

Gunnison County
Wildlife Planning Support Tool
Final Summary Report
July 2025



***Developed collaboratively by Gunnison County's
Sustainable Tourism and Outdoor Recreation (STOR) Committee***

Summary

As Colorado's resident and visitor populations increase, the impacts to our landscapes continue to compound. Urban, exurban, and rural development, increased traffic volumes, and demand for outdoor recreation are several ongoing factors that have resulted in the cumulative fragmentation and loss of habitat for the state's diverse wildlife. Within Colorado, some estimates indicate that over half a million acres of habitat have been lost to human development over the last several decades- habitat that is crucial to the long-term survival and perpetuation of our native species. Wildlife relies on expanses of functional habitat for food, water, shelter, reproduction, rearing of their young, and winter survival. Intact habitats provide connections between seasonal ranges, which is particularly important across the Rocky Mountain West, where snow accumulation dictates animal movements and distribution. Habitat is vital to the survival of the species that depend on it, while also providing a myriad of ancillary ecosystem services that include clean water and clean air, sustainable grazing opportunities, and local economic stimulus through tourism and outdoor recreation.

Gunnison County's Sustainable Tourism and Outdoor Recreation (STOR) Committee, representing, and in collaboration with our local communities, is committed to helping preserve and conserve our remaining wildlife habitat. There is a long-standing relationship with wildlife and wild places across our County, which is ingrained in local culture and values. Maintaining our diverse wildlife and the habitat they rely on will ensure that future generations may enjoy the inherent quality of life benefits and ecosystem services that they provide.

As a result of ongoing discussions surrounding habitat loss in Gunnison County and increasing dialogue with leaders of Envision Chaffee County and Lake County, the STOR Committee applied for and received a Regional Partnership Initiative (RPI) grant that helped formalize the "Central Colorado Recreation Partnership," which includes Gunnison, Chaffee, and Lake Counties. The grant provided funding to replicate Chaffee County's Wildlife Decision Support Tool, which had been developed and adopted in Chaffee and Lake Counties. In close collaboration with Colorado Parks and Wildlife (CPW) and STOR membership, we have developed a similar mapping product- the **Wildlife Planning Support Tool**- which aggregates and depicts Gunnison County land ownership, human disturbance, and wildlife sensitivity to human impacts.

Our Tool is a compilation of several maps; however, each map may be viewed independently as well. Within the human disturbance map, disturbance buffers are assigned around development to depict the cumulative area of direct and indirect disturbance to wildlife. The wildlife sensitivity map considers a variety of factors, including the species' population trend, economic contribution, security status, spatial data specificity, and scientific evidence of sensitivity, which is described in more detail later in this report. To a great extent, the STOR Tool relied upon the existing framework and categorizations done by Chaffee and Lake Counties. However, we did differentiate or add to our product where we felt it was appropriate based on current conditions and issues within Gunnison County. Because the southeast portion of the "Gunnison Basin" includes a large region of Saguache County, we opted to add that geographic area into our Tool to more comprehensively assess important habitats located south of Highway 50 between

Gunnison and Monarch Pass. CPW has extensively documented the relationships between Gunnison and Saguache Counties for local wildlife populations; however, inclusion within the Gunnison County Tool in no way commits Saguache County to any future land use decisions. The development of the Gunnison County Tool will now allow communities to assess sensitive wildlife habitats and human disturbance at a local or regional scale among the three Counties included in the Central Colorado Recreation Partnership, bolstering a collaborative approach to regional land use planning.

The Wildlife Planning Support Tool is intended to aid Gunnison County, state and federal managers, municipalities, local nonprofits, and citizens in land use planning on both public and private lands. The Tool provides a holistic view of how people and wildlife intersect across the landscape and is intended to augment or support project-level planning. The Tool may also be used to inform more comprehensive planning efforts by identifying sensitive wildlife habitats to avoid, conserve, or restore. Colorado Parks and Wildlife provided technical and logistical support for the development of the Tool, which foundationally relies upon data provided by CPW, Bureau of Land Management (BLM), United States Forest Service (USFS), and the Colorado Natural Heritage Program (CNHP). With the support of STOR, Gunnison County, and our communities, we hope that this Tool may be used to help guide anthropogenic influences across our landscapes- with an overarching goal of avoiding, minimizing, and mitigating impacts to sensitive wildlife habitats.

Stakeholder Engagement

The Gunnison County Tool was developed with input from regional professionals and stakeholders over the course of many months, beginning in January of 2024. The core development team consisted of diverse STOR members and was supported and augmented by state and federal agencies, local municipalities, and nonprofit organizations and associations where appropriate. The team met regularly from February through June of 2024, with follow-up meetings occurring on an ad hoc basis to collect and share data and discuss and develop draft maps for review by the larger STOR Committee. Draft products were presented to the STOR committee several times for review and discussion. The STOR Tool relied upon previous work and categorizations done by Chaffee and Lake Counties, in consultation with a CPW GIS specialist.

STOR consists of 21 leaders from local governments, CPW, USFS, BLM, Stockgrowers, Crested Butte Mountain Bike Association, Gunnison Trails, Crested Butte Land Trust, Crested Butte Nordic, Gunnison County Met Rec, Gunnison Wildlife Association, Backcountry Hunters and Anglers, Upper Gunnison River Water Conservancy District, Western Colorado University, Crested Butte Mountain Resort and several at-large community members. All STOR meetings are open to the general public. Because of its diverse representation, the STOR Committee provides a public engagement conduit across the broader Gunnison County community. During the development of the Wildlife Planning Support Tool, our group benefited from the engagement and participation of the collective STOR Committee. These types of planning tools are increasingly being developed and utilized across Colorado, particularly within communities and Counties where Regional Partnerships have been established.

The Maps

Land Ownership Map

Land ownership is summarized in **Figure 1 – Gunnison County Land Ownership Map**. Land ownership was assessed using the spatial layers listed in **Table 1**.

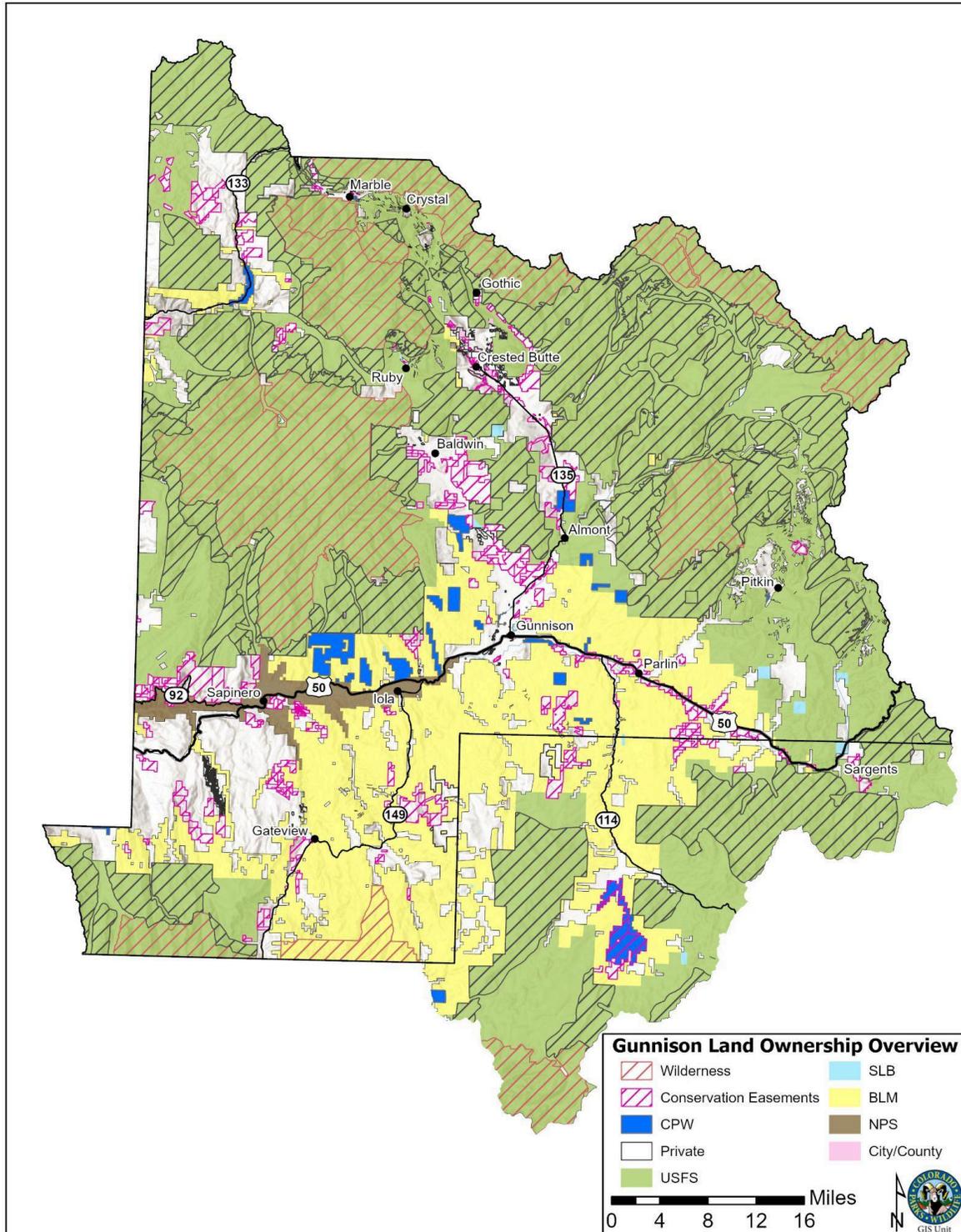


Figure 1. Gunnison County Land Ownership Map

Layer	Source
USFS	COMAP
National Park Service	COMAP
BLM	COMAP
State Land Board	COMAP
CPW Lands	COMAP
USFS Roadless	USFS
USFS Wilderness	USFS
BLM Wilderness / Wilderness Study	COMAP
Private	COMAP
Conservation Easements	COMAP
Local City/County	COMAP

Table 1. Land Ownership Layers.

Current Human Disturbance Map

Current human impact is summarized in **Figure 2 – Gunnison County Human Disturbance Model**. The human disturbance model depicts current anthropogenic impacts, including cities, towns, trails, roads, structures, active mining areas, recreation areas, and destinations such as Crested Butte Mountain Resort. The layers included are shown in **Table 2 – Human Disturbance Layers**.

For each impact, the human disturbance level was rated as high, moderate, or low. These ratings determined the indirect disturbance buffer associated with each feature (**Table 3 Criteria for Defining Human Disturbance Intensity and Spatial Buffers**). From a wildlife conservation perspective, the impacts of human development and activity often extend beyond the physical footprint of the development or activity. The science surrounding this is continuously growing, therefore, buffers used for the Gunnison County Tool should be considered an approximation of what may actually be occurring on the landscape. Wildlife disturbance distances are influenced by many factors, including but not limited to species, habitat type, season of use, and type of human impact. The STOR committee discussed these ratings at length, ultimately determining that general consistency with Chaffee and Lake Counties was pragmatic and appropriate. We explored using locally derived cellular phone geospatial data to refine ratings, however, those data were deemed insufficient for more precise ratings across the entire County. The STOR Committee recognizes that there is nuance, complexity, and specificity for each impact feature in the County. The three-category rating system introduces some bias into the Tool, in that some impacts may receive a higher or lower disturbance level rating than what may be occurring on the ground. However, for the purpose of this Tool, and lacking more comprehensive local data sets, we believe the assigned disturbance levels are reasonable for depicting human impact. The Tool does not consider unsanctioned social or non-system trails.

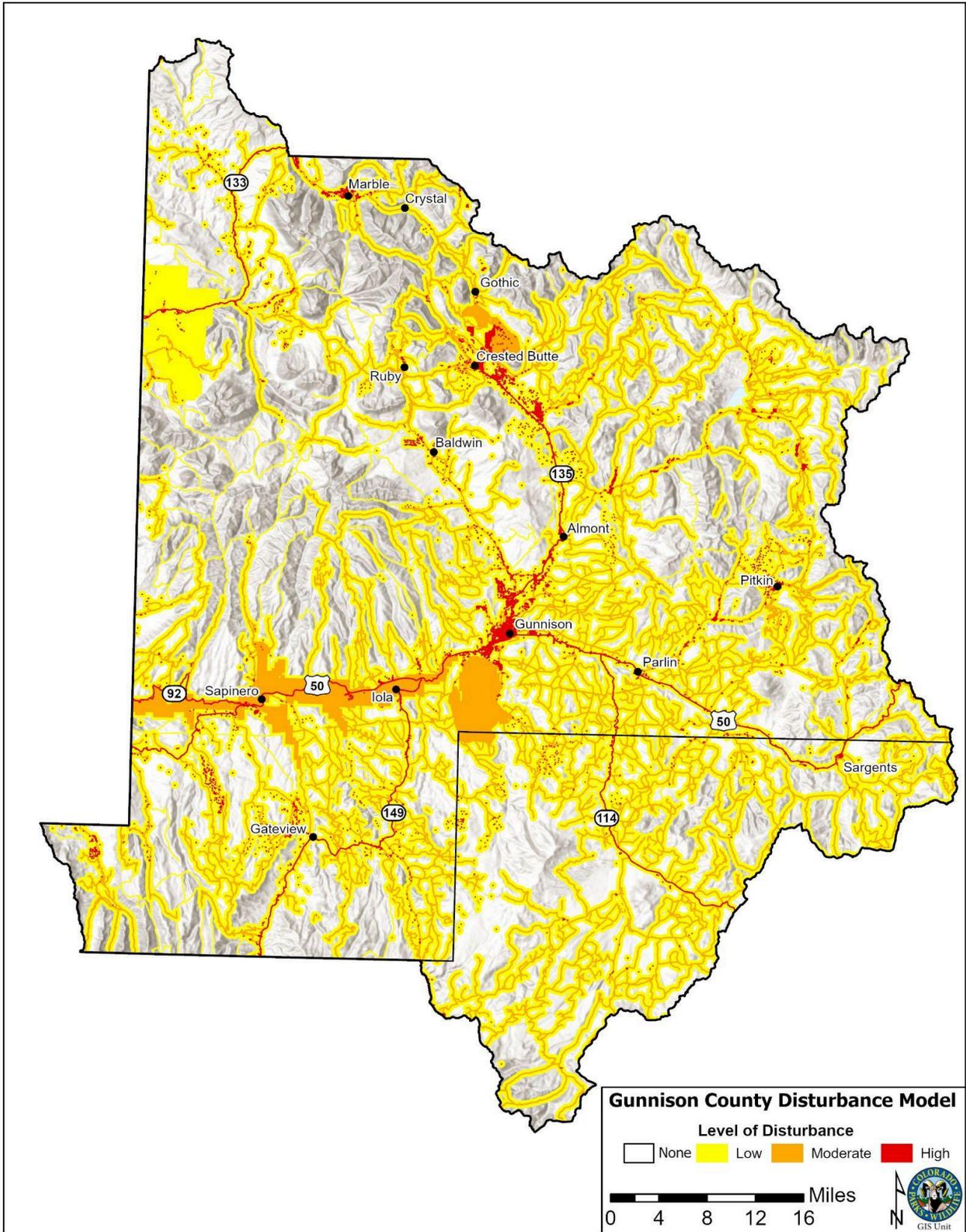


Figure 2. Gunnison County Human Disturbance Model

General Development	Layer	Source
Infrastructure	All Structures	Bing Building Data
	All Roads	CDOT & Gunnison County
	Highways	CDOT
	Telecommunication Towers	USFS
	Transmission lines, utility, and substations	GCEA
Industry	Active Coal and Hard Rock Mining Permits	Division of Reclamation, Mining and Safety
	Oil and Gas Active Wells	ECMC
Recreation Development	Layer	Source
Trails / Routes	City	COTREX
	County	COTREX
	USFS Road and Trails	USFS
	BLM Roads and Trails	BLM
	Curecanti NRA	COTREX
Campsites & Recreation Destinations	USFS Campgrounds	USFS
	BLM Campgrounds and dispersed camping	BLM
	County and other dispersed campsites	Open Street Map
	Curecanti NRA Boundary and Campsites	NPS
	Hartman Rocks Boundary and Campsites	BLM
	Crested Butte Mountain Resort	Open Street Map

Table 2. Human Disturbance Layers

Disturbance Level	General Criteria
Low	Within 100m of infrequent human occupation:
	Buffer around trails with ≤ 1,000 users per year
	Secondary roads with ≤ 1,000 users per year
	Radio towers and radio tower roads
	A 400 m Low buffer area was placed around moderate and high disturbance areas
Moderate	Within 100m of frequent but not permanent human occupation:
	Trails with > 1,000 users per year

Disturbance Level	General Criteria
Moderate	Secondary roads with > 1,000 users per year
	Designated and dispersed campsites
	Crested Butte Mountain Resort
	Hartman Rocks Recreation Area
	Curecanti National Recreation Area
High	Within 100m of frequent or permanent human occupation:
	Buildings (from Caggiano et al. 2016 and Microsoft 2018)
	Highways (from GOC routes and trails)
	Mining areas
NOTES:	<i>The Tool does not include unsanctioned social or non-system trails</i>
	<i>Intensity of human use may fluctuate by season</i>

Table 3. Criteria for Defining Human Disturbance Intensity and Spatial Buffers

Wildlife Habitat and Sensitivity Map

The wildlife sensitivity to human impacts map (**Figure 3**) was produced through a collaborative process involving data collection, spatial assessment, and ranking/scoring. Draft products were reviewed with the STOR Committee on several occasions, with feedback incorporated into final products where appropriate.

Data collection

These maps relied on the most current spatial data available for species and habitats found throughout Gunnison County. The timing for this work was ideal, as Colorado Parks and Wildlife had recently completed updates to their Species Activity Maps (SAM), which occur every five years. Spatial data was also provided by other resource management agencies including the BLM, USFS, NPS, CNHP, Gunnison County, and the USFWS. Depending on the species and what data were available, the maps may incorporate multiple layers that span different seasonal habitats or life history stages. For example, moose layers included priority habitat, concentration areas, and winter range.

CPW SAM definitions may be found at:

<https://geodata-cpw.hub.arcgis.com/documents/357fb049a40a4f9bb939dcd7d66b9512/about>

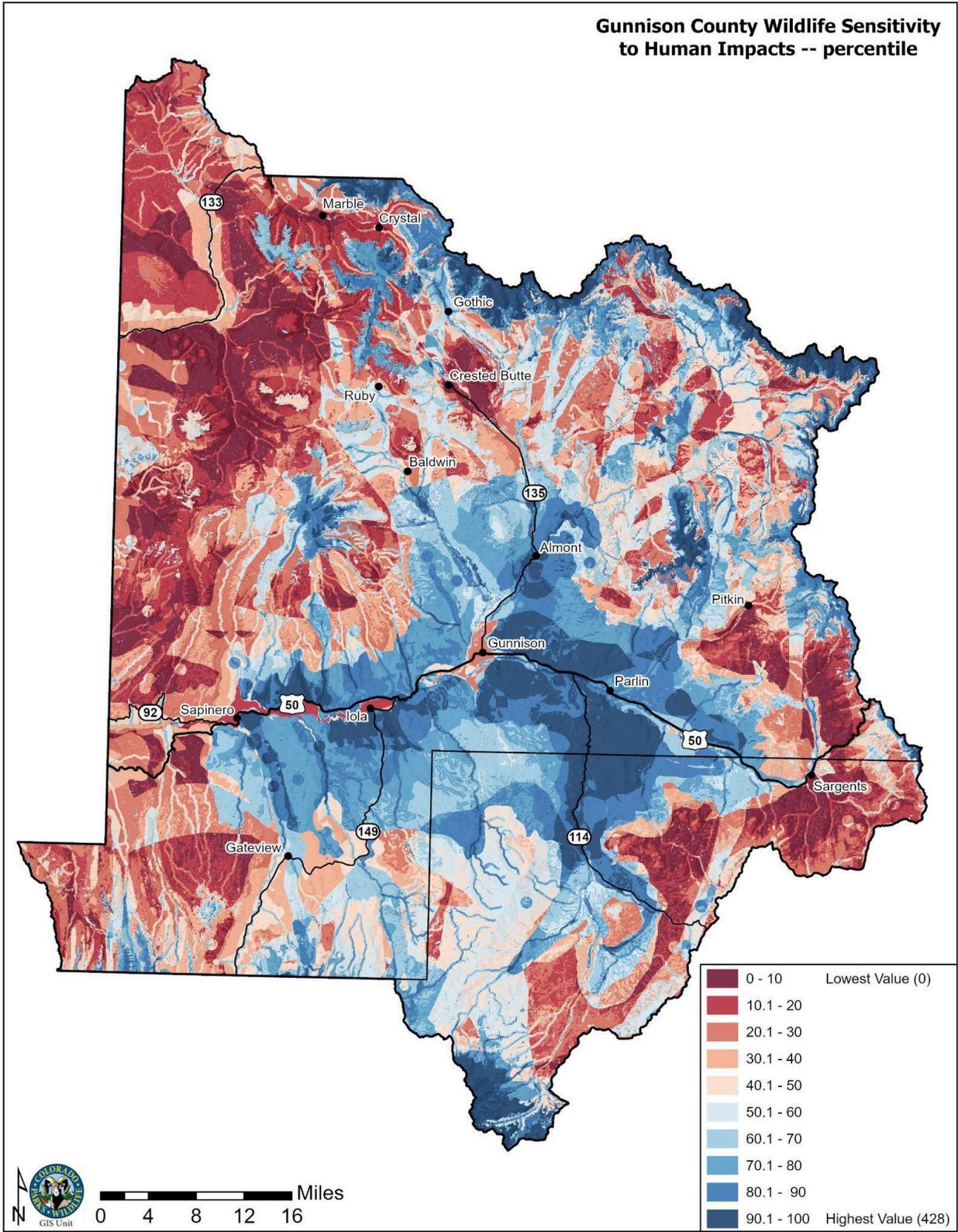


Figure 3. Gunnison County Wildlife Sensitivity to Human Impacts - Percentile Value

Only species with relatively strong and specific spatial data were included. Therefore, a variety of species found in Gunnison County could not be included in the development of the Tool because spatial data was not available or was insufficient. Our collective decisions not to include certain species in the Tool should not discount their conservation value or preclude discussion of conservation actions specific to those species. Some of the species not included in the Gunnison County Tool are listed in **Table 5**; however, this list is not all-inclusive for species occurring within the County.

This planning tool incorporated more than 60 animal, insect, and plant species and 80 habitat layers (**Table 4**).

Category	Species	Habitat Layer	Source
Aquatic & Riparian	Boreal toad	Boreal toad breeding sites	CPW
	Fish	Cutthroat trout designated crucial	CPW Aquatic HPH
	Fish	Native fish and other native aquatic species conservation waters	CPW Aquatic HPH
	Fish	Sport fish mgmt waters	CPW Aquatic HPH
Mammals	Bighorn sheep	Production areas	CPW - SAM Data
	Bighorn sheep	Winter range	CPW - SAM Data
	Bighorn sheep	Migration corridors	CPW - SAM Data
	Bighorn sheep	Summer Range	CPW - SAM Data
	Elk	Production areas	CPW - SAM Data
	Elk	Severe winter range	CPW - SAM Data
	Elk	Winter concentration areas	CPW - SAM Data
	Elk	Migration corridors	CPW - SAM Data
	Elk	Winter range	CPW - SAM Data
	Elk	Summer alpine habitat	CPW - SAM Data
	Lynx	Linkage areas	USFS
	Lynx	Modeled Habitat	Squires, J.R., Olson, L.E., Ivan, J.S. <i>et al.</i> Anthropogenically protected but naturally disturbed: a specialist carnivore at its southern range periphery. <i>Biodivers Conserv</i> 34, 401–427 (2025). https://doi.org/10.1007/s10531-024-02978-8
	Mountain goat	Production areas	CPW - SAM Data

Category	Species	Habitat Layer	Source
Mammals	Mountain goat	Summer alpine habitat	CPW - SAM Data
	Mule deer	Severe winter range	CPW - SAM Data
	Mule deer	Winter concentration areas	CPW - SAM Data
	Mule deer	Migration corridors	CPW - SAM Data
	Mule deer	Winter range	CPW - SAM Data
	Mule deer	Summer alpine habitat	CPW - SAM Data
	Pronghorn	Severe winter range	CPW - SAM Data
	Pronghorn	Winter concentration	CPW - SAM Data
	Pronghorn	Winter range	CPW - SAM Data
	Wolverine	Potential Habitat	Inman Model
	Moose	Priority habitat	CPW - SAM Data
	Moose	Concentration area	CPW - SAM Data
	Moose	Winter range	CPW - SAM Data
	Big Game	Migration pinch points	CPW - SAM Data
	Pika	Predicted range (modeled)	CPW
	Gunnison Prairie dog	Existing Colonies	CPW
	Avian	Ptarmigan	Winter range
Ptarmigan		Summer range	CPW - SAM Data
Gunnison Sage Grouse		Habitat Prioritization Tool Tier 1	Gunnison County
Gunnison Sage Grouse		Habitat Prioritization Tool Tier 2	Gunnison County
Great Blue Heron		Nesting area	CPW
Black Swift		Nesting habitat	CPW
Raptors	Burrowing Owl	Burrow locations	BLM / CPW
	Bald eagle	Nests	BLM / CPW
	Golden eagle	Nests	BLM / CPW
	Northern Goshawk	Nests	USFS / CPW
	Osprey	Nests	BLM / CPW
Insects and Plants	Uncompahgre Fritillary Butterfly	Critical Habitat	USFWS
	Altai Cotton-grass	Occupied occurrence	CNHP
	Avery Peak Twinpod	Occupied occurrence	CNHP
	Black Canyon Gilia	Occupied occurrence	CNHP / NPS
	Colorado Divide Whitlow-grass	Occupied occurrence	CNHP
Colorado Tansy-aster	Occupied occurrence	CNHP	

Category	Species	Habitat Layer	Source
Insects and Plants	Colorado Wild Buckwheat	Occupied occurrence	CNHP
	Colorado Wood-rush	Occupied occurrence	CNHP
	Crandall's Rockcress	Occupied occurrence	CNHP
	Few-seed Whitlow-grass	Occupied occurrence	CNHP
	Fragile Rockbrake	Occupied occurrence	CNHP
	Glenwood Springs Rockcress	Occupied occurrence	CNHP
	Gunnison's Milkvetch	Occupied occurrence	CNHP / NPS
	Juniper Tumble-mustard	Occupied occurrence	CNHP
	Little Green Sedge	Occupied occurrence	CNHP
	Low Fleabane	Occupied occurrence	CNHP
	Molybdenum Milkvetch	Occupied occurrence	CNHP
	Northern Twayblade	Occupied occurrence	CNHP
	Purpus' Sullivantia	Occupied occurrence	CNHP
	Rocky Mountain Thistle	Occupied occurrence	CNHP
	Rolland's Leafless-bulrush	Occupied occurrence	CNHP
	Rollins' Twinpod	Occupied occurrence	CNHP
	Rothrock's Townsend-daisy	Occupied occurrence	CNHP
	Roundleaf Sundew	Occupied occurrence	CNHP
	Skiff Milkvetch	Occupied occurrence	CNHP
	Slender Cotton-grass	Occupied occurrence	CNHP
	Small-winged Sedge	Occupied occurrence	CNHP
	Smooth Rockcress	Occupied occurrence	CNHP
	Tiger Beardtongue	Occupied occurrence	CNHP
Variiegated Horsetail	Occupied occurrence	CNHP	
Violet Milkvetch	Occupied occurrence	CNHP	
Woolly Fleabane	Occupied occurrence	CNHP	
Wetland	Various	Natural wetland inventory	USFWS

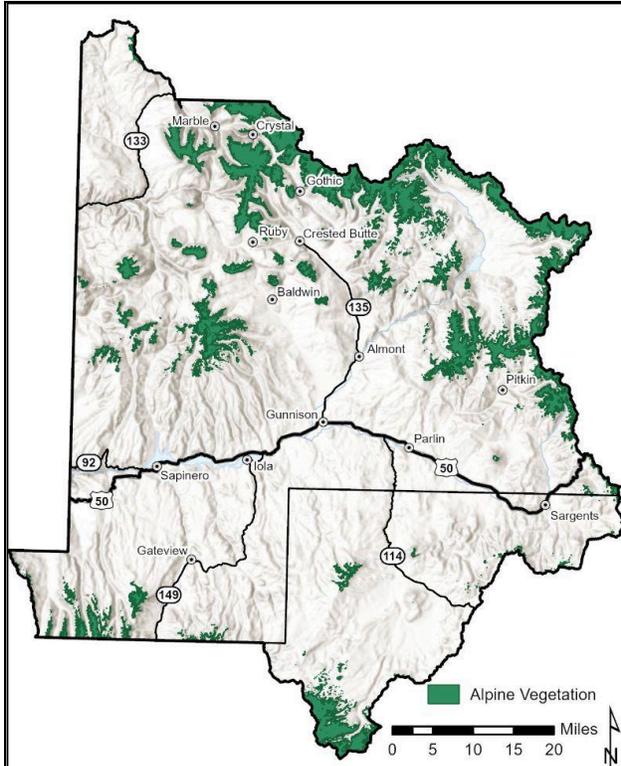
Table 4. Gunnison County Species and Habitat Layers

Each habitat is described by a GIS feature class, which can consist of point, line, or polygon data types. Those features may include a buffer that extends the spatial extent of high-precision data to account for the sensitivity of those features to potential human impacts. For example, CPW recommends no surface occupancy or ground disturbance within a quarter mile of an active golden eagle nest site and no permitted or authorized human activities within a half mile of a nest from December 15 to July 15 annually.

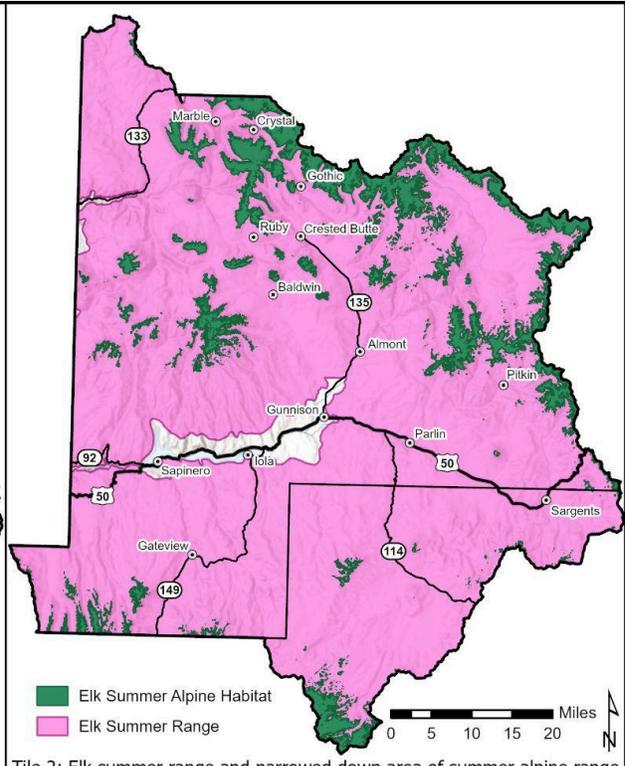
Alpine Habitat

After reviewing the draft map products for Gunnison County and the maps produced by Chaffee and Lake Counties, there was concern that alpine habitats were underemphasized and depicted unrealistically low wildlife sensitivity. Alpine ecosystems provide critical habitat for many Gunnison County wildlife species, including ptarmigan, pika, songbirds, and raptors. Big game species rely on the rich forage of alpine ecosystems during the short growing season for lactation and rearing of young. Some species, such as bighorn sheep and mountain goats, spend their entire lives in alpine habitats, which may be highly constrained depending on the season and level of human use. Additionally, due to the open terrain and lack of hiding cover, wildlife inhabiting alpine habitats are inherently vulnerable to human disturbance throughout the year. Over time, continuous human disturbance may result in the displacement or abandonment of prime alpine habitat for wildlife.

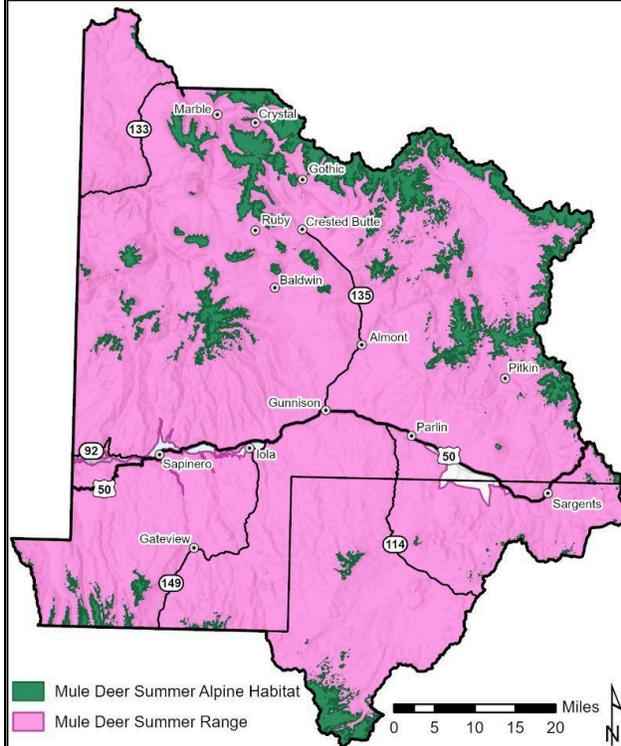
Thus, to more realistically portray the sensitivity of this habitat type, we started with the CPW Basinwide vegetation layer and the USGS 10 meter DEM layer to define the areas in Gunnison County that were above 11,000 ft and had alpine vegetation present. The vegetation classifications used from the Basinwide were: talus slopes and outcrops, alpine meadow, alpine forb dominated, alpine grass dominated, alpine grass/forb mix, subalpine shrub community, subalpine meadow, subalpine grass/forb mix, and snow. This established our alpine vegetation layer (**Tile 1**). That layer was then combined with the CPW Species Activity Mapping layers- elk summer range, mule deer summer range, and mountain goat summer range (**Tiles 2-4**). The overlapping areas for each species and the alpine layer were then used to create three new layers- elk summer alpine habitat, mule deer summer alpine habitat, and mountain goat summer alpine habitat. The geographic area included within these new layers is presumed to encompass important habitats for other alpine species, including but not limited to ptarmigan, brown-capped rosy finch, pika, and bighorn sheep.



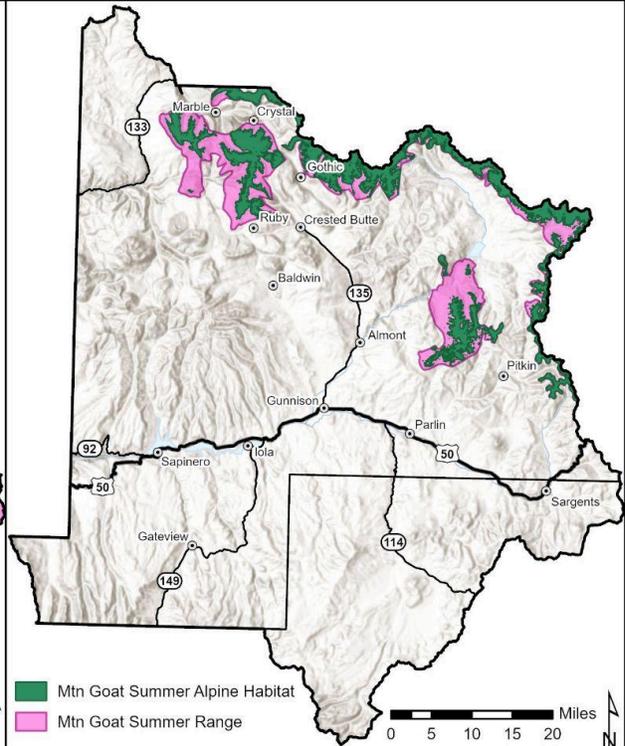
Tile 1: Alpine vegetation layer above 11,000 feet.



Tile 2: Elk summer range and narrowed down area of summer alpine range used in model.



Tile 3: Mule Deer summer range and narrowed down area of summer alpine range used in model.



Tile 4: Mountain Goat summer range and narrowed down area of summer alpine range used in model.

Species	Reason Excluded
American marten	Lack of accurate GIS data; habitat similar to Canada lynx
American white pelican	Limited occurrence in Gunnison County
Brewers sparrow	Lack of accurate GIS data
Brown-capped rosy finch	Lack of accurate GIS data, habitat similar to White-tailed ptarmigan
Ferruginous hawk	Lack of accurate GIS data
Various bat species	Lack of accurate GIS data
Lewis' woodpecker	Lack of accurate GIS data
Northern harrier	Lack of accurate GIS data
Northern leopard frog	Lack of accurate GIS data
Olive-sided flycatcher	Lack of accurate GIS data
Pinon Jay	Lack of accurate GIS data
Turkey	Only overall range is available and is too general
Beaver	Lack of accurate GIS data - stream corridors may serve as surrogate
Black bear	Overall range is ubiquitous and lacks precision
Mountain lion	Overall range is ubiquitous and lacks precision
Peregrine falcon	Lack of comprehensive GIS data
Abert's Squirrel	Lack of accurate GIS data

Table 5. Species and habitat layers *not* included in the Gunnison County Tool

Impact by Human Disturbance Level

For each species and habitat layer, we rated the impact from low, medium, and high human disturbance. We attempted to maintain consistency with Chaffee and Lake Counties but also adapted where it was deemed appropriate based on local considerations in Gunnison County. These ratings include a continuous numeric scale from 0 for no impact to 100 for maximum impact (**Table 6**). To put this into context and provide a specific local example, Boreal toads are very sensitive to even low levels of human disturbance at their breeding sites. A single dog or human disturbing a breeding site could cause the mortality of many eggs or tadpoles, therefore, that habitat layer received a rating of 100 across all levels of disturbance. Conversely, sport fish in a large river system may be more resilient to human disturbance impacts (e.g., low to moderate angling pressure, catch and release regulations), therefore, the impact ratings are less than 100 in all three disturbance categories.

For this exercise, the “Evidence” ratings of low, moderate, or high are generally consistent with Chaffee and Lake Counties, and are based on the best available science and professional subject matter expertise and opinion.

Species	Habitat Layer	Impact Rating by Human Disturbance Level			Evidence
		Low	Medium	High	
<i>Boreal toad</i>	<i>Boreal toad breeding sites</i>	100	100	100	Low
<i>Fish</i>	<i>Cutthroat Trout designated crucial</i>	20	50	70	Moderate
<i>Fish</i>	<i>Native fish and other native aquatic species conservation waters</i>	20	50	70	Moderate
<i>Fish</i>	<i>Sport fish Mgmt waters</i>	20	50	70	Moderate
<i>Big Game</i>	<i>Big Game migration pinch point</i>	75	100	100	High
<i>Bighorn sheep</i>	<i>Bighorn production areas</i>	50	100	100	High
<i>Bighorn sheep</i>	<i>Bighorn winter range</i>	30	50	100	High
<i>Bighorn sheep</i>	<i>Bighorn migration corridors</i>	25	50	100	High
<i>Bighorn sheep</i>	<i>Summer Range</i>	30	50	100	High
<i>Elk</i>	<i>Elk production areas</i>	30	50	100	High
<i>Elk</i>	<i>Elk severe winter range</i>	50	75	100	High
<i>Elk</i>	<i>Elk winter concentration areas</i>	40	70	100	High
<i>Elk</i>	<i>Elk migration corridors</i>	30	65	100	High
<i>Elk</i>	<i>Elk winter range</i>	30	60	100	High
<i>Elk</i>	<i>Summer alpine habitat</i>	30	60	100	High
<i>Lynx</i>	<i>Lynx linkage areas</i>	25	75	75	High
<i>Lynx</i>	<i>Lynx modeled habitat</i>	25	25	50	High
<i>Mountain goat</i>	<i>Mountain goat production areas</i>	50	100	100	Moderate
<i>Mountain goat</i>	<i>Summer alpine habitat</i>	25	50	100	Moderate
<i>Mule deer</i>	<i>Mule deer severe winter range</i>	50	75	100	High
<i>Mule deer</i>	<i>Mule deer winter concentration areas</i>	40	70	100	High
<i>Mule deer</i>	<i>Mule deer migration corridors</i>	30	65	100	High
<i>Mule deer</i>	<i>Mule deer winter range</i>	30	60	100	High
<i>Mule deer</i>	<i>Summer alpine habitat</i>	30	60	100	High
<i>Pronghorn</i>	<i>Pronghorn severe winter range</i>	75	100	100	Moderate
<i>Pronghorn</i>	<i>Pronghorn winter concentration</i>	50	75	100	Moderate
<i>Pronghorn</i>	<i>Pronghorn winter range</i>	40	75	100	Moderate
<i>Wolverine</i>	<i>Potential Habitat</i>	25	75	75	Moderate
<i>Moose</i>	<i>Moose priority habitat</i>	25	50	90	Moderate
<i>Moose</i>	<i>Moose concentration area</i>	25	50	90	Moderate
<i>Moose</i>	<i>Moose winter range</i>	30	70	100	Moderate
<i>Ptarmigan</i>	<i>Ptarmigan Winter Range</i>	25	50	100	High
<i>Ptarmigan</i>	<i>Ptarmigan Summer Range</i>	25	50	100	High
<i>Pika</i>	<i>Predicted range (modeled)</i>	25	25	75	Low

Species	Habitat Layer	Impact Rating by Human Disturbance Level			Evidence
		Low	Medium	High	
<i>Gunnison Sage Grouse</i>	HPT Tier 2	30	80	100	High
<i>Gunnison Prairie dog</i>	Colonies	20	40	70	Moderate
<i>Burrowing Owl</i>	Burrow Locations	50	75	100	Moderate
<i>Great Blue Heron</i>	Nesting Area	50	75	100	Moderate
<i>Black Swift</i>	Nesting Habitat	60	80	100	Low
<i>Bald eagle</i>	Bald eagle nests	50	75	100	High
<i>Golden eagle</i>	Golden eagle nests	50	75	100	High
<i>Northern goshawk</i>	Northern goshawk nests	50	75	100	high
<i>Osprey</i>	Osprey nests	75	75	75	Moderate
<i>Wetland/Aquatic Species</i>	Natural wetland inventory	50	75	100	Moderate
<i>Uncompahgre Fritillary</i>	FWS critical habitat	25	50	75	low
<i>Altai Cotton-grass</i>	occupied occurrence	25	50	100	Moderate
<i>Avery Peak Twinpod</i>	occupied occurrence	25	50	100	Moderate
<i>Black Canyon Gilia</i>	occupied occurrence	25	50	100	Moderate
<i>Colorado Divide Whitlow-grass</i>	occupied occurrence	25	50	100	Moderate
<i>Colorado Tansy-aster</i>	occupied occurrence	25	50	100	Moderate
<i>Colorado Wild Buckwheat</i>	occupied occurrence	25	50	100	Moderate
<i>Colorado Wood-rush</i>	occupied occurrence	25	50	100	Moderate
<i>Crandall's Rockcress</i>	occupied occurrence	25	50	100	Moderate
<i>Few-seed Whitlow-grass</i>	occupied occurrence	25	50	100	Moderate
<i>Fragile Rockbrake</i>	occupied occurrence	25	50	100	Moderate
<i>Glenwood Springs Rockcress</i>	occupied occurrence	25	50	100	Moderate
<i>Gunnison's Milkvetch</i>	occupied occurrence	25	50	100	Moderate
<i>Juniper Tumble-mustard</i>	occupied occurrence	25	50	100	Moderate
<i>Little Green Sedge</i>	occupied occurrence	25	50	100	Moderate
<i>Low Fleabane</i>	occupied occurrence	25	50	100	Moderate
<i>Molybdenum Milkvetch</i>	occupied occurrence	25	50	100	Moderate
<i>Northern Twayblade</i>	occupied occurrence	25	50	100	Moderate
<i>Purpus' Sullivantia</i>	occupied occurrence	25	50	100	Moderate
<i>Rocky Mountain Thistle</i>	occupied occurrence	25	50	100	Moderate
<i>Rolland's Leafless-bulrush</i>	occupied occurrence	25	50	100	Moderate
<i>Rollins' Twinpod</i>	occupied occurrence	25	50	100	Moderate
<i>Rothrock's Townsend-daisy</i>	occupied occurrence	25	50	100	Moderate
<i>Roundleaf Sundew</i>	occupied occurrence	25	50	100	Moderate

Species	Habitat Layer	Impact Rating by Human Disturbance Level			Evidence
		Low	Medium	High	
<i>Slender Cotton-grass</i>	<i>occupied occurrence</i>	25	50	100	<i>Moderate</i>
<i>Small-winged Sedge</i>	<i>occupied occurrence</i>	25	50	100	<i>Moderate</i>
<i>Smooth Rockcress</i>	<i>occupied occurrence</i>	25	50	100	<i>Moderate</i>
<i>Tiger Beardtongue</i>	<i>occupied occurrence</i>	25	50	100	<i>Moderate</i>
<i>Variiegated Horsetail</i>	<i>occupied occurrence</i>	25	50	100	<i>Moderate</i>
<i>Violet Milkvetch</i>	<i>occupied occurrence</i>	25	50	100	<i>Moderate</i>
<i>Woolly Fleabane</i>	<i>occupied occurrence</i>	25	50	100	<i>Moderate</i>

Table 6. Wildlife Impact by Human Disturbance Level

Species and Habitat Layer Importance Scoring

After rating the human disturbance impact levels, species’ habitat layers were then scored across five bulk categories: Population Trend, Economic Contribution, Security Status, Specificity, and Sensitivity and Evidence. These categories are described and defined in **Table 7**. Scores were derived based on current science and research as well as subject matter expertise and opinion; however, some species and habitats are more broadly and comprehensively studied than others. Confidence in these scores is reflected in the sensitivity and evidence column. The Sensitivity and Evidence category is in part determined by the human impact ratings shown in Table 6. Low, medium, and high impact ratings are summed and then assigned a rating of 1-5, where 5 is the highest sensitivity to disturbance with the highest professional evidence. We attempted to maintain consistency with Chaffee and Lake Counties but also adapted where it was deemed appropriate based on local considerations in Gunnison County. Scores are shown in **Table 8**.

Category	Scoring criteria
<i>Population Trend</i>	This component captures the local population trend of the associated species: 1 = increasing, 2 = stable or unknown/no data, 3 = slightly declining (<0.5%/yr), 4 = clear decline (0.5-1%/yr), and 5 = strong decline (>1%/yr). Note: Maximum score is for species with declining population.
<i>Economic Contribution</i>	This component captures the local direct economic impact of the species: 5 = species that have more than \$5M/yr impact (Elk, fishing), 4 = \$1 to \$5M, 3 = \$100k to \$1M, 2 = \$50k to \$100k, and 1 <\$100k, = no known/documented economic impact. To the extent possible, species economic contributions were based on a 2008 report that showed wildlife contributed \$35M annually to the local economy. It was assumed that these figures have roughly doubled since then. Note: Maximum score is for species with high economic impact.

Category	Scoring criteria
Security Status	This component captures species security and need for conservation using the NatureServe conservation status ranking system at the State level. 5 = critically imperiled at very high risk for extinction, 4 = imperiled at high risk for extinction, 3 = vulnerable at moderate risk for extinction, 2 = apparently secure, and 1 = secure. Note: Maximum score is for species that are critically imperiled.
Specificity	The component captures how well the spatial data reflects the occupied habitat: 5 = point occurrence locations and CPW polygons of discrete habitat elements developed from surveys, 3-4 = increasingly broad representations of general habitat, and 1-2 = occurrence points from sparse surveys and broad habitat models. Note: Maximum score if for species that have habitat defined by strong and specific data.
Sensitivity & evidence	This component captures technical professional confidence that the species use of the habitat is sensitive to recreation. Sensitivity was defined as the sum of the response function impacts for the low, moderate, and high disturbance intensity levels. This component was scored as: 5 = sensitivity >225 and high evidence, 4 = sensitivity >225 and low-moderate evidence, 3 = sensitivity >175 and high evidence, 2 = sensitivity >175 and moderate evidence, and 1 = others. Migration corridors were assigned a score of two. Note: Maximum score is for species that research strongly shows are highly sensitive to human impact.

Table 7. Habitat Importance Rank Components and Scoring Criteria.

Layer	Habitat	Component importance scores					TOTAL
		Population Trend	Economic	Security	Specificity	Sensitivity Evidence	
Boreal toad	Boreal toad breeding sites	5	1	5	5	4	20
Fish	Cutthroat Trout designated crucial	2	4	3	5	1	15
Fish	Native fish and other native aquatic species conservation waters	2	3	2	5	1	13
Fish	Sport fish Mgmt waters	2	5	1	5	1	14
Big Game	Big Game migration pinch point	2	5	1	5	5	18
Bighorn sheep	Bighorn production areas	3	3	3	5	5	19
Bighorn sheep	Bighorn winter range	3	3	3	4	3	16
Bighorn sheep	Bighorn migration corridors	3	3	3	4	2	15
Bighorn sheep	Summer Range	3	3	3	4	3	16
Elk	Elk production areas	2	5	1	3	5	16
Elk	Elk severe winter range	2	5	1	5	4	17
Elk	Elk migration corridors	2	5	1	4	2	14
Elk	Elk winter range	2	5	1	3	2	13
Elk	Summer Alpine Habitat	2	5	1	4	3	15
Lynx	Lynx linkage areas	2	1	5	3	3	14
Lynx	Lynx modeled habitat	2	1	5	3	1	12

Layer	Habitat	Component importance scores					TOTAL
		Population Trend	Economic	Security	Specificity	Sensitivity Evidence	
Mountain goat	Summer Alpine Habitat	2	2	1	3	3	11
Mule deer	Mule deer severe winter range	3	4	2	5	5	19
Mule deer	Mule deer winter concentration areas	3	4	2	4	5	18
Mule deer	Mule deer migration corridors	3	4	2	3	3	15
Mule deer	Mule deer winter range	3	4	1	4	3	15
Mule deer	Summer Alpine Habitat	3	4	2	4	3	16
Pronghorn	Pronghorn severe winter range	4	2	2	5	4	17
Pronghorn	Pronghorn winter concentration	4	2	2	5	4	17
Pronghorn	Pronghorn winter range	4	2	2	4	3	15
Wolverine	Potential Habitat	5	1	5	1	1	13
Moose	Moose priority habitat	1	3	2	3	2	11
Moose	Moose concentration area	1	3	2	3	2	11
Moose	Moose winter range	1	3	2	3	2	11
Ptarmigan	Ptarmigan Winter Range	3	2	2	4	3	14
Ptarmigan	Ptarmigan Summer Range	3	2	2	4	3	14
Pika	Predicted range (modeled)	2	2	2	3	2	11
Gunnison Sage Grouse	Gunnison County HPT tier 1	2	2	5	5	5	19
Gunnison Sage Grouse	Gunnison County HPT tier 2	2	2	5	5	5	19
Gunnison Prairie Dog	Colonies	2	2	2	4	2	12
Burrowing Owl	Burrow locations	3	1	3	2	3	12
Great Blue Heron	Nesting Area	2	1	2	5	3	13
Black Swift	Nesting Habitat	2	1	4	5	3	15
Bald eagle	Bald eagle nests	2	1	3	5	5	16
Golden eagle	Golden eagle nests	2	1	3	5	5	16
Northern goshawk	Model Nesting Habitat	2	1	2	3	3	11
Osprey	Osprey Nests	1	1	3	5	3	13
Wetland/Aquatic Species	National wetland inventory	3	1	5	5	4	18
Uncompahgre Fritillary	FWS critical habitat	2	1	3	1	1	8
Avery Peak Twinpod	occupied occurrence	2	1	4	5	2	14
Black Canyon Gilia	occupied occurrence	2	1	3	5	2	13
Colorado Divide Whitlow-grass	occupied occurrence	2	1	3	5	2	13
Colorado Tansy-aster	occupied occurrence	2	1	3	5	2	13
Colorado Wild Buckwheat	occupied occurrence	2	1	3	5	2	13

Layer	Habitat	Component importance scores					TOTAL
		Population Trend	Economic	Security	Specificity	Sensitivity Evidence	
<i>Crandall's Rockcress</i>	<i>occupied occurrence</i>	2	1	3	5	2	13
<i>Few-seed Whitlow-grass</i>	<i>occupied occurrence</i>	2	1	1	5	2	11
<i>Fragile Rockbrake</i>	<i>occupied occurrence</i>	2	1	4	5	2	14
<i>Glenwood Springs Rockcress</i>	<i>occupied occurrence</i>	2	1	3	5	2	13
<i>Gunnison's Milkvetch</i>	<i>occupied occurrence</i>	2	1	3	5	2	13
<i>Juniper Tumble-mustard</i>	<i>occupied occurrence</i>	2	1	4	5	2	14
<i>Little Green Sedge</i>	<i>occupied occurrence</i>	2	1	5	5	2	15
<i>Low Fleabane</i>	<i>occupied occurrence</i>	2	1	5	5	2	15
<i>Molybdenum Milkvetch</i>	<i>occupied occurrence</i>	2	1	2	5	2	12
<i>Northern Twayblade</i>	<i>occupied occurrence</i>	2	1	4	5	2	14
<i>Purpus' Sullivantia</i>	<i>occupied occurrence</i>	2	1	3	5	2	13
<i>Rocky Mountain Thistle</i>	<i>occupied occurrence</i>	2	1	3	5	2	13
<i>Rolland's Leafless-bulrush</i>	<i>occupied occurrence</i>	2	1	4	5	2	14
<i>Rollins' Twinpod</i>	<i>occupied occurrence</i>	2	1	4	5	2	14
<i>Rothrock's Townsend-daisy</i>	<i>occupied occurrence</i>	2	1	3	5	2	13
<i>Roundleaf Sundew</i>	<i>occupied occurrence</i>	2	1	4	5	2	14
<i>Skiff Milkvetch</i>	<i>occupied occurrence</i>	4	1	5	5	2	17
<i>Slender Cotton-grass</i>	<i>occupied occurrence</i>	3	1	5	5	2	16
<i>Small-winged Sedge</i>	<i>occupied occurrence</i>	2	1	2	5	2	12
<i>Smooth Rockcress</i>	<i>occupied occurrence</i>	4	1	5	5	2	17
<i>Tiger Beardtongue</i>	<i>occupied occurrence</i>	2	1	3	5	2	13
<i>Variiegated Horsetail</i>	<i>occupied occurrence</i>	2	1	3	5	2	13
<i>Violet Milkvetch</i>	<i>occupied occurrence</i>	2	1	3	1	2	9
<i>Woolly Fleabane</i>	<i>occupied occurrence</i>	2	1	4	5	2	14

Table 8. Gunnison County Habitat Importance Scores.

Spatial Assessment and Tool Production

The habitat layers and scores shown in Table 8 were incorporated into a spatial model by CPW GIS Staff. The model followed the same format developed by Chaffee County and used by Lake County. The wildlife habitat layers, impact assessment, and importance scores are combined spatially to calculate wildlife habitat sensitivity to human disturbance. The response functions are applied individually to each spatial representation of disturbance intensity and habitat extent. This raster surface is then multiplied by the total importance score divided by the maximum

allowable score of 25. During this process, the species group field is used to group related habitat elements to control for layer quantity in the analysis. If there are multiple habitats in a species group, each pixel is assigned the maximum impact of any overlapping habitats. This favors the most sensitive and important habitat of the species. The weighted impact measured by species group is then summed to create a composite raster of human disturbance impact sensitivity for wildlife.

In math terms, this is expressed as:

$$Composite\ impact = \sum_{i=0}^N \left(\bigcup_{j=1}^O Presence\ Raster \times (ImpScore/25) \right)$$

Where *i* is the index for the *N* species groups, *j* is the index for the *O* habitats in the species group, PresenceRaster depicts the habitat extent (1 = presence, 0 = absence), ImpactLevel is the level of habitat degradation from the quantitative response function, and ImpScore is the importance score.

For some of the habitat layers a buffer was applied to the data before it was converted to a raster layer. The layers and buffer sizes are listed in **Table 9** below.

Species Layer	Buffer Size
Bald Eagle Nesting	800 meters
Golden Eagle Nesting	800 meters
Northern Goshawk Nesting	800 meters
Osprey Nesting	800 meters
Boreal Toad Breeding Sites	300 meters

Table 9. Buffer Sizes by Species Layer

Wildlife Planning Support Tool

The ultimate product of this Gunnison County mapping and modeling effort is shown in **Figure 6- Gunnison County Wildlife Planning Support Tool**. This powerful map combines the Current Human Impacts Map (*Figure 2*) and the Habitat Percentile Map (*Figure 3*). The result is a map that depicts the most important remaining habitat for wildlife within Gunnison County and a portion of northwest Saguache County falling within the Gunnison Basin. The Gunnison County Tool was developed using a process similar to that administered in Chaffee and Lake Counties. However, each County is unique in its species assemblages, habitats, and local social and political issues. Two noteworthy attributes of the Gunnison County Tool include the occupation of the largest remaining subpopulation of Gunnison sage-grouse, which are Federally Threatened under the Endangered Species Act (ESA), and the exceptional ecological value of the sagebrush ecosystems found throughout the low and mid-elevations of the

Gunnison Basin. The highest quality habitats depicted in the Gunnison County Tool are significantly driven by these two attributes within the model.

Interpreting the Support Tool

In Figure 6, areas depicted in **shades of darker green** are the **highest quality habitats**. These areas are subdivided into disturbed and undisturbed categories based on current anthropogenic influence. Through a wildlife conservation lens, these areas should be viewed as a top priority for protection from human development or impact. These areas might also be considered for habitat restoration or enhancement, or for providing potential mitigation for land use elsewhere. For example, a hypothetical section of road or trail within a highest quality, disturbed habitat might be closed and restored as mitigation for a newly authorized stretch of road or trail in a less impactful area elsewhere. Protecting our highest quality habitat should promote thriving wildlife and plant populations and overall ecosystem health. Healthy ecosystems will help foster and perpetuate quality outdoor experiences for County residents and visitors, maintain local cultural values and ecosystem services, and maintain essential drivers of our local economies.

In Figure 6, areas shown in the **lightest shade of green** are categorized as **undisturbed high quality habitat**. These areas are of high conservation value and are geographies to avoid, minimize, and mitigate impacts to wildlife and their habitat. High quality, undisturbed habitats may provide connection between seasonal ranges and provide unfragmented habitat refugia for species throughout the year. Maintaining undisturbed habitats will be key to local conservation in the face of an increasing human population, development, and demand for outdoor access and activities.

In Figure 6, areas shown in **shades of brown** are **disturbed or represent lower quality habitats**. Some of these may be intuitive, such as the developed areas surrounding municipalities or high-use recreation areas. These areas may still include wildlife habitat values and should be evaluated at a fine-scale during project level planning.

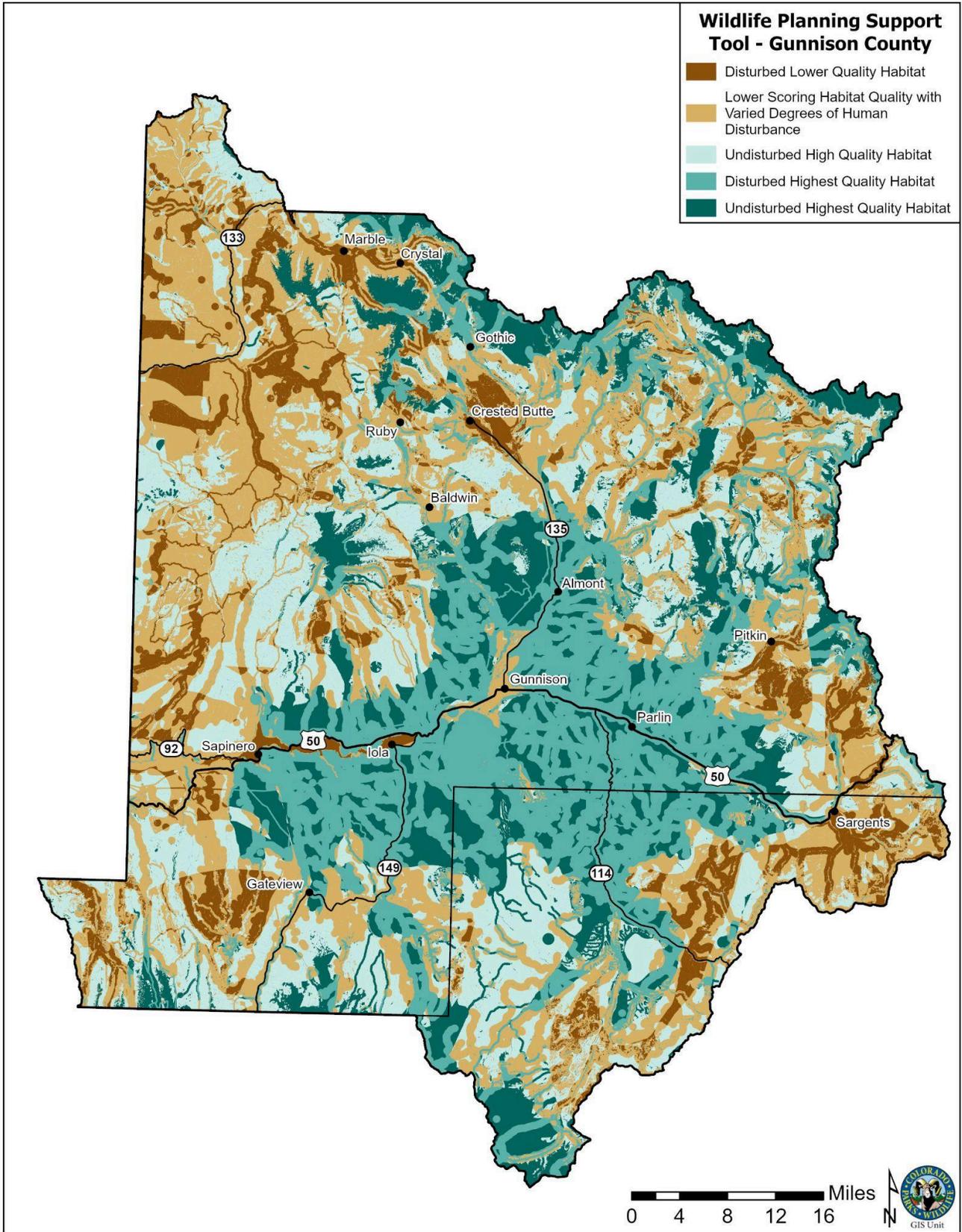


Figure 6. Gunnison County Wildlife Planning Support Tool

Future Use of the Wildlife Planning Support Tool

These Tools provide communities with a resource to help guide local management across jurisdictions and promote wildlife conservation during land use planning. Finalizing the Tool in Gunnison County completes our analysis across the Central Colorado Recreation Partnership, which will accommodate conservation planning between Lake, Chaffee, and Gunnison Counties (**Figure 8**). Moving forward, Gunnison County's Tool will be warehoused within Colorado's Conservation Data Explorer (CODEX) alongside Chaffee and Lake Counties. Making our Tool widely available and promoting its use, coupled with ongoing education and collaboration, will hopefully help realize its full potential as we forge through ongoing and unprecedented change across our wild places.

Potential applications for the Wildlife Planning Support Tool include:

- Gunnison County and municipalities adopt the Tool to inform and guide land use policy and planning
 - Example: Gunnison County Corridor Planning; designating areas appropriate for future development
- Local economic development initiatives (e.g., Local Marketing District, City of Gunnison Economic Development Strategic Planning, etc.) use the Tool to consider impacts to wildlife habitat; promotion and marketing may direct activities away from high quality habitats
- Land Preservation Board, CB Land Trust, Gunnison Ranchland Conservation Legacy, and other conservation entities use the Tool as a resource for potentially prioritizing and conserving high quality habitats
- Grant funders, such as STOR or the Land Preservation Board may prioritize projects that support wildlife habitat improvements in high quality areas; or mitigation/restoration work in disturbed areas
- Informing Federal and State agency land management planning: bolstering consideration for high quality habitats; or directing mitigation/restoration work in disturbed areas
- Informing Community Wildfire Protection Plan (CWPP) treatments, where reducing wildfire risk in high priority habitats also strives to enhance wildlife habitat

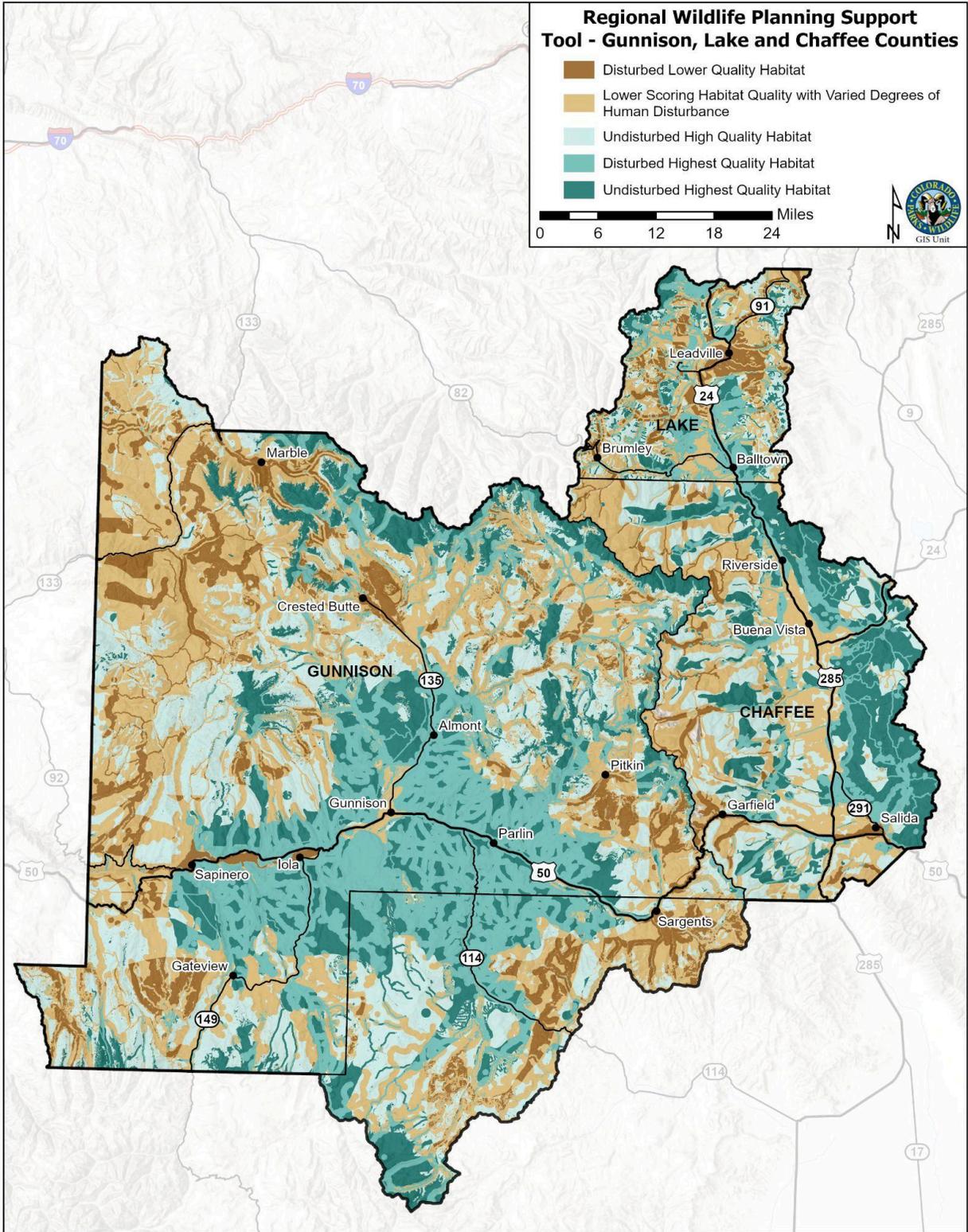


Figure 8: Gunnison, Chaffee, and Lake County Planning for Wildlife Map - Central Colorado Recreation Partnership

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