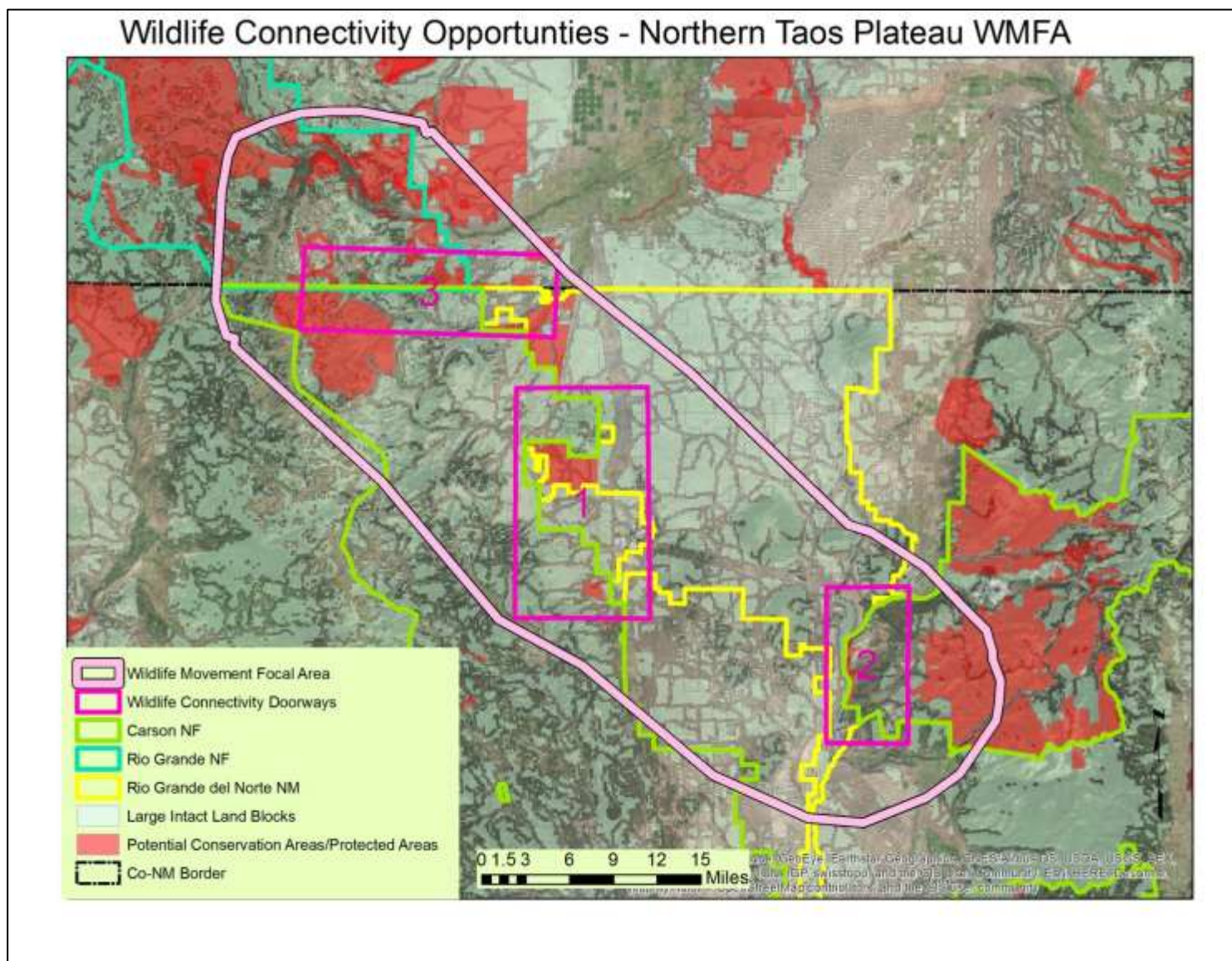
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Figure 4. Examples of wildlife connectivity opportunities within the Northern Taos Plateau Wildlife Movement Focal Area (WMFA). See text and Table 3b for details.

Table 3. Examples of the wildlife movement and connectivity information available within the three wildlife doorways (WD 1 & 2) in the Northern Taos Plateau WMFA.

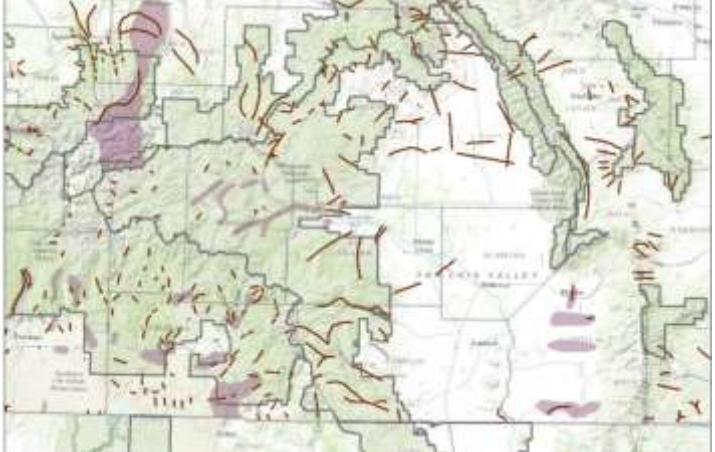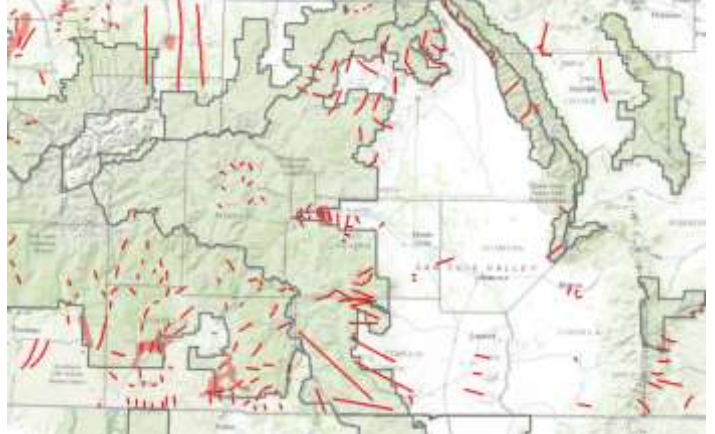| Data Set Name	Wildlife Doorway 1	Wildlife Doorway 2	Wildlife Doorway 3
Wildlife Movement Data			
WGA Pilot Project – Corridor analysis NM-CO border	X	X	X
New Mexico DOT Wildlife Collision Data	Elk, deer, antelope	Elk, deer	
Chama Peak Land Alliance Elk migration			X
CHAT Wildlife Corridor (cougar)	X	X	
NM Dept. of Game & Fish Big Game Movement	Mule deer, elk, pronghorn		Mule deer, elk
All Species Movement Arrows (SREP)	Pronghorn, elk, wolf		Gunnison prairie dog, elk, wolf
Elk Highway Crossings and Corridors (CPW)			x
Mule Deer Movement, Highway Crossings, and Migration Corridors (CPW)			x
Taos Field Office Big Game Migration Corridors	x	x	x
Wildlife Connectivity Opportunity Data			
Natural Heritage Species Data - Colorado			Mammals, birds, plants, fish
Natural Heritage Species Data - New Mexico	Gunnison's prairie dog, mountain plover, *Lorandersonia*	Peregrine falcon, yellow-billed cuckoo, Rio Grande cutthroat trout, masked	Boreal owl, *Astragalus ripleyi*
CO Crucial Habitat Assessment Tool (CHAT) Scores (1,2)			2
CO Crucial Habitat Assessment Tool (SERI) Scores (1,2)			2
NM Crucial Habitat Assessment Tool (CHAT) Scores (1,2)	2	1 and 2	1 and 2
NM CHAT Species of Concern (1,2)	2	2	2
NM CHAT Terrestrial Game Species (1,2)	Elk, mule deer, cougar, bear, pronghorn	Elk, mule deer, cougar, bear, bighorn sheep, pronghorn	Elk, mule deer, cougar, bear, pronghorn
CHAT Large Natural Areas (large intact land blocks)	2	2	2 and 3
CHAT Natural Vegetation Communities of Concern	2	2	2
Protected Areas (land use limitations)	x		x
Relative Wildness in the United States (high score)	x		x

Acknowledgements

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Appendix A. Project dataset summaries for Wildlife Doorways: Supporting Wildlife Habitat Connectivity Across Borders in the Upper Rio Grande Watershed

Below is a table listing the data sets with thumbnail maps that have been collected for this project. Data sets are grouped by their source.

1. **Colorado Parks and Wildlife's data library:**
   http://cpw.state.co.us/learn/Pages/Species-Maps.aspx

Bighorn Sheep Migration Patterns and Corridors (http://cpw.state.co.us/learn/SpeciesKMZMaps/BighornSheep.kmz)	
Elk Highway Crossings and Corridors (http://cpw.state.co.us/learn/SpeciesKMZMaps/Elk.kmz)	
Mule Deer Movement, Highway Crossings, and Migration Corridors (http://cpw.state.co.us/learn/SpeciesKMZMaps/MuleDeer.kmz)	

Pronghorn Migration Corridors (http://cpw.state.co.us/learn/SpeciesKMZMaps/Pronghorn.kmz)		
Boreal Toad Overall Range (http://cpw.state.co.us/learn/SpeciesKMZMaps/BorealToad.kmz)		

2. **Southern Rockies Ecosystem Project (SREP) Connectivity report -** http://rockymountainwild.org/_site/wp-content/uploads/LCL-Phase-1-Report.pdf - Maps start on pdf page number 44. May be the same as CPW data?
   a. GIS data is online here: LCL-Phase 1 GIS Data Download.
   b. And overview of the process to identify these linkages is here: http://rockymountainwild.org/srep/linking-colorados-landscapes.

All Species Movement Arrows - SREP utilized a two-track approach that integrated local and regional expertise, as well as computer modeling. The first track – or 'expert track' – consisted of a series of interagency workshops held across the state to identify both functioning and degraded wildlife linkages vital to wildlife populations. The workshop participants then evaluated the characteristics and existing condition of each identified linkage.

The second track – or 'computer modeling track' – considered the same questions within the framework of a geographic information system (GIS). Colorado State University research scientist Dr. Dave Theobald led this effort. Dr. Theobald combined layers of spatial data about landscape characteristics (e.g., topography, rivers and streams) with wildlife habitat preferences and movement patterns to model areas of the landscape that are important for wildlife movement. The highest priority linkages identified by each of these tracks were then combined with CDOT animal-vehicle collision data and

transportation planning data to select a subset of high-priority wildlife linkages for further assessment.

In total, 176 linkages were identified via the expert workshops, with additional linkages modeled for Canada lynx, gray wolf and pronghorn. The Executive Committee selected high-priority linkages for further analysis in Phase II based on the workshop-based prioritization for large carnivores and ungulates, the model-based prioritization, and additional considerations such as: presence of local partners; stretches of roadway with frequent animal-vehicle collisions; planned transportation projects projected by CDOT through 2030; and the distribution of linkages across the state and their complementary contributions to landscape connectivity. Twenty-three linkages were thereby selected in the top tier and were grouped into twelve high-priority linkage complexes based on similar species usage and geography. This collaborative effort provides transportation planners, community leaders and conservationists with a statewide vision for protecting and restoring habitat connectivity, which is vital for maintaining healthy populations of native species. The Executive Committee reviewed the nominees over a period of several weeks, and from these selected 28 focal species[i] and two ecological systems.
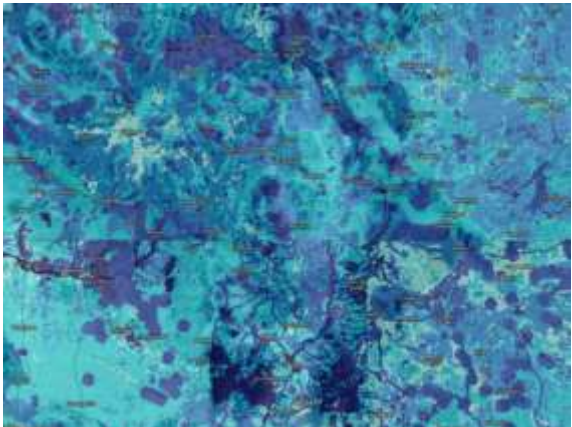
Expert Workshop Details

Each group was asked to sketch both the core habitat patches and their connecting linkages for a given focal species. The decision to ask the participants to define core habitat patches themselves relative to a given focal species was based on the premise that core habitat patches may be different for different focal species, and to avoid biasing their responses. Core habitat patches did not have to be comprised of land in conservation ownership or management, and workshop participants delineated them based on vegetation, ownership and/or other considerations.
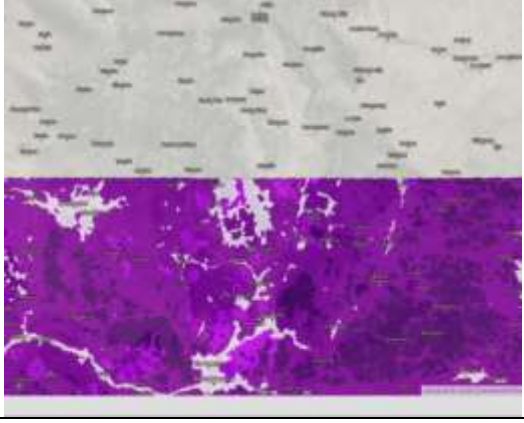
Each workshop began with a detailed presentation outlining the process for identifying linkages to ensure a consistent process at each workshop location. The participants were instructed to roughly sketch linkage areas rather than simply draw linear arrows connecting core habitat patches. Given the time constraints of a daylong workshop, participants were asked to focus on the highest priority linkages for the focal species being considered by their group, rather than attempting to identify every possible linkage on the landscape.
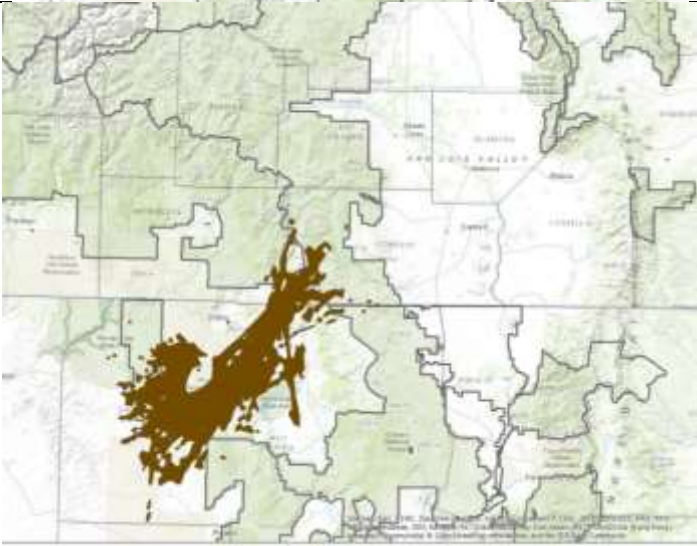
All Species Movement Arrows	
All Species Top Linkages	

3. **Crucial Habitat Assessment Tool Data** (http://nmchat.org/) – One-mile hexagonal data. On Colorado side only CHAT score is exposed. On NM side can get all 9 layers. See http://nmchat.org/data-metadata.html for detailed metadata.

CHAT Rollup Scores.	

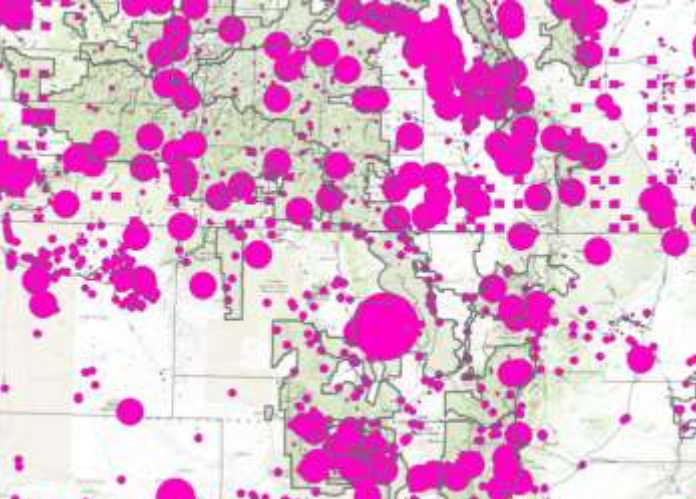|	
c. Species of Concern Scores. (only available for NM)	
Terrestrial Game Species (SERI – Species of Economic and Recreational Value) Scores. (only available for NM)	
Sport Fish (Aquatic SERI) – based on "fishing waters" layer from NMDGF. Used because of highlighted perennial waters. (only available for NM)	
Wildlife Corridor Scores – based on a corridor model for cougars developed by K. Menke (2008) for NMDGF. (only available for NM)	

Wetland/Riparian Areas – aggregation of 4 data sets. (only available for NM)	
Ecosystems of Concern –ecosystems were given conservation ranks like sensitive species. (only available for NM)	
Large Natural Areas – shows amount of anthropogenic disturbance. (only available for NM)	
Freshwater Integrity – from the National Fish Habitat Action Plan (NFHAP). Measure of watershed stress. (only available for NM)	

4. Game Species Data (see also CHAT SERI species in 2c and 2d above)
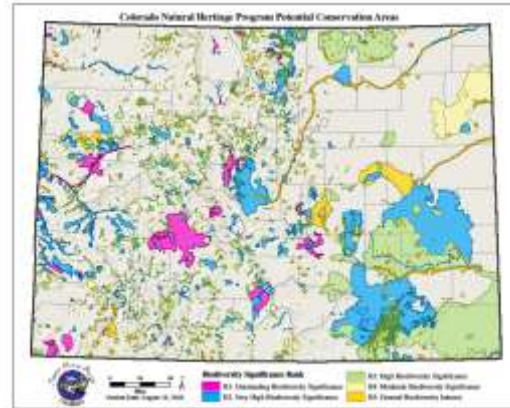
Hall Sawyer Mule Deer migration data (http://www.chamapeak.org/pdf/Watts_FINAL%20REPORT-2014.pdf)	
Chama Peak Land Alliance (http://chamapeak.org/) Elk migration data (Chama Peak Land Alliance. *Elk Corridors*. ESRI Shapefile. Bozeman, MT: Cameron Ellis, 2013. Adapted and buffered data reconstructed from data provided by the Jicarilla Apache Nation and Tom Watts, personal communication.)	
Chama Peak Land Alliance (http://chamapeak.org/) Deer migration data (Chama Peak Land Alliance. *Mule Deer Corridors.* ESRI Shapefile. Bozeman, MT: Cameron Ellis, 2013. Adapted and buffered data reconstructed from data provided by the Southern Ute Tribe and Tom Watts, personal communication.)	

NM Dept. of Game & Fish Big Game Big Game Movement Polygons – Bighorn Sheep	
NM Dept. of Game & Fish Big Game Big Game Movement Polygons ☐ ☑ NM Big Game WGA 201109 　　　Type, Species 　■ Corridor, BighornSheep 　■ Corridor, Elk 　■ Migration, Elk 　■ Migration, MuleDeer	

5. Natural Heritage Data from Colorado (http://www.cnhp.colostate.edu/) and New Mexico (http://nhnm.unm.edu/)

Heritage Data – Occurrence data from NM and CO for all state and federally listed species plus sensitive species including USFS species of conservation concern.	

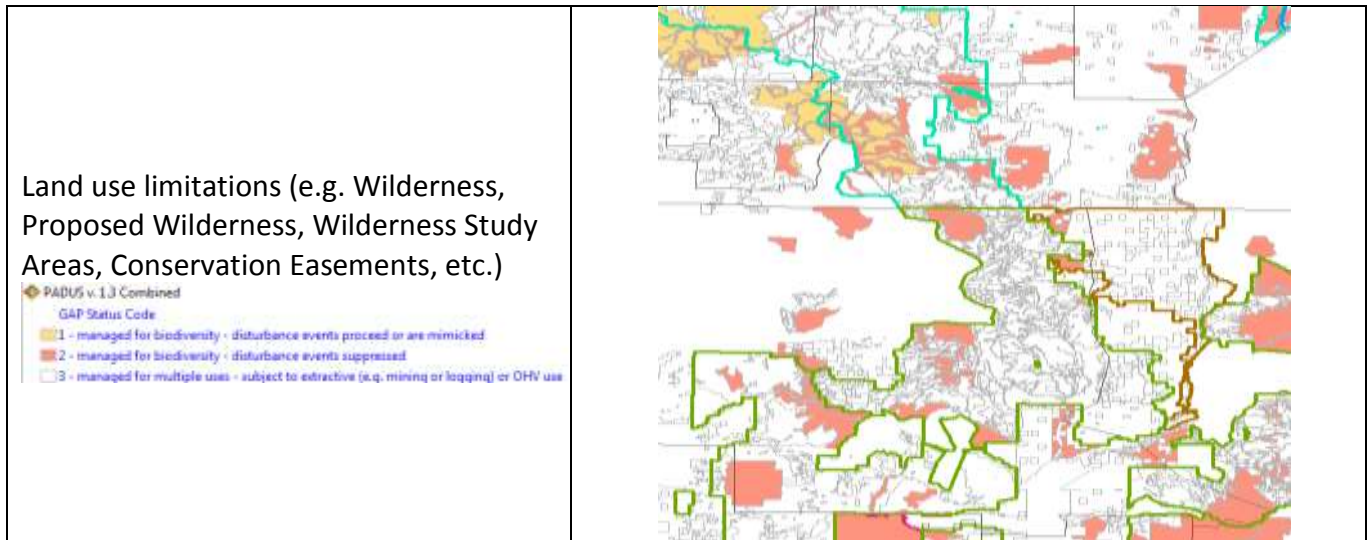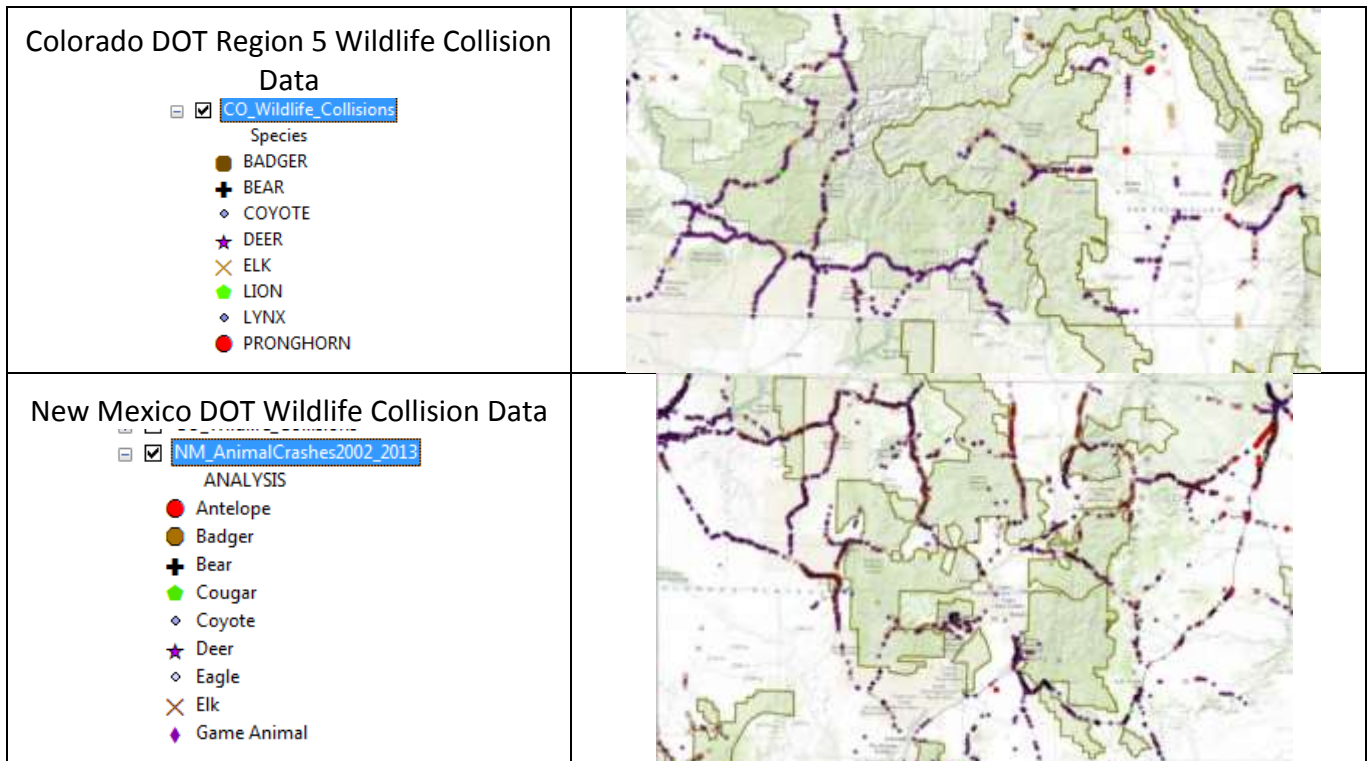|	
Colorado Natural Heritage Program – Potential Conservation Areas	
Conservation Opportunity Areas (from draft NMDGF State Wildlife Action Plan - developed by NHNM and NMDGF)	

6. Wildlife Corridor Models

WGA Pilot Project – Corridor analysis along border (Reed et al. 2012)	

7. Protected Areas Data

Land use limitations (e.g. Wilderness, Proposed Wilderness, Wilderness Study Areas, Conservation Easements, etc.)

PADUS v. 1.3 Combined
GAP Status Code
1 - managed for biodiversity - disturbance events proceed or are mimicked
2 - managed for biodiversity - disturbance events suppressed
3 - managed for multiple uses - subject to extractive (e.g. mining or logging) or OHV use

8. Wildlife Collision Data

Colorado DOT Region 5 Wildlife Collision Data

CO_Wildlife_Collisions
Species
BADGER
BEAR
COYOTE
DEER
ELK
LION
LYNX
PRONGHORN

New Mexico DOT Wildlife Collision Data

NM_AnimalCrashes2002_2013
ANALYSIS
Antelope
Badger
Bear
Cougar
Coyote
Deer
Eagle
Elk
Game Animal

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i Focal species - "For this project we adopted the Forest Service's operational definition: Focal species are surrogate measures used in the evaluation of ecological sustainability, including species and ecosystem diversity. The key characteristic of a focal species is that its status and trend provide insights to the integrity of the larger ecosystem to which it belongs…. focal species may be used as surrogates to represent ecological conditions that provide for viability of other species, rather than directly representing the population dynamics of those other species (Proposed Planning Rule, Section 219.36, August 2000)."