



Appendix 3

Supplemental Data for the Environmental Profile

January 24, 2008

NOTE: This document has been prepared using Federal funding from the United States Department of Transportation. The United States Department of Transportation assumes no responsibility for its contents or use thereof.

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Figure 3-1: Historic Resources

Map Description:

For a more detailed view, please see the version provided on the accompanying DVD, or contact the Pueblo Area Council of Governments for mapping of more specific areas of interest. There are a number of historic sites and trails listed on the map to the right. The data represents the 2007 Colorado Office of Archaeology & Historic Preservation data of major historic sites for Pueblo County. The large brown area on the left side of the map is the former Charles Goodnight Ranch. The blue line represents the Goodnight-Loving Trail, and the other trails displayed are various possible Anza routes through the county. Many of the historic sites in the southwest corner of the county are historic camps or campgrounds. In the greater Pueblo area there are a number of identified historic locations two of which are labeled here, Fort Pueblo, and the location of the original Goodnight Barn. Finer grain labeling of all the historic points in Pueblo was not possible at this scale.

Map Limitations:

Scale is the biggest limitation of this map. At the county scale it gives a thematic understanding of the identified locations. The data is much more specific and can be viewed at more appropriate scales for future work on projects. Also, the data is not conclusive. There are a number of historic sites that have not been identified in this data set. Future mapping may include the locations of all the structures identified by the City of Pueblo on its historic registry, the location of the Cherokee Trail, other early ranches and homesteads, quarries, whistle-stops, and mines.

Data Sources:

Colorado Office of Archaeology and Historic Preservation (OAHP) 2007.

Integration:

This data can be used for a number of purposes. From a project perspective, it would be a good starting point to identify known points of historic significance. It may also be possible to incorporate some of the historic trails into large-scale transportation plans for recreation and trail routes in the future use. These routes would provide a number of opportunities for Natural Resource, Educational and Historic Interpretation.



Figure 3-2 Drainage Basins

Map Description:

This map shows how the water in Pueblo County flows across the landscape. Each drainage basin (outlined in yellow) collects water that falls within its confines, in a series of waterways that then empty into the next drainage basin as it joins a larger river. Every tiny stream has its own drainage basin or “water shed” and they can be broken out into hundreds of smaller basins, or grouped together with other basins to show their larger system.

Map Limitations:

Not all of the drainage basins in this map are the same category. Higher granularity was used for the areas in and around the city of Pueblo. This only maps the course of surface water in the region. In some areas ground water does not travel the same courses that surface water travels, so, for instance a contaminate can be dumped in one drainage basin, seep into the ground, and exit into the surface water of another basin entirely.

Data Sources:

USGS via the City of Pueblo Stormwater Department.

Integration:

When considering how development and transportation systems create impacts on water quality, it is vital that an understanding of the flow of water across the landscape be understood. This information may also help predict areas of future growth as watershed boundaries can be a physical limitation for the extension of urban services such as water and sewer lines.

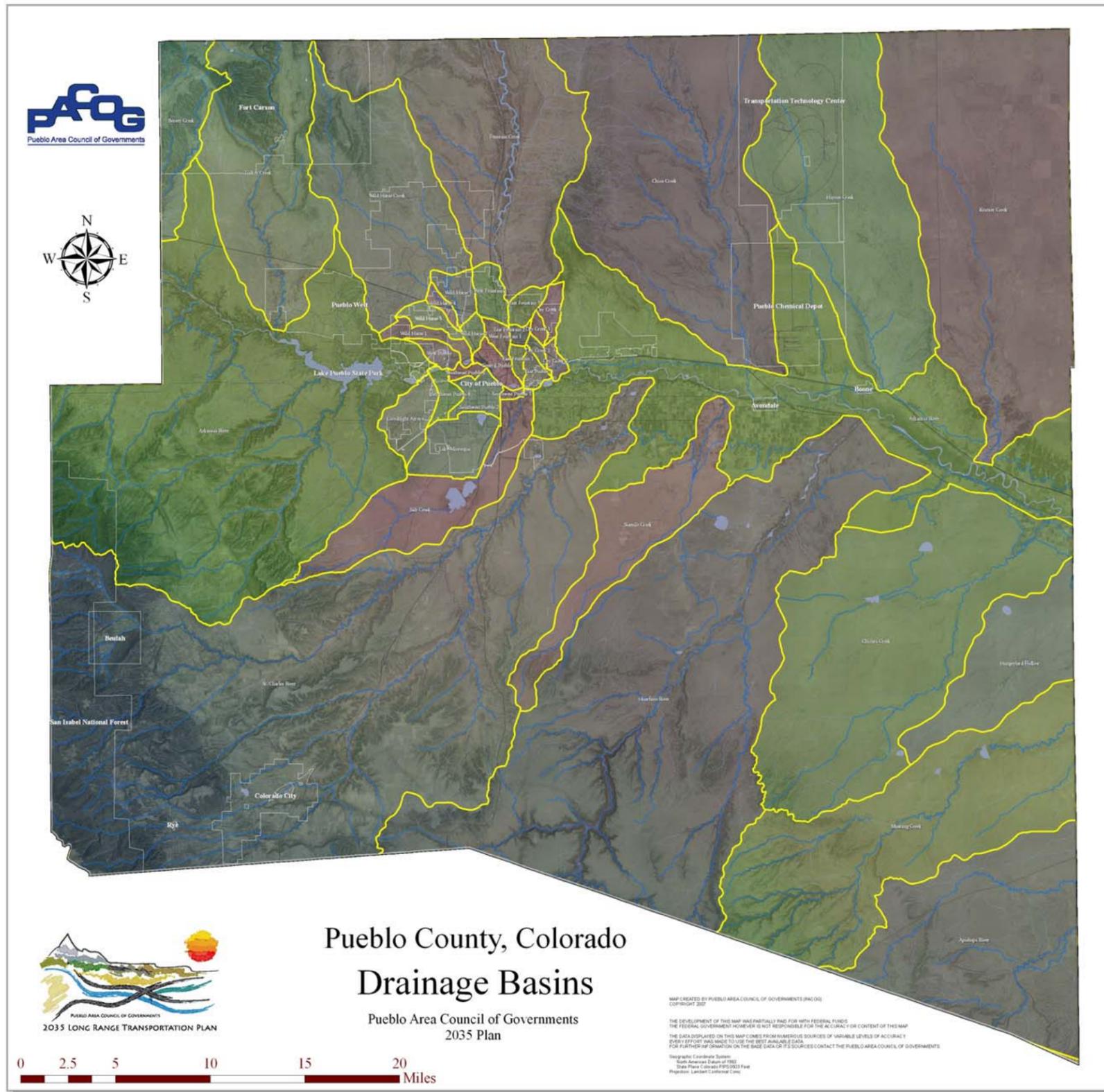


Figure 3-3 Threatened and Endangered Species

Map Description:

This map shows Colorado Division of Wildlife known and potential habitats for 5 Pueblo County endangered species.

Species known to exist in the County: Bald Eagle, Massasagua Rattlesnake, Texas Horned Lizard, and the Mexican Spotted Owl.

Species for which habitat exists, but sightings have not occurred: Canada Lynx and the Preble's Meadow Jumping Mouse.

Map Limitations:

This is not a full list of all the Threatened and Endangered species within Pueblo County. Mapping habitats of rare, threatened and endangered species is not always advisable.

Data Sources:

Colorado Division of Wildlife.

Integration:

The closest observed Preble's Meadow Jumping Mouse to Pueblo County was sighted near the intersection of North Academy and Interstate 25 in northern El Paso County. The area shaped in red, was determined by Colorado Division of Wildlife to be possible habitat for the mouse.

The areas in purple indicate Bald Eagle habitat in the county. For the most part these are riparian areas and are not under significant development pressure. The remaining mapped Endangered Species habitat also lies in areas with minimal development pressure. Any activities that take place in Pueblo County need to be in full compliance with the Endangered Species Act of 1973.

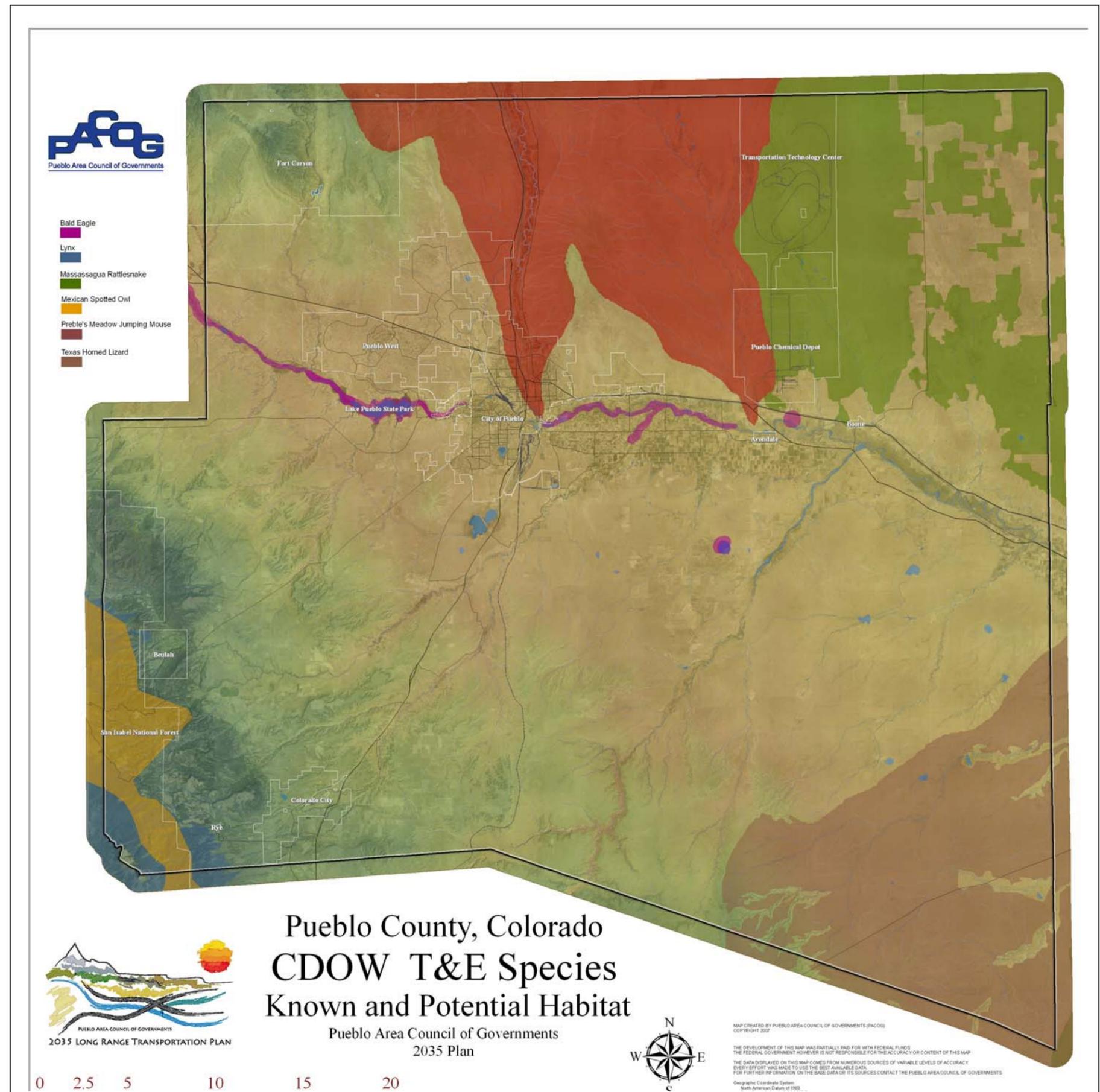


Figure 3.5 Avian Habitat

Map Description:

This map was created using the Colorado Division of Wildlife mapped habitat data for the avian species within Pueblo County. This includes prime known nesting sites, breeding sites, seasonal concentration area, and communal roost sites. Data was limited for the habitats of bird species within Pueblo County. A few migratory species, some prairie species, a few water birds, and a few raptors are all that make up this base data. As GIS data on the habitats of more avian species becomes available, this map will begin to show more vibrant patterns of how birds use the landscape in Pueblo County.

Until that data is available, this map shows some trends that can be useful to the transportation planning process. The most noticeable is the concentration of use along wetland, riparian areas and also near water bodies. Most birds require access to water and many concentrate around it as a source of both habitat and food.

Lighter areas on this map should not be considered “bird-free.” They are simply showing the need for more avian habitat data.

Map Limitations:

The greatest limitation of this map is that only a handful of avian species have mapped GIS data for their ranges.

Data Sources:

Avian Habitat: Colorado Division of Wildlife

Integration:

This map contributes to a greater understanding of the function of the landscape as it relates to avian species and further indicates the importance of riparian areas to wildlife within the region. As transportation planning is done within Pueblo County, every measure practicable should be taken to protect the viability and access of riparian areas, wetlands, and the areas surrounding water bodies as they represent critical habitat for a wide number of species.

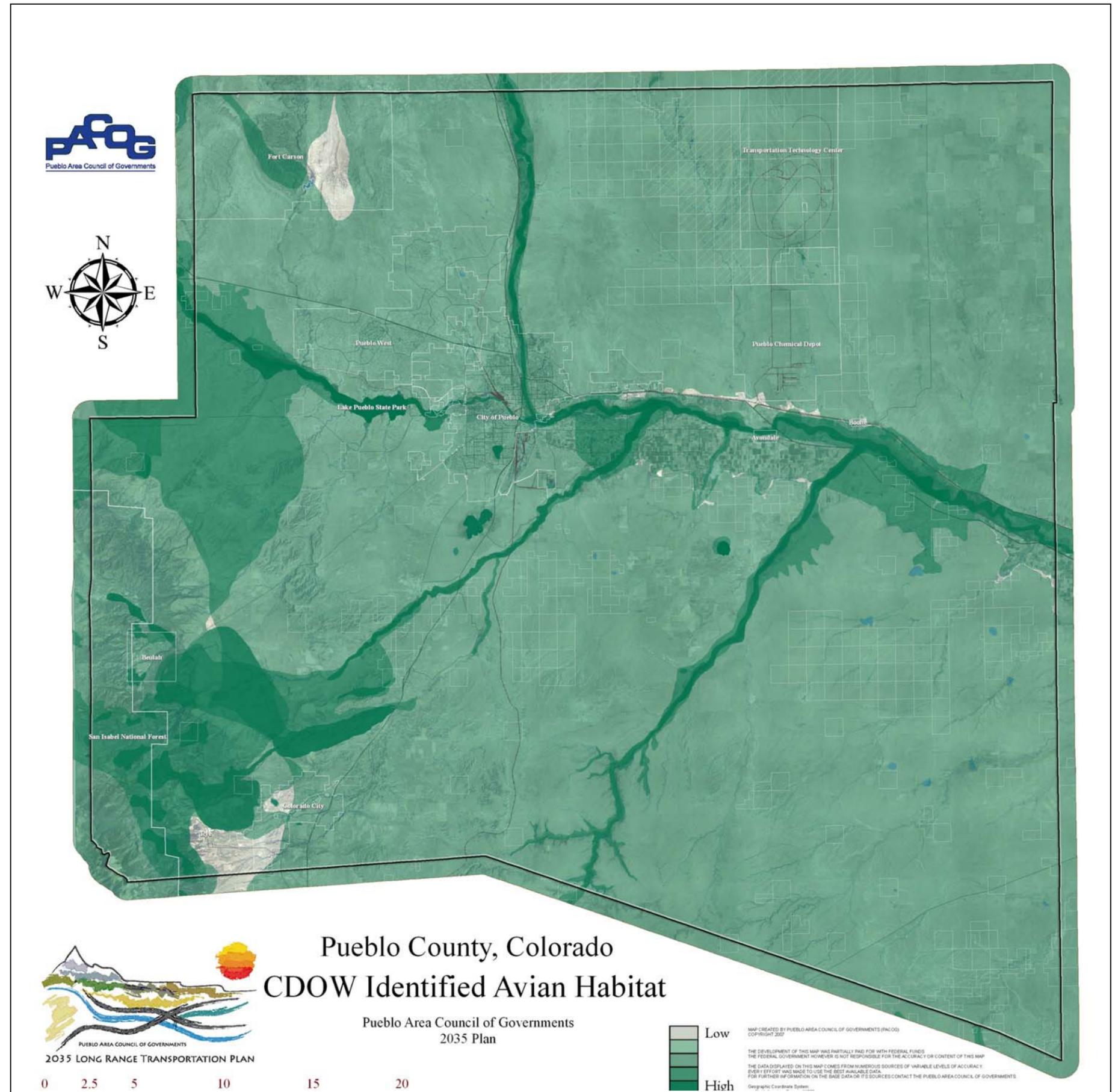


Figure 3.6 Ungulate Ranges (Over-all)

Map Description:

Ungulates, or hooved animals represent one of the most mobile and migratory groups of terrestrial animals in the county. They are also often referred to as “charismatic mega-fauna” because they tend to be game species, and iconic species that people naturally associated with “wildlife” and natural beauty. In Pueblo County they consist of Mountain Goats, Bighorn Sheep, Elk, Mule Deer, White-Tailed Deer, and Pronghorn. Traditionally bison would have been found in the area but they no longer roam wild in Pueblo County.

This map shows the over-all ranges for ungulates within Pueblo County. Some patterns can be derived from this data. Ungulates, like many western species require access to water and often use riparian corridors to move across the landscape. The areas of the county with higher elevation receive more precipitation and therefore have more vegetation that provides not only a source of food for ungulates, but also a much needed source of “cover.” The lighter areas are less well used by the entire group of ungulates and represent a large percentage of the short-grass prairie habitat within the county. These areas would be used mostly by Pronghorn, White-Tailed Deer and Mule Deer, but Elk have also been known to use the short-grass prairie as well.

Map Limitations:

The lightest areas in this map represent the most urban portion of the county surrounding the City of Pueblo. That may lend the viewer to believe that ungulates are not found within the city, but it is more correct to say that these areas have low occurrences of ungulates. The riparian corridors that bisect the city are heavily used by some species as they move across the landscape. Also this map does not show seasonal variations in landscape use. The following two maps show how seasonal changes greatly affect the location of ungulates in the landscape and the importance of maintaining viable migration corridors.

Data Sources:

Ungulate Ranges: Colorado Division of Wildlife.

Integration:

This map contributes to the greater understanding of the function of the landscape as it relates to ungulate ranges and migration corridors.

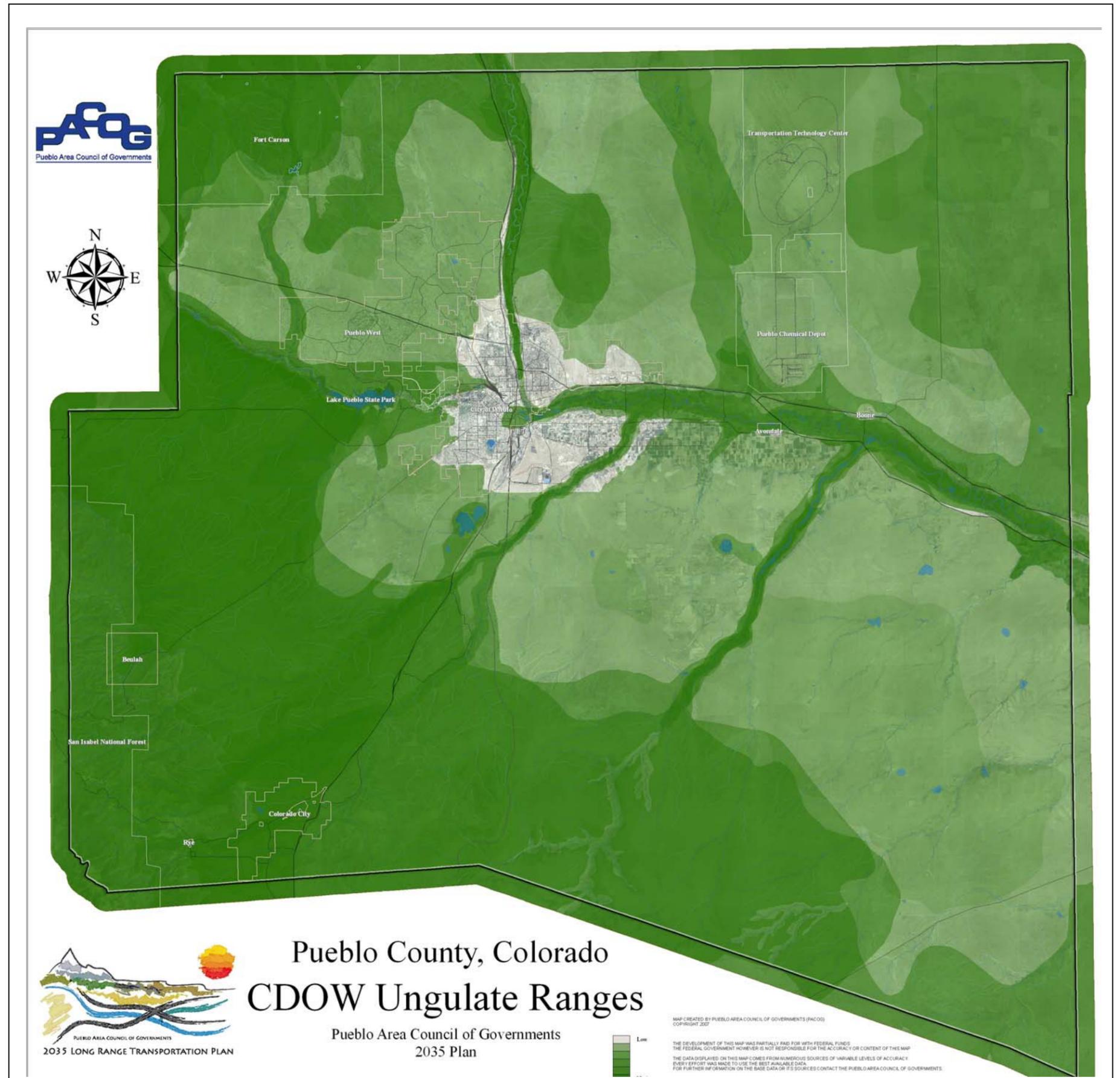


Figure 3.7 Ungulate Ranges (Summer)

Map Description:

Ungulates, or hooved animals represent one of the most mobile and migratory groups of terrestrial animals in the county. They are also often referred to as “charismatic mega-fauna” because they tend to be game species, and iconic species that people naturally associated with “wildlife” and natural beauty. In Pueblo County they consist of Mountain Goats, Bighorn Sheep, Elk, Mule Deer, White-Tailed Deer, and Pronghorn. Traditionally bison would have been found in the area but they no longer roam wild in Pueblo County.

This map shows the summer ranges for ungulates within Pueblo County. Some patterns can be derived from this data. The irrigated and wet portions of the county attract a large number of ungulates down out of the mountains in the summer months. Using the riparian areas they move across the landscape and use different portions of their range for breeding, calving, and seasonal foraging.

Map Limitations:

The lightest areas in this map represent the most urban portion of the county surrounding the City of Pueblo. That may lend the viewer to believe that ungulates are not found within the city, but it is more correct to say that these areas have low occurrences of ungulates. The riparian corridors that bisect the city are heavily used by some species as they move across the landscape. Also this map does not show seasonal variations in landscape use. The following two maps show how seasonal changes greatly affect the location of ungulates in the landscape and the importance of maintaining viable migration corridors.

Data Sources:

Ungulate Ranges: Colorado Division of Wildlife.

Integration:

This map contributes to the greater understanding of the function of the landscape as it relates to ungulate ranges and migration corridors.

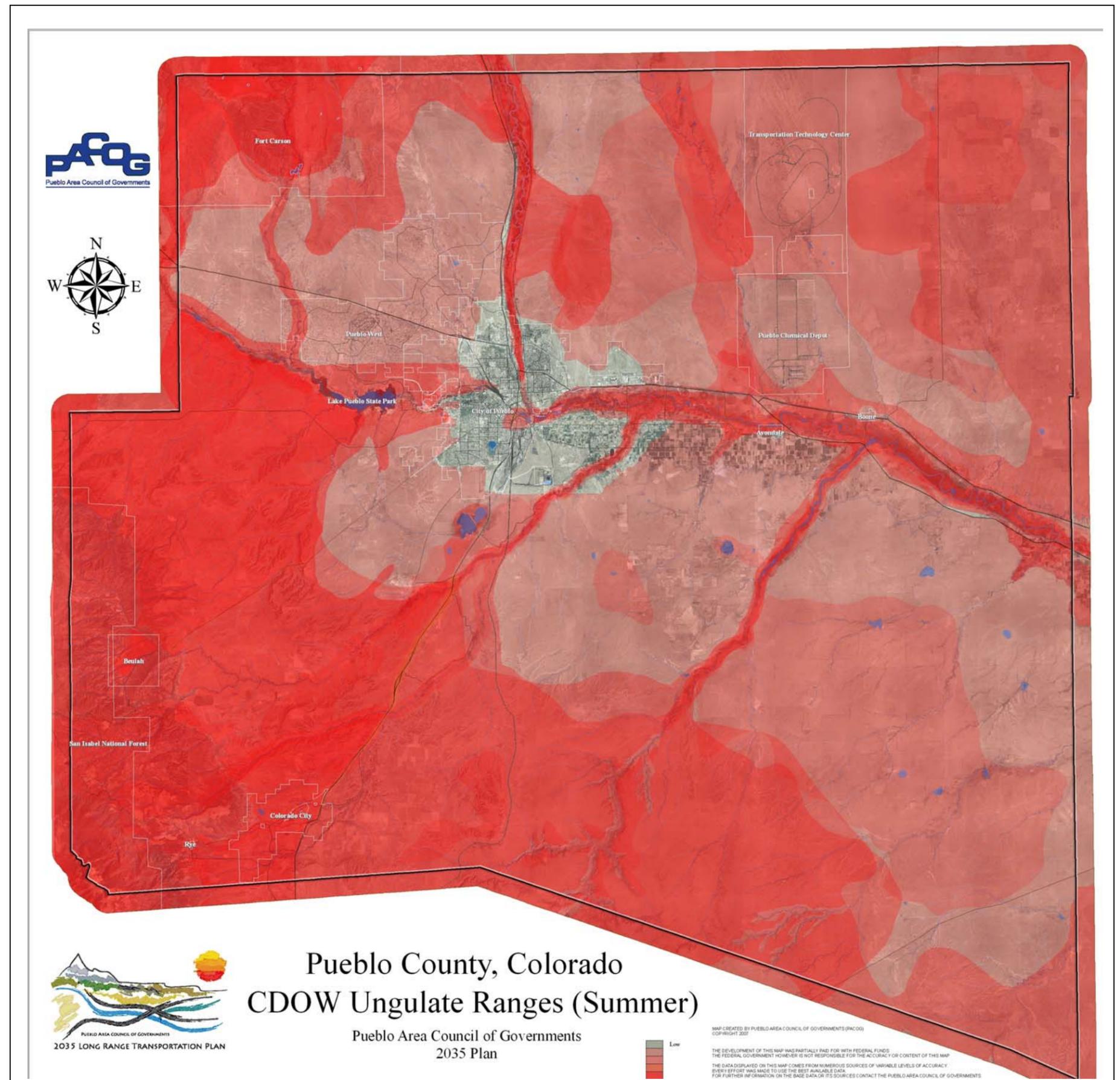


Figure 3.8 Ungulate Ranges (Winter)

Map Description:

Ungulates, or hoofed animals represent one of the most mobile and migratory groups of terrestrial animals in the county. They are also often referred to as “charismatic mega-fauna” because they tend to be game species, and iconic species that people naturally associated with “wildlife” and natural beauty. In Pueblo County they consist of Mountain Goats, Bighorn Sheep, Elk, Mule Deer, White-Tailed Deer, and Pronghorn. Traditionally bison would have been found in the area but they no longer roam wild in Pueblo County.

This map shows the winter ranges for ungulates within Pueblo County. Some patterns can be derived from this data. The eastern prairies provide minimal cover and foraging options for ungulates during the winter and the irrigated agricultural areas are not in production. This map shows the wide range of movement that the ungulate group requires of this landscape seasonally. Winter finds them largely in the foothills, shrub-lands, and lower elevation forests of Pueblo County.

Map Limitations:

The lightest areas in this map represent the most urban portion of the county surrounding the City of Pueblo. That may lend the viewer to believe that ungulates are not found within the city, but it is more correct to say that these areas have low occurrences of ungulates. The riparian corridors that bisect the city are heavily used by some species as they move across the landscape. Also this map does not show seasonal variations in landscape use. The following two maps show how seasonal changes greatly affect the location of ungulates in the landscape and the importance of maintaining viable migration corridors.

Data Sources:

Ungulate Ranges: Colorado Division of Wildlife.

Integration:

This map contributes to the greater understanding of the function of the landscape as it relates to ungulate ranges and migration corridors.

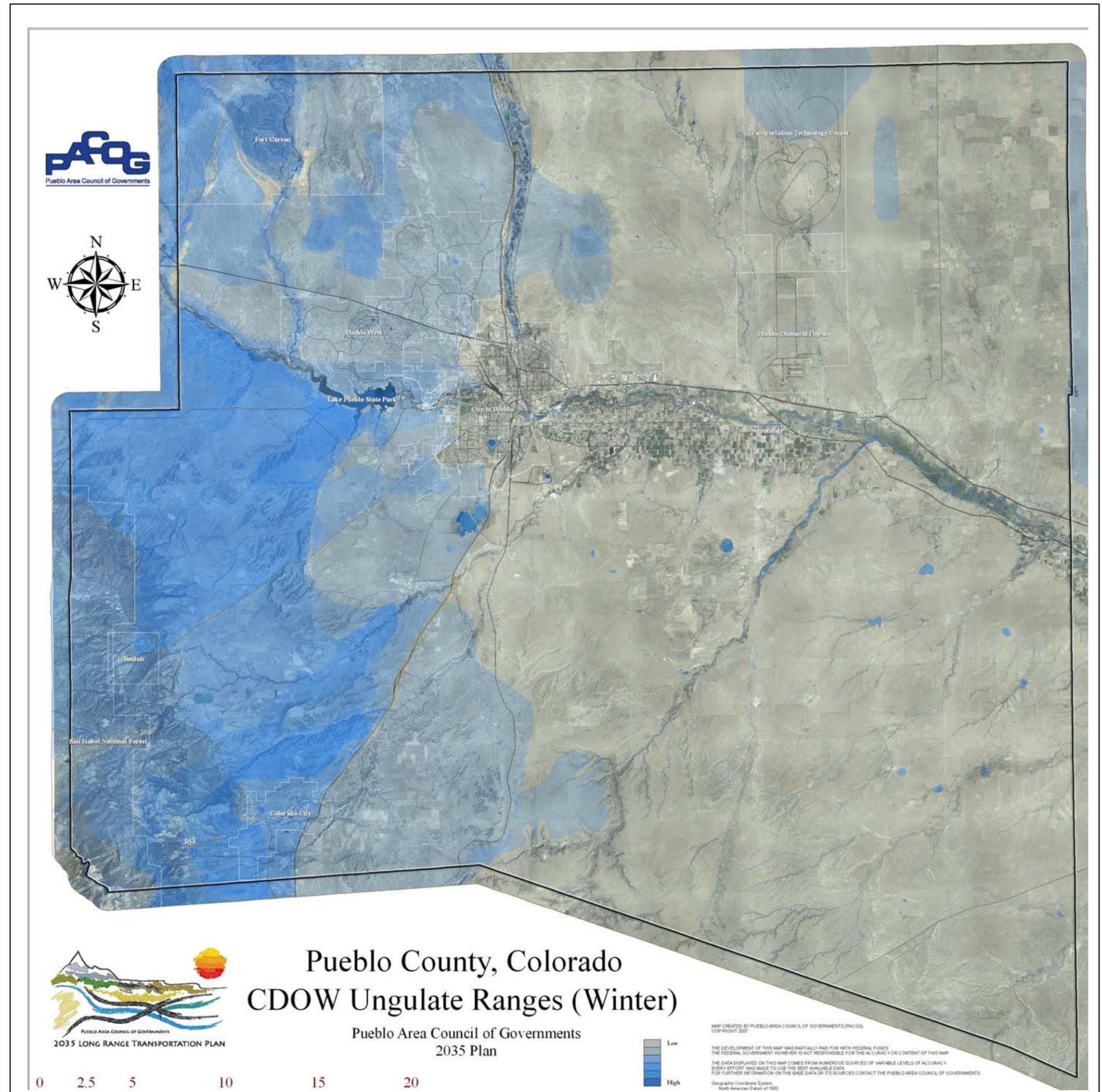


Figure 3.9 Large Predator Ranges

Map Description:

This map shows the ranges of the major predators (Black Bear and Mountain Lion) with their seasonal concentration areas, migration corridors, over-all ranges, and limited use areas.

Map Limitations:

Certainly predators can be found outside of these mapped areas, but this represents the most likely spots where they can be found. It also correlates with the habitat of many of their prey species which would be expected, but does not extend to the northwest quadrant of the county to the degree that ungulate summer ranges tend to do.

Data Sources:

Large Predator Ranges: Colorado Division of Wildlife

Integration:

This information contributes to the greater understanding of the function and structure of the landscape within the study area. Projects planned in the region should consider migration corridors and the needs of predators to maintain and where possible, improve access for predators across the landscape, while also working to limit the amount of human-predator conflict.

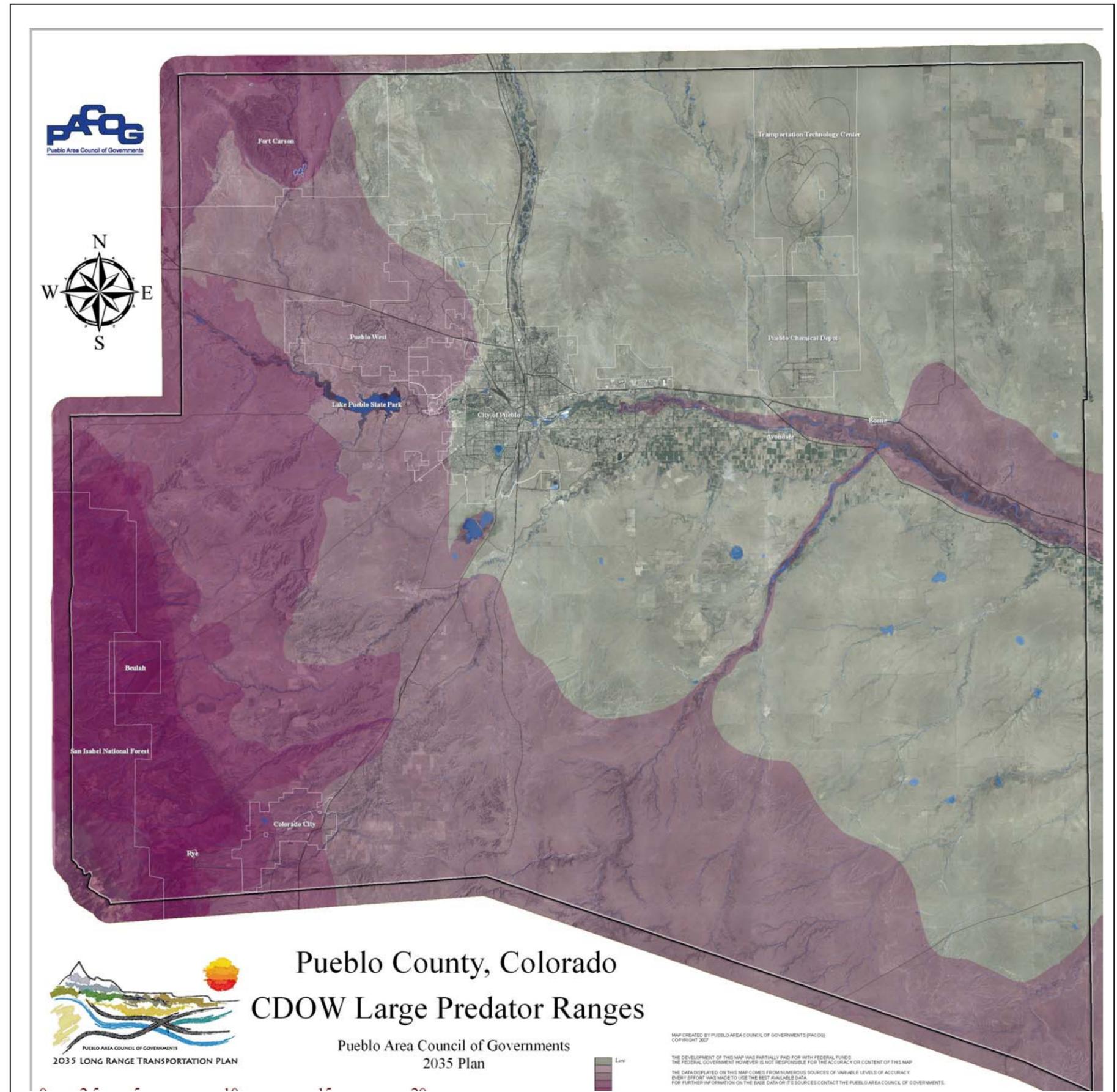


Figure 3.10 Biodiversity

Map Description:

What is “Biodiversity?” It can be described on four different levels:

1. Genetic Diversity – variation within a population and among populations of plant and animal species. The genetic makeup of a species is variable between populations within its geographic range. Loss of a population results in a loss of genetic diversity for that species and a reduction of total biological diversity for the region. This unique genetic information cannot be reclaimed.
2. Species Diversity – the total number and abundance of plant and animal species and subspecies in an area.
3. Community Diversity – the variety of plant communities within an area that represent the range of species relationships and inter-dependence. These communities may be diagnostic or even endemic to an area. It is within communities that all life dwells.
4. Landscape Diversity – the type, condition, pattern, and connectedness of plant communities.

The conservation of [Biodiversity] must include all levels of diversity: genetic, species, community, and landscape. –Colorado Natural Heritage Program – *Inventory of Critical Biological Resources in the Upper Arkansas Watershed 1999 Final Report.*

Map Limitations:

The generalized nature of some of these shapes may cause a viewer to think they are less accurate, but in most cases these communities have been buffered and drawn indistinctly to protect the valuable plant and animal communities by not publishing their exact locations.

Data Sources:

Biodiversity: Colorado Natural Heritage Program

Integration:

These are areas that need to be considered and avoided to the greatest extent practicable. Avoiding fragmentation of these areas should be a goal of environmentally sound Transportation Planning.

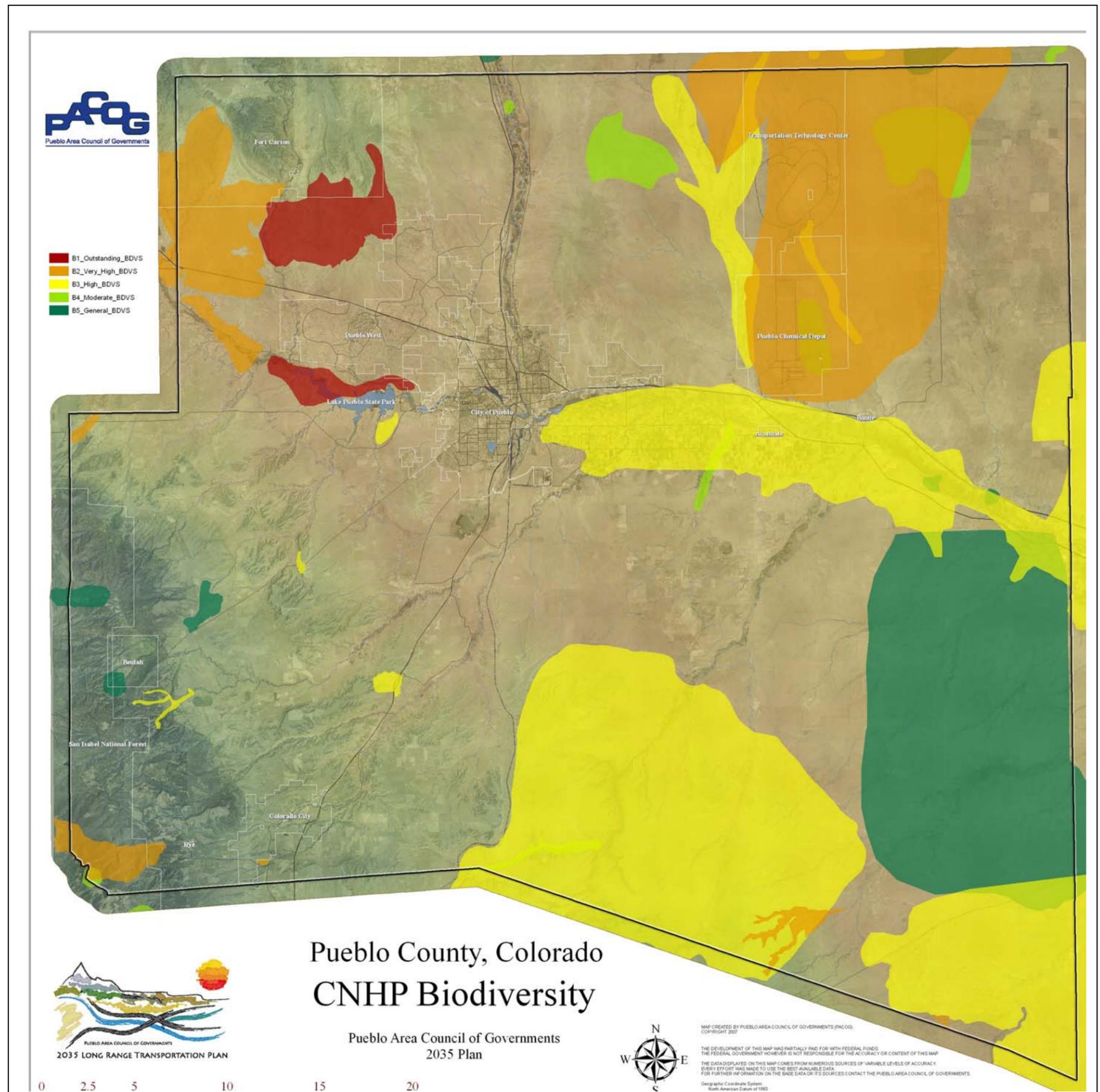


Figure 3.11 Wetlands and Riparian Areas

Map Description:

This map shows wetland and riparian areas gathered through Remote Sensing by Landsat Satellites during the period of 1999-2001 and categorized by the SW Gap Analysis project.

Map Limitations:

During the period of 1999-2001, the study area was in a drought cycle. More wetlands may appear in wetter weather cycles than appear in this analysis. Also, wetlands and river systems tend to move within the landscape through hydrologic processes of erosion, flooding, and natural changes. Increased run-off from urbanization can create higher levels of storm surges due to increased flows, and these surges can make cause the system to be more volatile.

Data Sources:

Wetlands and Riparian Areas: Southwest GAP Analysis Landcover Data

Integration:

More than 85% of terrestrial land animals require access to wetland and riparian areas in the arid West. Maintaining and improving the health, quality and accessibility of these areas is vital to the continued functionality of the wildlife within this study area. These areas are also located in or near the floodplain and will most likely be avoided by future development in the region. Future transportation planning should consider maintaining access and protecting migration corridors within the study area as it relates to these areas.

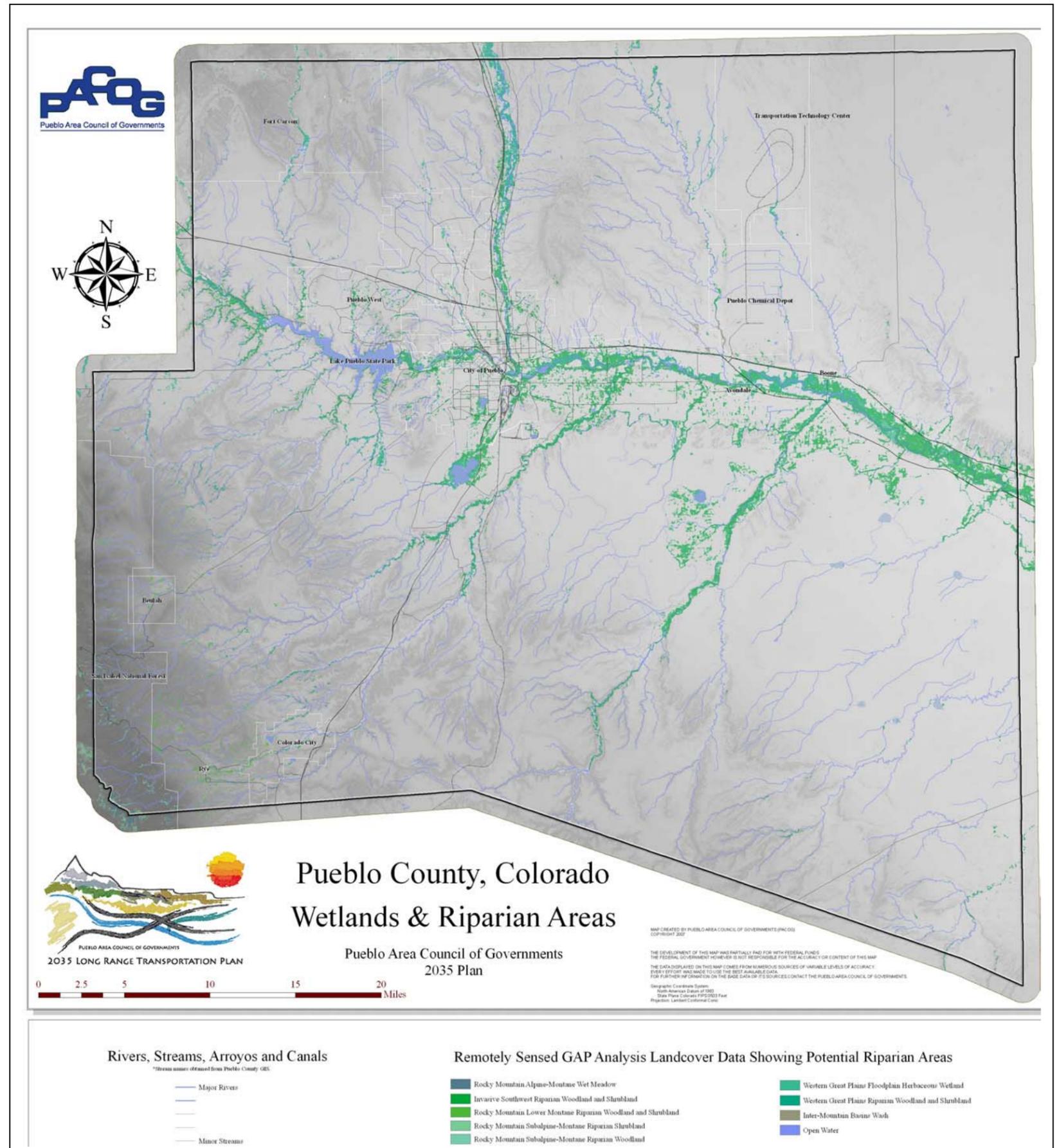


Figure 3.12 Floodplains

Map Description:

This map shows the 100 year and 500 year floodplains within the study area.

Map Limitations:

This map is not useful for determining whether individual parcels are in or out of a particular floodplain. The data used to make this map does not have that level of granularity, but parcel inquiries should be made of that data at a finer grain scale than this map can provide. Also, the FEMA floodplain has been amended to show the protection of the levy system in Pueblo. That data is available through the city storm water division but is not reflected here.

Data Sources:

Floodplains: FEMA

Integration:

This map adds to a greater understanding of the function of the landscape as it relates to flooding. It may have impacts for future roadway networks and will affect how land develops within the study area.



Figure 3.13 Public Lands

Map Description:

Public lands within the study area include, National Forests, Bureau of Land Management parcels, State Land Board Lands, State Parks, State Wildlife Areas, Federal Military Installations, and city/municipal parks.

Map Limitations:

Some of these public lands are not “public access lands” but they are still owned by the public. Some of them are managed in such a way that they could change in the future.

Data Sources:

Ownerships: Pueblo County Assessor

Integration:

Contributes to the greater understanding of the function of the landscape as it relates to ownerships.

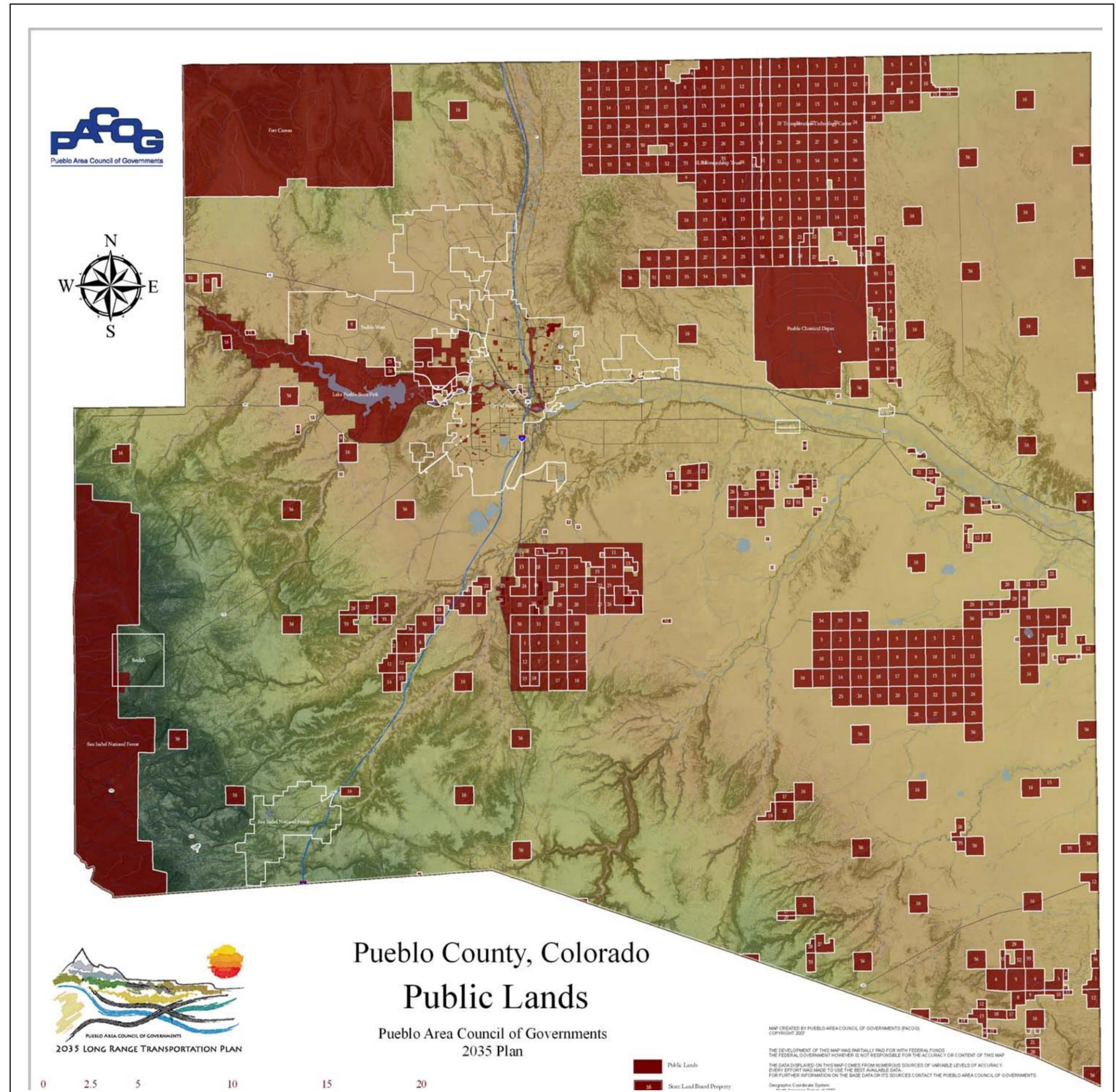


Figure 3.14 Conservation Lands

Map Description:

This map shows areas that are currently under conservation easement, conservation lease, or are protected from development by the nature of their ownership. There is a considerable amount of State Land Board properties found within the study area and these parcels, can change, be or be sold. Also, while they are generally characterized as being open and undeveloped, they are not protected in any long-term sense. Also leases can be placed on State Land Board properties that can allow for uses that would not be considered conservation oriented. For this reason they were noted but not considered “conservation lands.” State Land board properties are outlined in white with their original section number listed inside them.

Map Limitations:

The conservation leases (noted in yellow) on the Walker Ranches just to the south and east of Fort Carson are three-year leases. These may be renewed, and they may not be depending on the desires of the lease holder and property owner at the time that they expire. Also, land ownership is always time-sensitive. This data is current as of 2007.

Data Sources:

Ownership data: Pueblo County Assessor’s database.
 Conservation Easements and Leases: Pueblo County Assessor and also The Nature Conservancy.

Integration:

Conservation lands can have impacts on the placement of future roadway corridors and thereby affect the future transportation system. From a wildlife migration perspective they can be helpful in planning corridors for wildlife movement and connections from one area of valuable conserved lands to another.

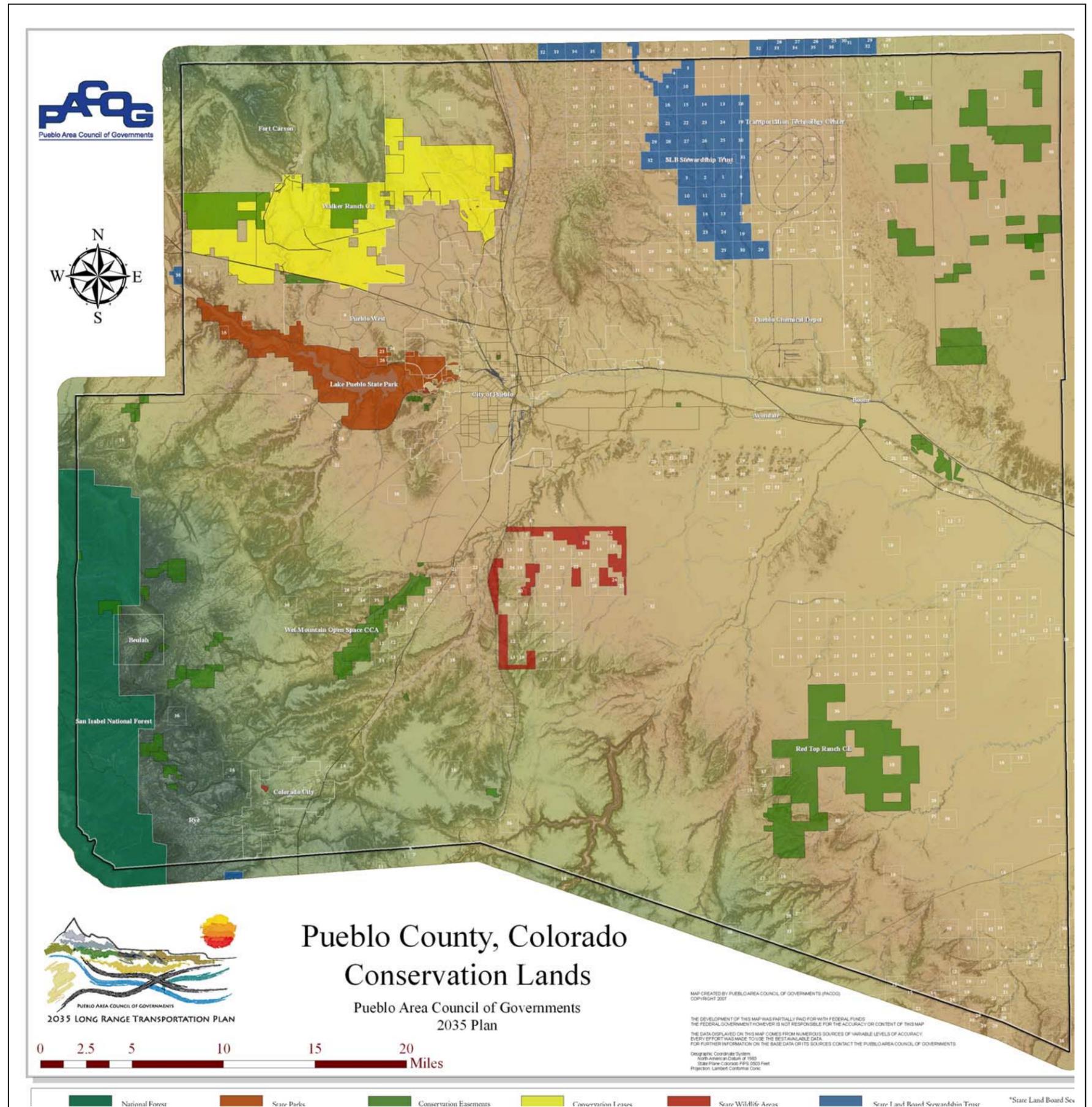


Figure 3.15 Elevations

Map Description:

This map shows the elevation trends in Pueblo County. The high point is Greenhorn Mountain at 12,347 feet above sea level and the low point is where the Arkansas River exits the county to the east at just over 4,000 feet above sea level. The variations within the study area can be both extreme, as in the southwest portion of the county where huge changes in elevation can be experienced over a relatively short distance, and also more mild as you can find in the lower portions of the Arkansas valley toward the eastern edge of the county.

Map Limitations:

This map is thematic and should only be used for getting a better understanding of the structure and function of the study area as it relates to elevation. Site-specific elevation determinations based on this map would be ill-advised. More detailed mapping of a specific project would be appropriate.

Data Sources:

Elevations were extracted from a digital elevation model and broken down into 250 foot

Integration:

This map contributes to a greater understanding of the structure of the landscape as it relates to elevation.

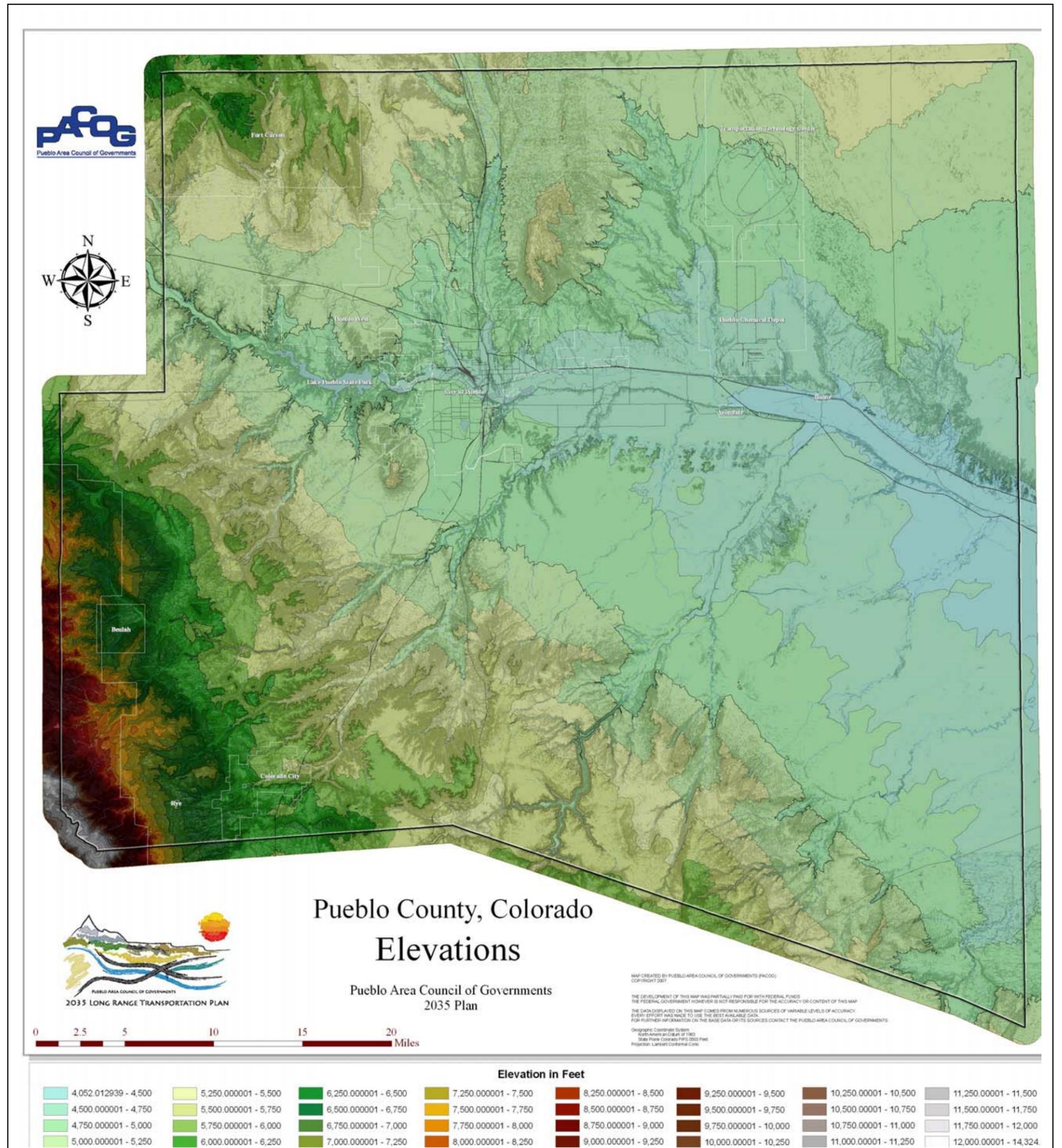


Figure 3.16 Slopes by Percentage

Map Description:

This map shows trends in slope in the county by percentage. Slopes begin to affect the construction of certain structures at 4% slope. Another major breaking point for the built environment is between 7-10% slope. Slopes between 10 -40% would require mitigation and slopes over 40% should probably be avoided. This map was created to show those trends in slope across the landscape. These trends can help predict likely areas of residential and commercial development that will require new transportation infrastructure, and it allows for the planning of that infrastructure to avoid areas of steep slopes where possible.

Map Limitations:

Many other factors should be taken into consideration when planning roads or predicting future development. It may, for instance be cheaper to mitigate for steep slopes when building a structure than to avoid them. Also proximity to urban services, existing transportation corridors and growth pressures from communities to the north of the study area may cause the cost-benefit ratio of development to outweigh the costs of mitigating slopes that in other areas would be avoided.

Data Sources:

Slopes were extracted from a Digital Elevation Model and categorized by percentile into 5 pre-determined categories based on published development standards.

Integration:

This map and it's parent data can be used in combination with other data sets to help predict the future locations of major residential and commercial development within the study area, and also to plan for the location of future transportation corridors.

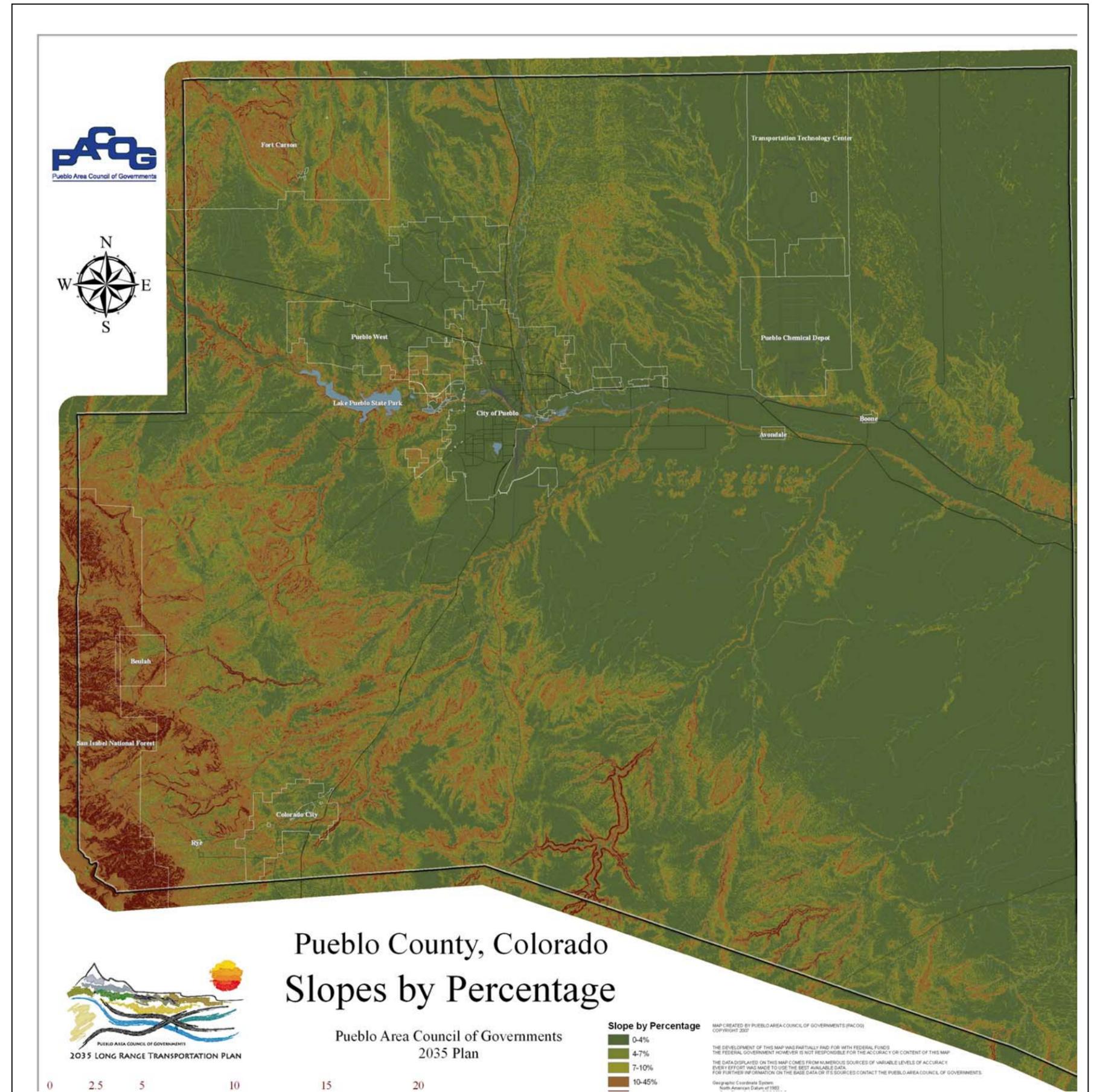


Figure 3.17 Soil Shrink-Swell Potential

Map Description:

This map shows areas in the county identified by USGS as having a high potential for “expansion.” The soils in the area will change as they interact with moisture and will expand and move. Areas that have developed locally on expansive soils have needed thicker foundations to accommodate for this feature of the soil.

Map Limitations:

The map was generated by using SW Gap soils data along with USGS soils mapping of shrink-swell potential in Pueblo County. The soil types were identified for their pre-determined USGS themes based on that mapping. The combination of the two data sources may lead to some inaccuracy, and a more specific analysis should be considered as projects are evaluated.

Data Sources:

Shrink-Swell Potential: USGS
Soils Groups: SW Gap Soils data.

Integration:

This map could be used when planning a transportation structure. It would be beneficial to know which areas of the identified project corridor would need higher standards of construction to allow for this tendency of the local soils, and which areas would not need those higher standards.

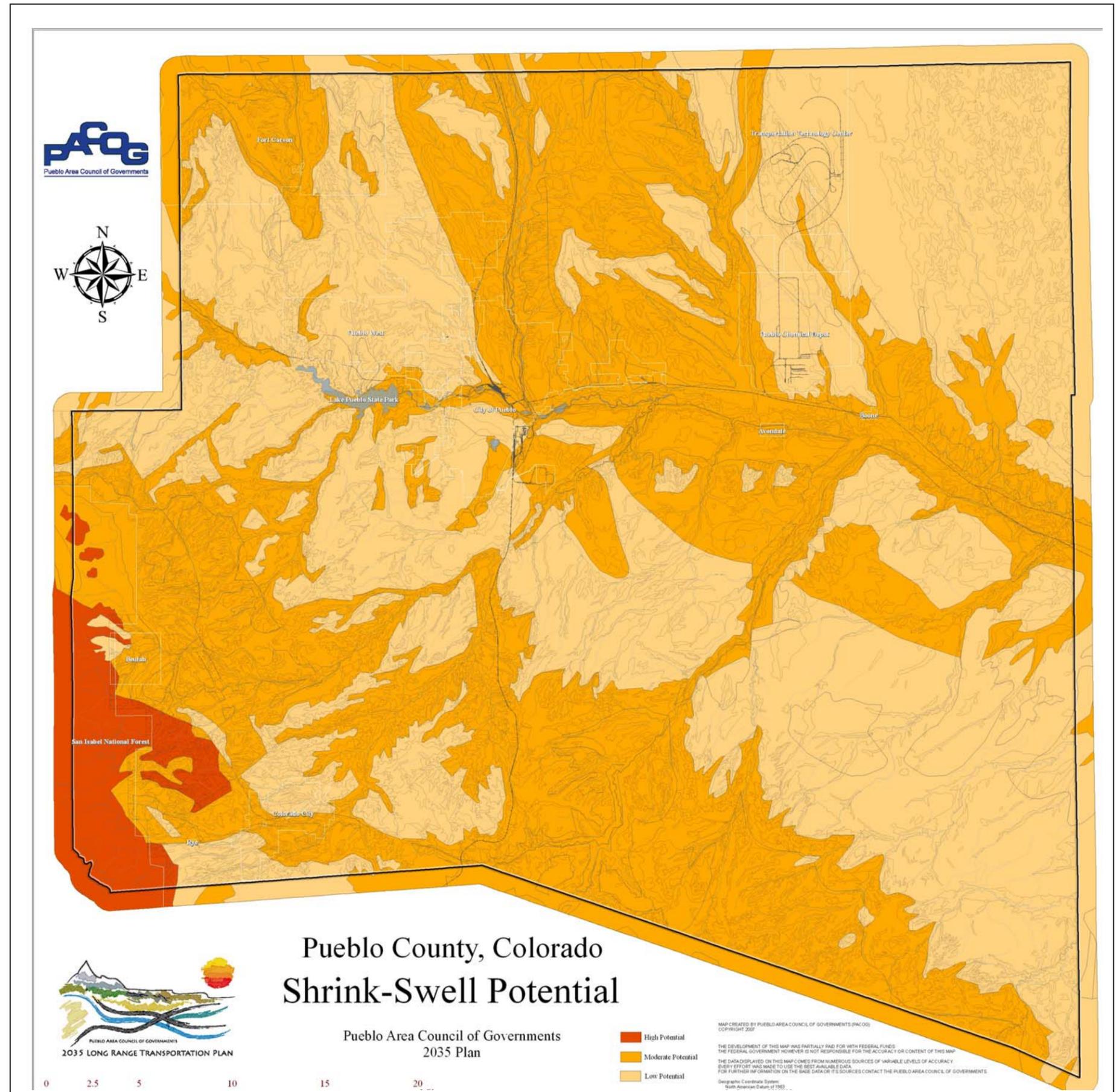


Figure 3.18 Landcover

Map Description:

This map shows Landcover data gathered through Remote Sensing by Landsat Satellites during the period of 1999-2001 and categorized by the SW Gap Analysis project.

Map Limitations:

During the period of 1999-2001, the study area was in a drought cycle. More wetlands may appear in wetter weather cycles than appear in this analysis. Also, wetlands and river systems tend to move within the landscape through hydrologic processes of erosion, flooding, and natural changes. Increased run-off from urbanization can create higher levels of storm surges due to increased flows, and these surges can make cause the system to be more volatile. Development in the area has also increased and will change with time as these analyses are repeated.

Data Sources:

Landcover: Southwest GAP Analysis Landcover Data

Integration:

This data represents the most accurate landscape analysis we have available for the purposes of large scale landscape-scale transportation planning. Plant communities can be identified, and Eco-regions can be verified. It adds to the over-all understanding of the structure of the landscape in the study area.

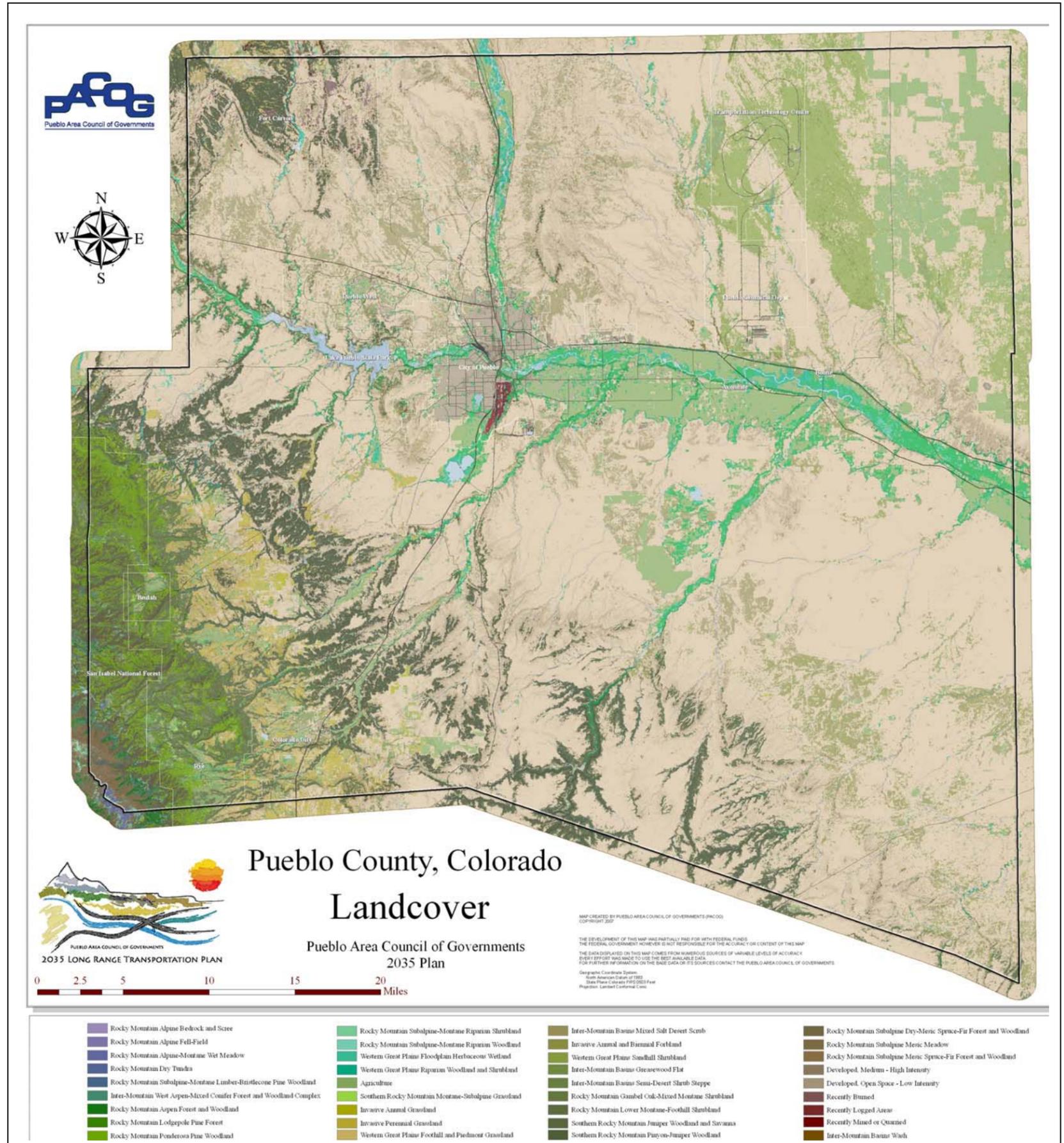


Figure 3.19 Eco-Regions

Map Description:

Eco-Regions of Colorado were identified in a joint project by the EPA, USGS, Division of Wildlife, US Forest Service, NRCS, Colorado Department of Public Health and the Environment, and the US Department of the Interior.

The major Eco-Regions found in the study area are:

- Piedmont Plains and Tablelands (Beige)
- Sandsheets (Dark Brown)
- Pinyon-Juniper Woodlands (Sage Green)
- Sedimentary Mid-Elevation Forests and Shrublands (Aqua)
- Crystalline Mid-Elevation Forests and Shrublands (Forest Green)
- Crystalline Subalpine Forests (Blue)
- Alpine Zone (White)

Map Limitations:

The data has been generalized and should not be used to determine plant communities on a site scale.

Data Sources:

Eco-Regions: USGS

Integration:

This information adds to the over-all understanding of the structure and functionality of the study area.

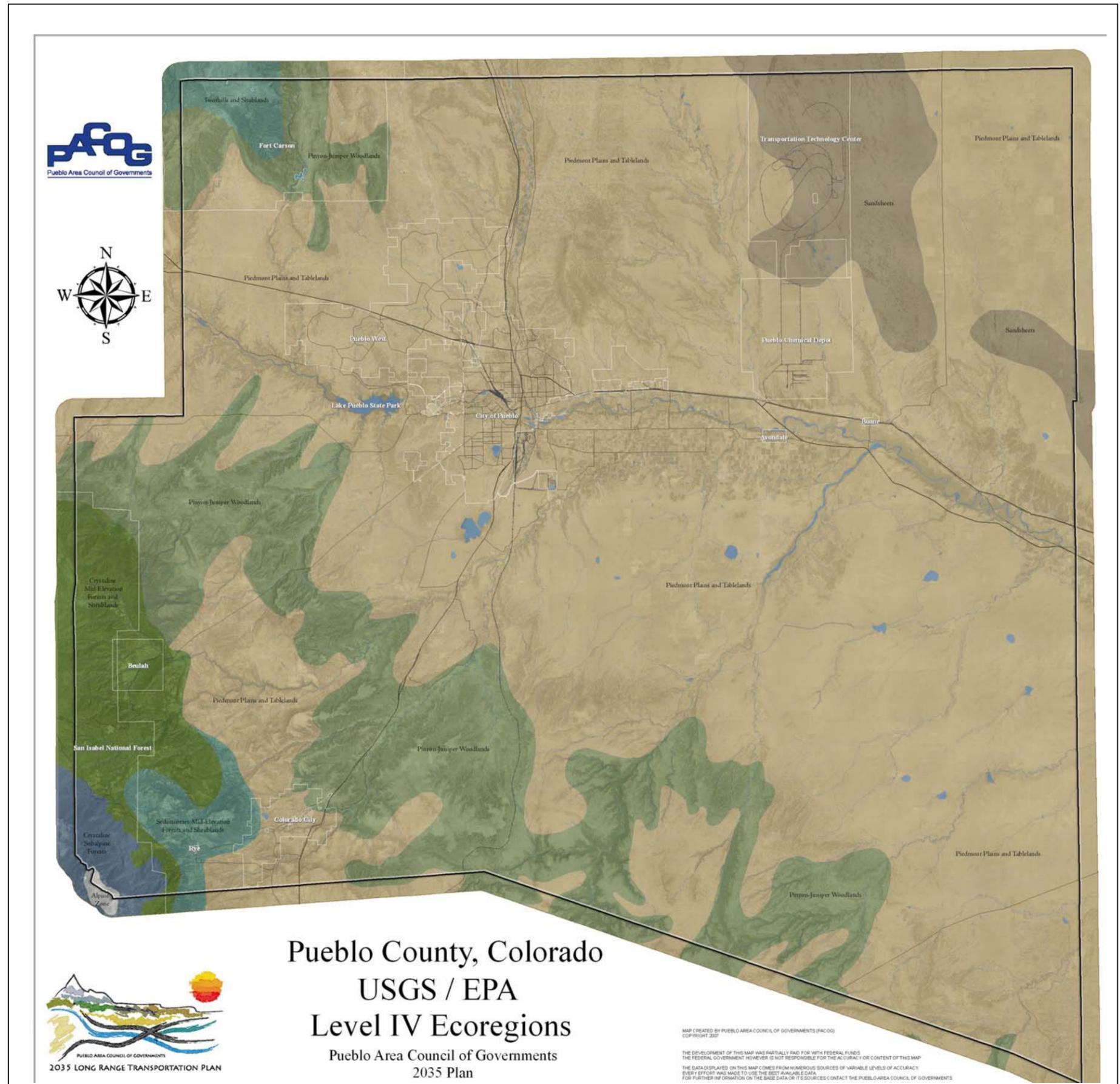


Figure 3.20 Comprehensive Plan

Map Description:

This is a map of the City/County joint Comprehensive Land Use Plan. Since the time of its creation there has been an effort made to create a “Special Study Area” in the section of the county labeled “Rural Ranch” that lies roughly north of the City of Pueblo and east of Interstate 25.

Map Limitations:

As the comprehensive plan is amended this map will also need to change in order to remain a viable planning resource.

Data Sources:

Comprehensive plan: City of Pueblo GIS

Integration:

The intent of this map is to show what the vision of the City and County of Pueblo view as their vision for future land use within the study area. Recent development pressures have changed the local development climate and this plan may be changing to keep up with market pressures.

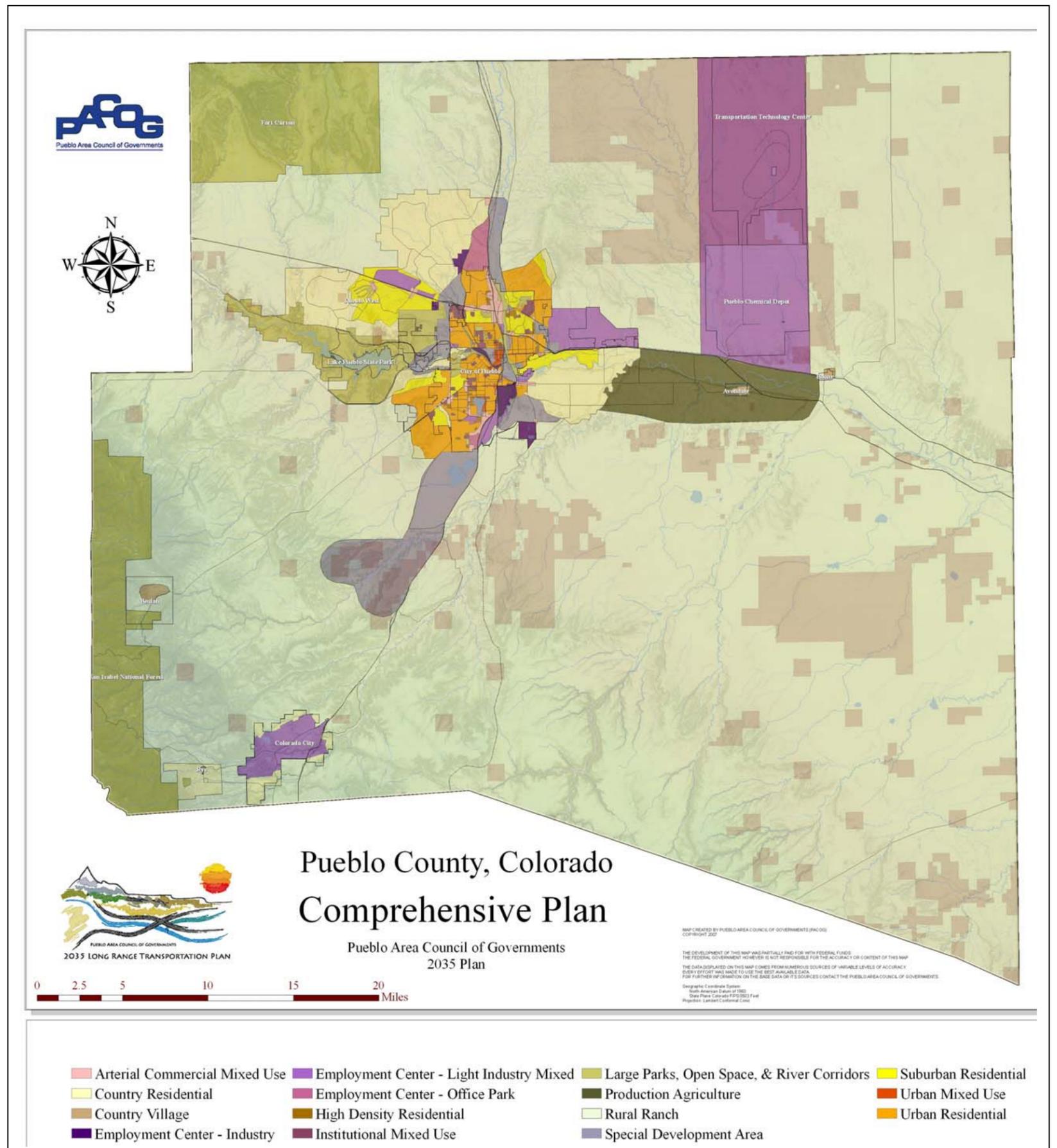


Figure 3.21 Zoning

Map Description:

This map shows City and County Zoning for the study area. The majority of the county is zoned A-1 Agricultural uses. When paired with a roadway network zoning can provide a better understanding of landscape functionality and future transportation needs.

Map Limitations:

Zoning changes will occur in the area and as such this map will need to be updated with those changes to remain useful for the transportation planning process. This data was accurate during the period of information gathering and development for the 2035 plan in late 2006, and early 2007. Any subsequent changes to zoning are not included in this map.

Data Sources:

County Zoning: Pueblo County GIS
 City Zoning: City of Pueblo GIS

Integration:

This map contributes to the greater understanding of the function of the landscape within the study area.

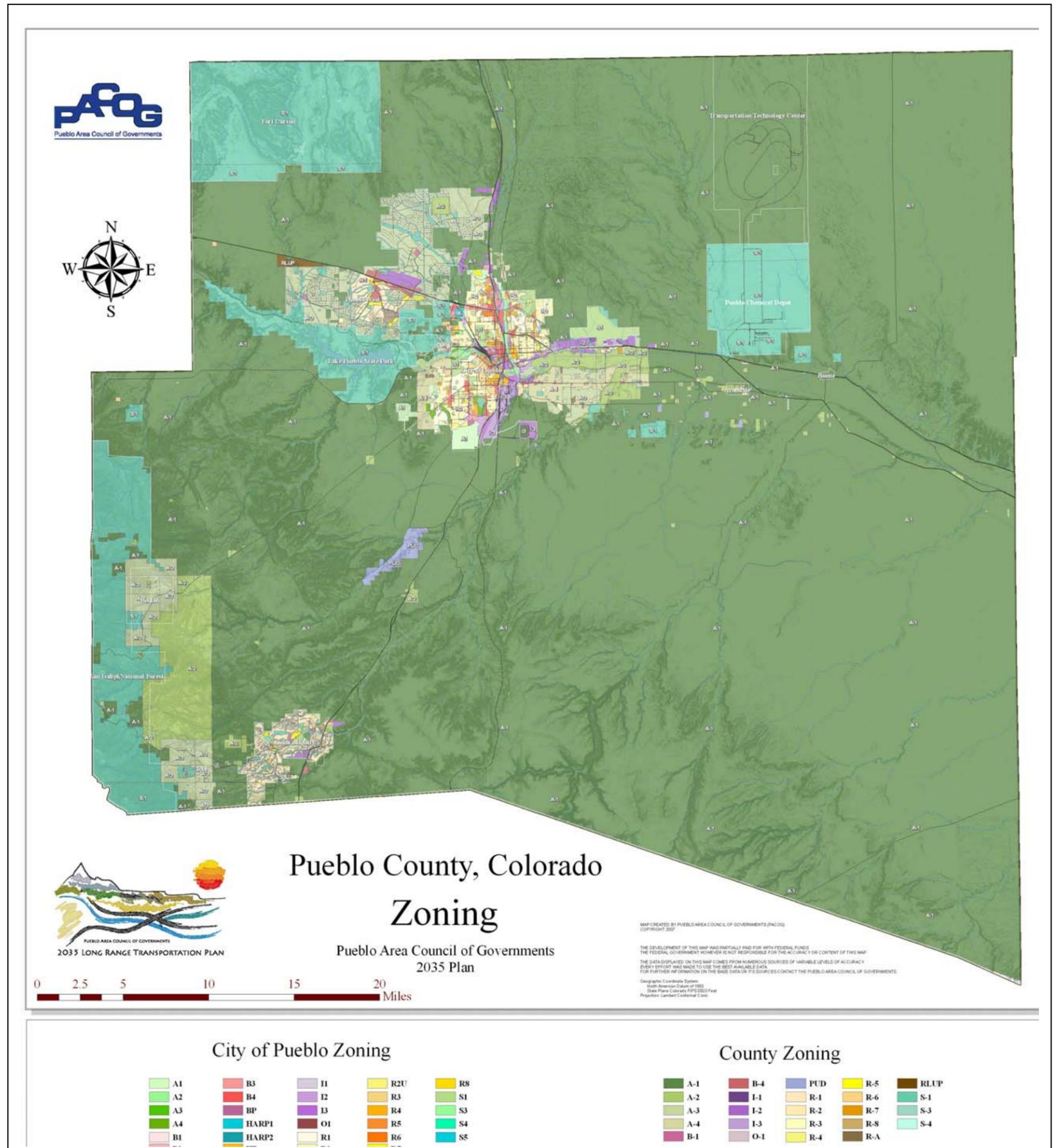


Figure 3.22 Developable Lands

Map Description:

This map represents the areas least likely to see large-scale development under the current development standards. Public lands, Conservation Easements and Leases, floodplains, steep slopes and riparian areas were identified as having lower chances of developing and are marked in red. The remaining land is more likely to develop simply because it is not disqualified by one of these normal development constraints. Certainly this map will have its flaws, as the ownership data can change, constraints such as steep slopes can be mitigated, riparian areas and wetlands will change through drought cycles and as meander patterns of river systems change, and conservation leases may not be renewed. Also, probability of development is not considered in this map. Urban service areas would identify places that extension of municipal services such as water and sewer lines could be extended more easily than others, and proximity to Interstate 25 and the growth along the Front Range to the north would make the area to the north of the city of Pueblo more likely to develop than other areas shown here as “developable” that lie further from urban services. The purpose of this map is to show those trends that one could expect of major development for the purposes of anticipating the location of future transportation networks, and facilities.

Map Limitations:

Small-scale development could happen extensively in areas that show up as “red” or undevelopable. Site by site scale analysis will find ways to mitigate for the constraints identified here and would not necessarily need city services. Ownership can change – especially with the State Land Board parcels. Conservation Leases may or may not be renewed in the future.

Data Sources:

Ownership data: Pueblo County Assessor
 Floodplains: FEMA
 Riparian Areas and Wetlands: Southwest GAP Analysis Landsat Lancover data 199-2001

Integration:

This map helps to anticipate areas of possible, future, large-scale development within Pueblo County by eliminating areas that are less likely to develop due to pre-determined ownership or physical constraints. Transportation planning for roadway networks would find this map useful in determining which areas will need to be served in the future and what level of transportation service they will require.

