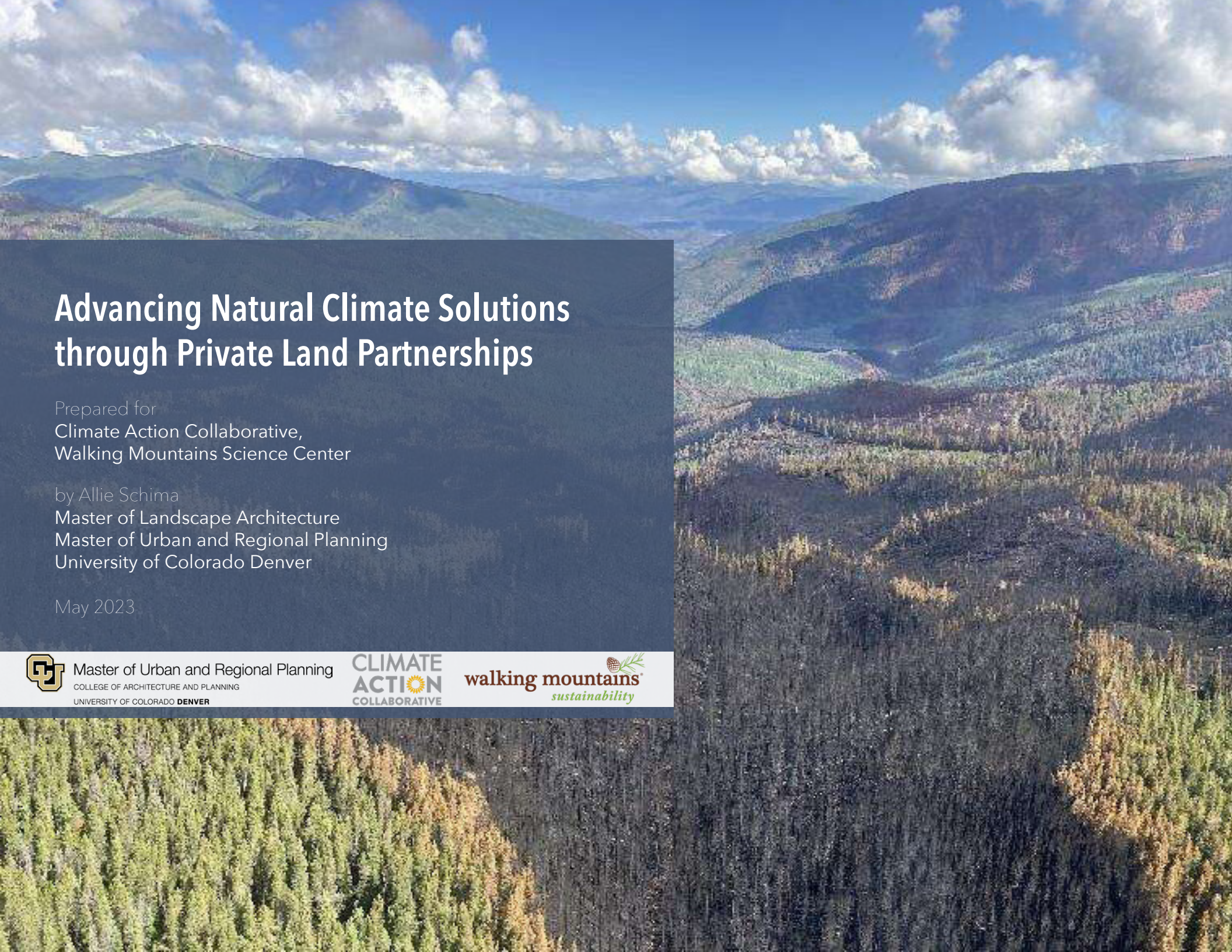

Advancing Natural Climate Solutions through Private Land Partnerships

Prepared for
Climate Action Collaborative,
Walking Mountains Science Center

by Allie Schima
Master of Landscape Architecture
Master of Urban and Regional Planning
University of Colorado Denver

May 2023

Master of Urban and Regional Planning
COLLEGE OF ARCHITECTURE AND PLANNING
UNIVERSITY OF COLORADO DENVER

CLIMATE ACTION COLLABORATIVE

walking mountains sustainability

This Capstone Project submitted in partial satisfaction of the
requirements for the degree of Master of Urban and Regional Planning,
College of Architecture and Planning, University of Colorado Denver.

Prepared for Gina McCrackin, Climate Action Collaborative Manager
Walking Mountains Science Center, Avon, CO

by Allie Schima
Master of Landscape Architecture
Master of Urban and Regional Planning

11 May 2023

FRONT COVER: The Sylvan Fire in 2021 burned nearly 4,000 acres and caused evacuations throughout south central Eagle County. *Source: Vail Daily.*

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Executive Summary

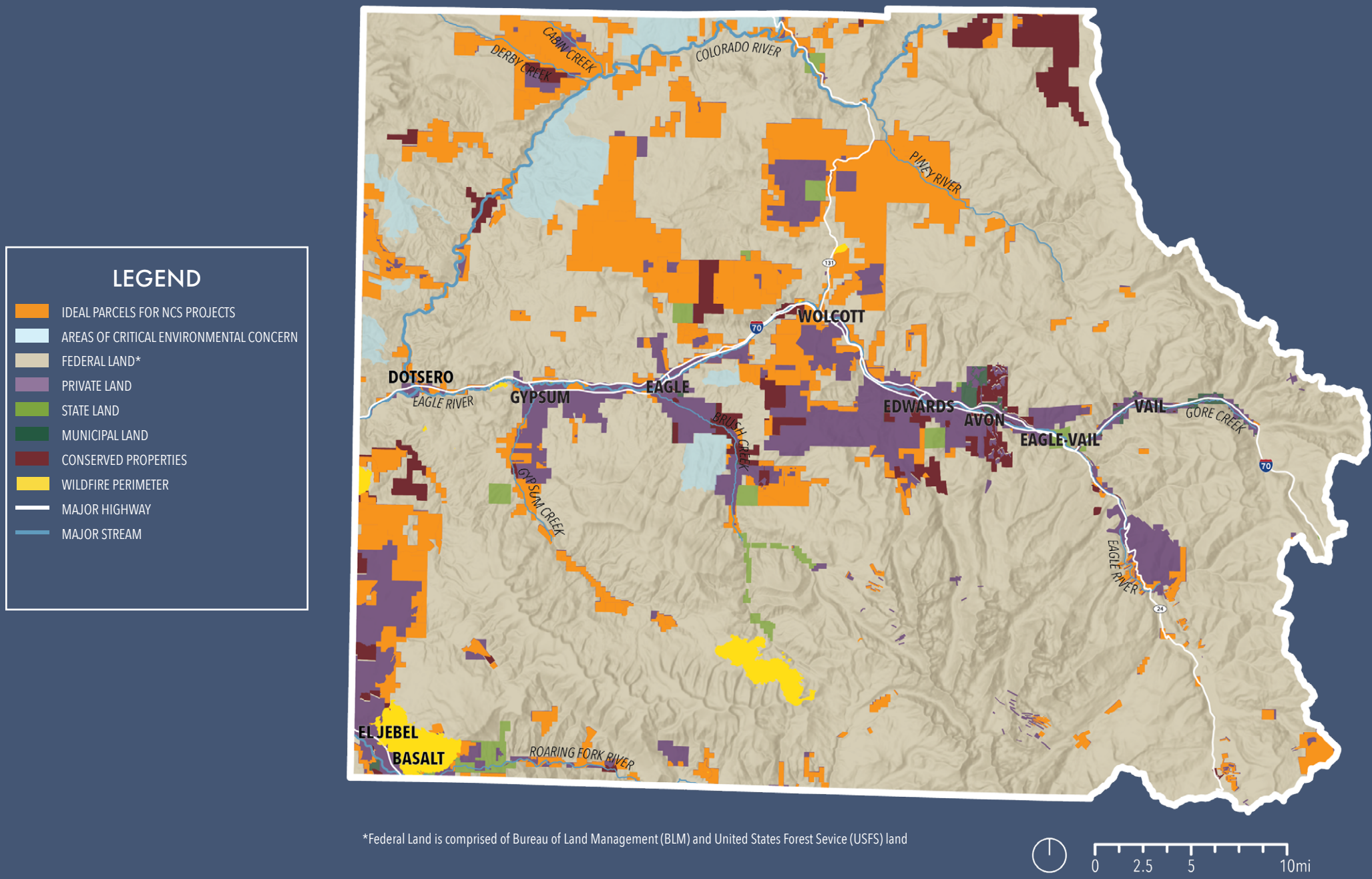
Identifying **private land parcels** to support connective **natural climate solution** projects and establishing **best practices for building partnerships** with private landowners in Eagle County, CO.

Colorado's diverse landscapes offer both an abundance of ecosystem services to its residents and natural opportunities to mitigate climate change. The complexity of these landscapes in terms of land use, management practices, and connectivity, however, poses challenges that are poorly understood by the general population. With 60% of the nation's land under private ownership, engaging private landowners in natural climate solutions (NCS) work is essential for addressing the climate crisis at a meaningful scale. Eagle County, Colorado exemplifies the issues surrounding land ownership and management discrepancies which hinder the implementation of connective NCS projects beyond municipal boundaries. Walking Mountains Science Center (WMSC), an Eagle County-based organization advocating environmental stewardship and sustainability, aims to address these challenges by helping partners collaborate with private landowners on NCS projects.

Climate change-related challenges such as extreme weather events, wildfires, water scarcity, and declining air and soil quality require collaborative efforts at various levels to mitigate and adapt to these changes. Private land conservation plays a crucial role in climate mitigation especially in Eagle County, as 20% of the land is privately owned - the second largest land ownership category. There is a lack of documentation, however, on how to engage and collaborate with private landowners for conservation projects. Considering the diverse range of landowners and land uses, it is necessary to establish a best practices approach in order to advance this type of work. A review of literature identifies the need for case-by-case approaches, incorporating local knowledge, multi-beneficial actions, and partnership commitments for successful conservation efforts. By understanding the preferences and resources of landowners, while considering diverse land uses, an inclusive and holistic approach can be achieved in land and resource conservation.

Through GIS analysis and cultivating a best practices report, this project aimed to identify ideal private parcels suited for NCS projects and establish best practices for partnering with private landowners in order to implement climate-mitigating, resilience-building projects throughout Colorado's landscape. The methodology involved mapping and identification as well as extensive research using academic literature and precedent case studies. In the category of best practices, a key component was a focus group session with Eagle County residents. The mapping and identification category employed GIS-based techniques, incorporating data from various sources such as land ownership, land use, conservation easements, wildfire data, and wildlife and environmental areas of concern. By analyzing and visualizing this data, the project aimed to identify suitable private land parcels for NCS projects and foster interconnectivity between different restoration efforts. The outcome of the project includes a best practices report and a collection of maps highlighting ideal private land for NCS projects, contributing to a more coordinated and comprehensive approach to land management in Eagle County.

Ideal Private Parcels for NCS



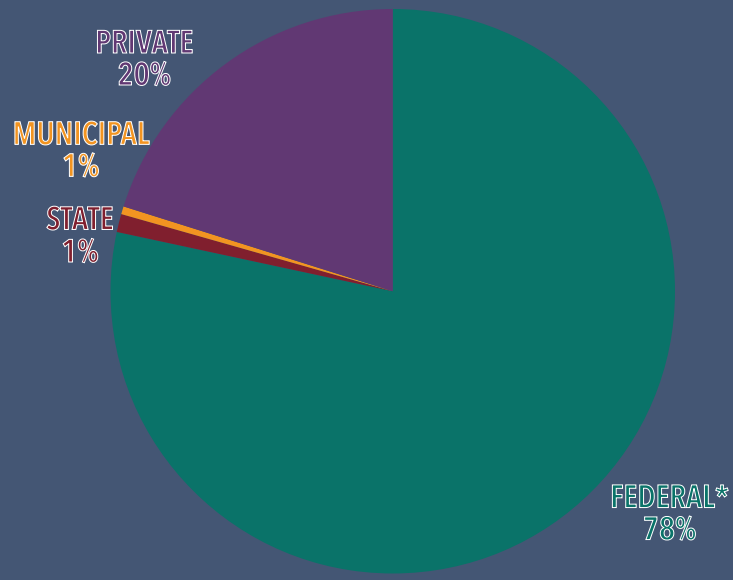
*Federal Land is comprised of Bureau of Land Management (BLM) and United States Forest Sevice (USFS) land

highlight key strategies for effective engagement with private landowners in conservation partnerships. Understanding and acknowledging landowners' attitudes and values regarding land management styles and conservation practices is essential for meaningful engagement. Leveraging existing social networks and alliances among landowners can significantly influence mindset and practice adoption. Nurturing relationships through transparent communication and trust-building efforts is crucial for successful cooperation. Providing accessible education on conservation practices, disseminating information through various channels, and emphasizing multi-beneficial practices are essential for increasing adoption rates. Additionally, sharing information about funding opportunities and offering application assistance can help overcome barriers and encourage private landowners to participate in conservation projects. By implementing these techniques, the likelihood of facilitating partnerships with private landowners and advancing conservation goals is greatly enhanced.

Through the mapping and identification process, it has been determined that Eagle County's 1,083,985 acres are divided into various land ownership categories. Federal lands total 849,521 acres, state lands cover 11,237 acres, municipal lands total 4,885 acres, and private lands encompass 218,342 acres. With private lands accounting for the second largest land ownership category, it became clear how important it is to engage these owners in NCS projects. Our work identified 955 parcels covering 128,211 acres of privately owned land available for locating ideal properties for NCS projects. Criteria such as area size, active ranching/agricultural use, wildlife habitat buffers, proximity to federal lands, protected areas, and significant water bodies were used to identify acres as suitable for NCS projects. The majority of these parcels (913) are adjacent to federally owned land, providing opportunities for continuity with existing NCS projects. Appendix A contains a list of these identified parcels.

This work highlights the importance of collaboration between governments, non-profits, and private landowners in Eagle County, Colorado to address environmental pressures and combat the climate crisis through NCS projects. The recommended approach involves utilizing the Eagle County Ideal Private Land Parcels interactive ArcGIS map and Appendix B: List of Private Parcel Identifiers to connect with private landowners. By using the Property Record Search on Eagle County's Assessor website, property owners can be identified, enabling effective communication and partnership building based on best practices. The project provides resources for the collaboration between the WMSC and private landowners, allowing for the identification of suitable parcels, respectful engagement, and implementation of NCS projects to mitigate climate change impacts. Ultimately, the outcomes of this project are envisioned to be used to foster environmental stewardship and sustainability throughout Eagle County, Colorado.

COUNTY LAND OWNERSHIP



Best Practices for Partnering with Private Landowners

UNDERSTAND ATTITUDES

TAP INTO EXISTING SOCIAL NETWORKS

NURTURE RELATIONSHIPS

PROVIDE ACCESSIBLE EDUCATION

SHARE FUNDING OPPORTUNITIES

Introduction

Colorado is home to a variety of different landscapes, including high plains deserts, short grass prairies, riverine wetlands, and alpine forests. These landscapes offer a broad range of benefits to both residents and tourists alike. From outdoor recreation and breathtaking scenery to ecosystem services and agricultural opportunities, Colorado is truly America's all-season playground. The complexity of these landscapes, however, is poorly understood by the general population and includes an intricate patchwork of public and private land ownership as well as a number of environmental effects associated with our rapidly changing climate. This landscape complexity is exasperated by the boundlessness of climatic effects and extreme weather events, as such factors do not recognize ownership, boundaries, or established land uses. Due to the environmental pressures Colorado currently faces, the land ownership, use, and management discrepancies pose a dire need for the collaboration between governments, non-profits, and private landowners in order to reduce environmental threats, provide adaptations to the changing climate, and sequester carbon through connected natural climate solutions (NCS). NCS refers to actions that protect, restore, or enhance ecosystems, with the goal of mitigating greenhouse gas emissions and helping to adapt to the impacts of climate change.

With private land ownership accounting for 60% of the nation's land (Casstevens et al., 2022), a need exists to engage private landowners in NCS work in order to have a large scale impact on the climate crisis. Furthermore, little to no restrictions that prevent natural habitat conversion as well as mandated climate-sensitive land management practices exist within these privately owned lands. It is crucial to build coalitions and provide resources to conserve these lands, reduce the impact of conversion, and introduce private landowners to NCS projects (Casstevens et al., 2022).

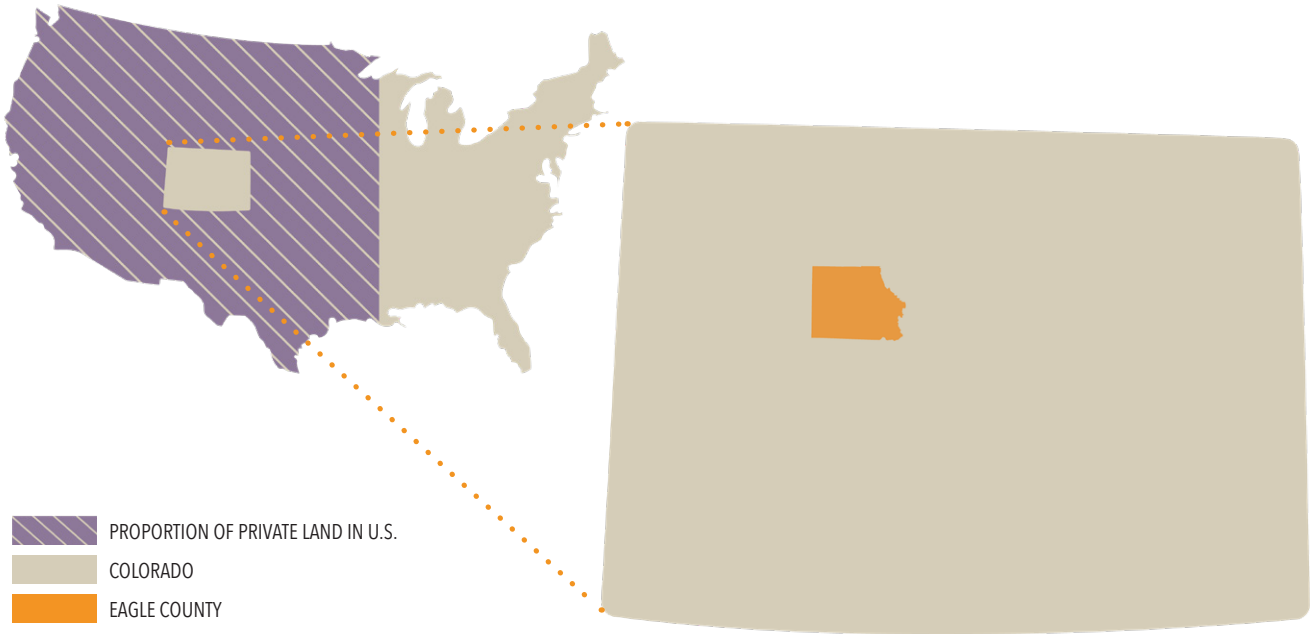
Eagle County, Colorado is a key example of a landscape hosting vast environmental amenities combined with land ownership and management discrepancies. Communities within this county, from Vail to Dotsero, more or less exist off the bisecting I-70 corridor. This is primarily due to the geography and mountainous landscape that sandwiches communities into the Eagle River Valley. Land ownership varies in Eagle County, with federal (~840K acres) and private (~225K acres) land ownership dominating, while municipal and county (~9K acres) ownership is comparatively minimal. These discrepancies have created challenges for local governments & environmental non-profits looking to minimize the climate crisis' impact utilizing NCS. Finding it difficult to both scale up NCS projects beyond the boundaries of municipalities and collaborate with federal land managers or private property owners, methods and best practices are necessary to advance these projects and coalitions.

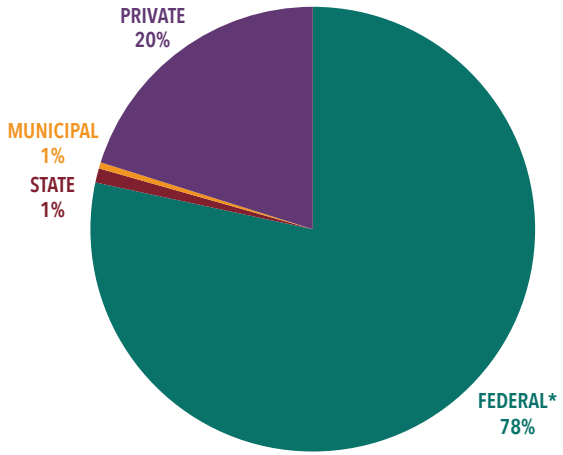
Walking Mountains Science Center (WMSC) is the organization driving this project. Their mission is to "awaken a sense of wonder and inspire environmental stewardship and sustainability through natural science education" (Mission, Vision, History, & Values, 2023). WMSC has three primary program areas: Youth Programs, Community Programs, and Sustainability Programs. The Sustainability Programs will be the focus of this project, and the department has a few key areas: energy and buildings, zero waste efforts, sustainable destinations, sustainable business, and the Climate Action Collaborative (CAC). The CAC was formed following the creation of the Climate Action Plan for Eagle

UNITED STATES LAND OWNERSHIP

EAGLE COUNTY, COLORADO

COUNTY LAND OWNERSHIP





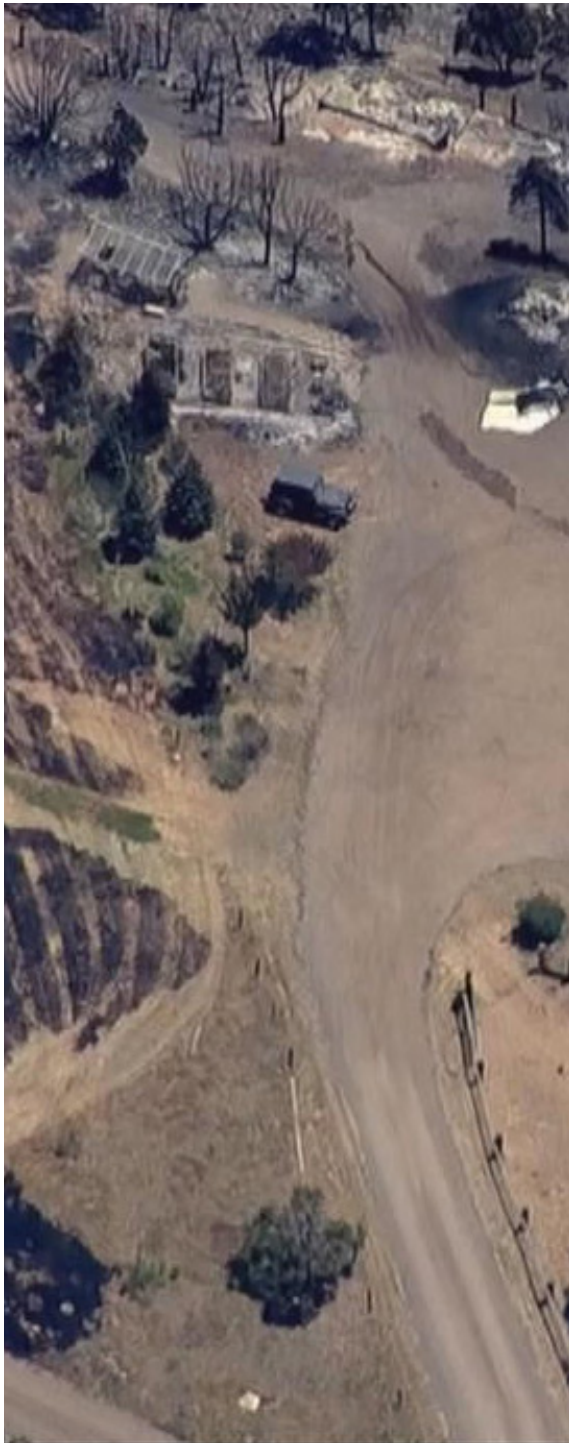
ABOVE: Private land ownership accounts for 60% of the continental U.S.' area.
CENTER: Eagle County is located in the northwestern quadrant of Colorado.
RIGHT: Eagle County land by ownership, depicting private land ownership as the second largest category.

*Federal Land is comprised of Bureau of Land Management (BLM) and United States Forest Sevice (USFS) land.

County Communities in 2016, specifically to unite Eagle county's local municipalities; county, industry, school districts; and other non-profit partners toward meeting the goals of the climate action plan.

Throughout this project, I will provide resources for the CAC and CAC partners to get involved with private land owners. Utilizing GIS and planning methods, I will provide a visual understanding of where ideal NCS projects (tree planting, riparian restoration, soil amendments, etc.) exist on private lands within Eagle County, giving my client the ability to use this visualization as a means to target partnerships with land owners. Another element will be the identification of existing conservation easements, as that indicates a potential land owner partner to collaborate with on conservation initiatives. Finally, a report on the best practices for public/private NCS partnerships, with a specific focus on Eagle County's demographics and landscape, will help my client to identify locations best suited for this landscape and implement best practices in order to collaborate with private landowners.

The remainder of this report will consist of background research identifying case studies and best practices for NCS projects and public/private land collaborations; methodology describing data collection techniques and analysis; project content presenting research and analysis findings, maps, and current best practices; and a conclusion chapter summarizing project research, findings, and presenting recommendations.



ABOVE: Aerial of the 2008 Lake Christine Fire burnscar which tore across both private and federal land. *Source: CNN.*

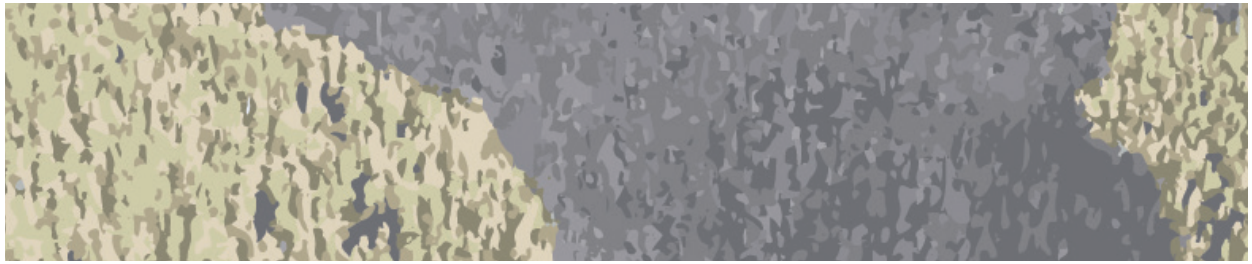
Climate Challenges, Landscape Complexities, and Potential Solutions

The Anthropocene is rendering itself one of the most devastating periods to life on earth, threatening the stability of our environment, and therefore humanity's livelihood, in a myriad of ways. Extended extreme weather disasters, increased wildfire frequency, reduced water supply, and decreased air and soil quality concurrently impose ecosystem challenges extending far beyond legal boundaries and differing land uses. This problem requires a multi-scalar and cross-collaborative approach in order to mitigate and adapt to climate change and provide connected solutions benefitting both the environment and humanity (Kremen & Merenlender, 2018). This background research will provide a review of academic literature, case studies, and planning documents seeking to understand the current state of private land ownership collaboration within the climate mitigation effort and provide place-based NCS specific to the intermountain west, U.S.

Key Terms

In order for clarity and consistency within this research, it is necessary to define several terms. For the purpose of this paper, conservation serves as an umbrella term for the preservation, protection, restoration, and/or implementation of NCS. These terms will be used interchangeably throughout this report and indicate a measure aimed at mitigating climate change and its effects. Private land conservation science (PLCS) is the study of the political, economic, social, and ecological drivers influencing conservation practices on privately owned land. This science will be a main focus of the background research in an attempt to cultivate best practices for building partnerships with private landowners. Finally, a multitude of different types of landowners and land uses exist under the category of privately owned land. For the purpose of this research, a private landowner includes but is not limited to: residents, non-residents, farmers, and ranchers while land use types include but are not limited to residential, commercial, hospitality, and working lands (rangelands, farms, forests).

Private Land Conservation Science



Our landscapes, comprised from a mix of natural and human-built typologies, form a complex mosaic of contrasting land uses, ownership patterns, and management practices. Despite the connectedness and symbiosis of ecological systems, human-determined boundaries drawn upon the land have caused fragmented conservation efforts reducing the potency of such measures. Many connected efforts exist upon federal and state owned property, where large tracts of land and consistent management practices are present. With 60% of the United States' land under private ownership (Casstevens et al., 2022), it is imperative to include private property in conservation conversations and projects in order have the most meaningful impact mitigating climate change.

Engaging and collaborating with private landowners on conservation projects has relatively little documentation (Drescher & Brenner, 2018; Duvall et al., 2017; Naugle et al., 2020) despite vast literature on general community participation processes. A number of community participation guidelines have been developed to determine appropriate formats and group sizes based on desired outcomes. Examples include in-person formats such as town meetings, conversation cafes, and charrettes, as well as web-based tools such as online surveys and community forum boards (Afzalan et al., 2017). While both in-person and online methods are situation dependent and require a clear understanding of the existing context and challenges to be addressed, online methods must consider community members' technology literacy and organizational resources (Afzalan et al., 2017; Bryson et al., 2013).

General community participation practices can be applied to engage private landowners in conservation projects. These recommendations, however, do not account for the complexities associated with a variety of land owners with differing land uses and ecosystem challenges. The implementation, therefore, of a case-by-case mindset becomes imperative. In Conserving the Greater Sage-Grouse: A Social-Ecological Systems Case Study from the California-Nevada Region (2017), several themes for successful partnerships emerge:

01. voluntary participation by private landowners
02. all parties committed to group success and share responsibilities in the conservation process
03. information must be grounded in local knowledge
04. actions must be multi-beneficial (ie: agriculture and ecosystem interests)
05. the availability of conservation group staff, resources, and direct investment into NCS projects (Duvall et al., 2017).

Similarly, other reviews observe elements such as income and tax incentives (Robinson, 2019; Drescher et al., 2017); a range of goals beyond conservation; and intangible characteristics including trust, reciprocity, and solidarity (Drescher et

EMERGING THEMES FOR SUCCESSFUL PARTNERSHIPS

VOLUNTARY PARTICIPATION

GROUP COMMITMENT

LOCAL KNOWLEDGE

MULTI BENEFICIAL

AVAILABLE RESOURCES

al., 2017) all contributing to successful conservation partnerships.

Beyond academic literature and case studies, private landowner organizations have arisen in response to mounting environmental pressures. A number of these groups exist within the intermountain west and share similar goals including the identification of environmental issues, the promotion of conservation strategies, and the dissemination of knowledge. Malpai Borderlands Group, Western Landowners Alliance, and Blackfoot Challenge have all come to fruition due to grassroots efforts led by private landowners of working lands in an effort to create connected conservation solutions. Many of the values are in line with previously identified themes such as voluntary participation, work grounded in local knowledge, and implementing practices with a range of benefits in addition to conservation. Together, nearly 80,000 acres of land have been conserved under the work of these collaborative efforts.

Another multi-scalar method of conservation includes the enactment of various U.S. legislation. The Endangered Species Act (ESA) of 1973 and the Farm Bill of 2018 both seek to conserve wildlife, habitat, and natural resources in their own manner of ways. The ESA aims at protecting at-risk species and their habitats, but does not apply to the private sector. A number of voluntary initiatives are encouraged throughout this act, however, they typically come at a high cost to landowners (Epanchin-Niell and Boyd, 2020). Conversely, the Farm Bill provides financial aid and technical assistance to voluntary participants. This program is competitive and targets land providing the highest environmental benefit (Helping to Deliver Conservation on Private Lands through the Farm Bill, 2023).

Reviewing a combination of academic literature, case studies, and planning documents begins to reveal a number of best practices, cautionary lessons, and room for opportunity. Applying a bottom-up approach, grounded in local knowledge, while offering a range of benefits will be most impactful in building relationships with private landowners. These elements, however, must be supplemented by conversations with Eagle County private landowners. Uncovering what methods of communication landowners prefer in conjunction with the CAC's available resources will determine a more refined process moving forward. Furthermore, a majority of research has surrounded around landowners of working lands. While ~155,000 acres of the ~225,000 acres of private land in Eagle County are farm land (Census of Agriculture, 2017), it is necessary to understand the remaining land uses under privately owned lands and identify appropriate participation and conservation practices. In order to arrive at an inclusive and holistic approach to land and resource conservation, all types of private landowners within Eagle County must be included.

Place-Based Natural Climate Solutions

NCS on private lands will depend upon the site's existing landscape typology, but can include the use of biochar; avoiding grassland, wetland, and forest conversion; cropland nutrient management; regenerative agriculture practices; and optimal grazing intensity and animal management practices (Natural Climate Solutions, 2023). In particular, this region is subject to rising temperatures and increased droughts, ultimately increasing wildfire risk and endangering human and non-human populations as well as ecosystem services. NCS projects will be site specific, place-based interventions and be determined upon completion of the mapping and analysis phase. Generally, these interventions will include but not be limited to: creating wildfire resilient landscapes, maintaining wildlife populations and corridors, establishing water sustainability and quality measures, and restoring riparian areas.

Methodology

The approach for this project is divided into two categories: best practices for partnering with private landowners and mapping and identification. These categories pulled research and materials from academic literature, precedent case studies, and existing relevant planning documents. Academic literature provided context for each category where as case studies and existing relevant planning documents identified precedent work, best practices, and cautionary lessons.

Best Practices for Partnering with Private Landowners

Understanding who owns private land in Eagle County, what land uses occur on privately owned parcels, and the many different values owners have for their land is the main goal of creating best practices for partnering with private landowners. This approach required a number of different research methods in order to cultivate a holistic strategy to respectfully build relationships with existing private landowners. A focus group facilitated by the CAC in partnership with Eagle County Conservation District (ECCD) and Eagle Valley Land Trust (EVLT) was keystone for gathering information from private landowners directly. This was held in-person on Monday, March 27th, 2023 and consisted of members from the CAC, ECCD, EVLT, one legacy rancher in Eagle County, and one long-time Eagle County resident and ranch manager. Questions intended for open-ended conversations aimed at understanding landownership reasons and histories, landowners' values, parcels' landscape amenities, and existing and perceived environmental impacts were included in this round table discussion.

The focus group was the sole private landowner engagement event and was supplemented by an academic literature review and identification of relevant case studies and planning documents in order to identify best practices for partnering with private landowners.

Mapping and Identification

This category took a GIS-based approach with the goal to understand Eagle County's existing land ownership distribution, land uses, and landscape typologies. Data sets from a variety of sources were used in the mapping and analysis portion of this project. Map layers and their corresponding data sources are listed below:

01. Land Ownership: Land ownership is divided into several ownership categories: BLM, Local, NGO/Land Trust, Private, State, and U.S. Forest

Service. A number of sources were combined to gather accurate land ownership data for Eagle County. Both COMaP data by the Colorado Natural Heritage Program and data sets provided by the Eagle County GIS Department were referenced in this analysis.

02. Land Use: Zoning and land cover by vegetation type fall under the land use category. The zoning layer was source from the Eagle County GIS Department. Land cover by vegetation type was provided by the U.S. Department of Agriculture's CropScape Data Layer.
03. Conservation Easements: Both public and private lands hold conservation easements within Eagle County. This data was sourced from the Eagle County Conservation District , the Eagle Valley Land Trust, and the Colorado Natural Heritage Program's COMaP data set.
04. Wildfire Data: Data for this layer was provided by Eagle County's Emergency Management Department.
05. Wildlife and Environmental Areas of Concern: Data for this layer was provided by Colorado Park and Wildlife Department.

Through these datasets, a number of ArcGIS Pro geoprocessing tools were applied in order to determine relationships between land ownership, use, and landscape typologies; identify locations of environmental areas of concern within private land; detect patterns; and make decisions regarding NCS projects based on mapping and analysis results. Spatial analysis was used to solve the project's location-oriented questions and include the following tools: clip, merge, join, dissolve, intersect, union, summarize. Using a GIS-based approach for the mapping and identification category accurately displayed a visual understanding of where ideal NCS projects (tree planting, riparian restoration, soil amendments, etc.) exist on private lands within Eagle County, giving my client the ability to use this visualization as a means to target partnerships with land owners.

The listed methodology produced the desired outcome of this project including a best practices report for partnering with private landowners and a collection of Eagle County maps identifying ideal private land parcels suited for NCS projects. While there is a great deal of NCS work going on across Eagle County, much of it is segmented and lacks connecting linkages to private and/or federal land owners and managers and their projects. Through this analysis, I hope to close the gap on NCS project boundaries and create more interconnectivity through land restoration work.

Enacting NCS on Private Lands: How and Where

Through a combination of case study research, academic journal literature reviews, and a focus group with Eagle County residents, a number of best practices for building partnerships with private landowners has ben uncovered.

Overview: Focus Group

On March 27, 2023 a focus group was hosted at the Eagle Public Library consisting of the project clients, Gina McCrackin and Will Barror, Torrey Davis and Jessica Foulis from the Eagle Valley Land Trust, Laura Bohannon from the Eagle County Conservation District, and members from two Eagle County ranching families, Jennifer Jones and Clayton Gerard. The goal of this focus group was to better understand the ranchers' values related to land stewardship, what conservation practices they

implement on their land, and if any barriers exist in implementing conservation practices. The discussion lasted nearly 2 hours and took the format of an informal conversation with question and response dialogue. By the end of the focus group, the goal to better understand the ranchers' values and hindrances to land stewardship practices was achieved.

Valuable insight regarding land management practices and building relationships with ranchers was offered by both of the participating Eagle County ranchers. Clayton Gerard, a fourth generation rancher and private landowner, sits on the board of the Eagle County Conservation District and raises cattle and grows hay on his 1,500 acre legacy ranch in Gypsum, CO. Surrounded by golf courses and hobby farms, Gerard Ranch is one of three existing family ranches of the original seven ranches in the Gypsum Creek Valley. As for current conservation practices, Gerard indicated his land management differs very little from conservation practices, stating "We're doing conservation practices and don't even know it." According to him, land stewardship is synonymous with ranching, and implementing conservation practices is instinctual. Gerard explained how the land is only as good as the care you put into it, and in order to make

"We're doing conservation practices and don't even know it."

- Clayton Gerard, Eagle County Legacy Rancher

a living, you must tend to the land. These values translate into rotational grazing and the spreading of ash from the local biomass plant for the last 8-9 years. Furthermore, Gerard participates in Colorado's Soil Health Program (STAR), implementing mindful practices on the soil including cover cropping, no-till drilling and limiting soil erosion. Ultimately, what outsiders consider to be conservation practices, Gerard views as typical ranching methods. It is these methods that have enabled the Gerard family to ranch regeneratively for decades.

While Gerard implements a variety of conservation practices on his land, Jennifer Jones has another way of land stewardship. Land manager for Colorado River Ranch, Jones lives on and manages 1,000 acres of agricultural and ranch land. She too raises cattle and produces hay in a completely regenerative and circular manner. Practicing rotational grazing and no-till drilling, similar to Gerard, Jones also implements river restoration practices and verticulture composting. These practices stem from Jones' pride in the land. She acknowledges the reciprocity between her and the land: what you give is what you get. Much like Gerard and his view on soil health, Jones knows that the livestock below ground is "just as important at the biology above ground" and makes every effort to ensure the health of the soil.

Both Gerard and Jones have no plans to end their regenerative conservation practices, but do acknowledge the tremendous amount of time, money, and staff these practices require. Gerard noted the availability of short-term funding for conservation practices, but is concerned about financing for long-term endeavors. Jones agreed, stating "it takes resources to maintain the land." Additionally, Gerard and Jones discussed the steps needed moving forward and the best ways to engage with private landowners and ranchers. Jones recognizes a desire

to practice conservation, yet ranchers lack the time to research solutions. It is clear a dissemination of knowledge is needed in order to implement change at a larger scale. How that information is shared comes into play too. Due to the 24/7/365 nature of this type of land management, it is necessary for proponents to come to ranchers, instead of having ranchers come to them. This requires a mindful approach and a baseline understanding of what the ranchers already doing. Additionally, both Gerard and Jones think a general cost/benefit worksheet would influence ranchers to adopt conservation practices. Most ranches are the caretaker's livelihoods, therefore, seeing how conservation practices could increase profit, soil health, or yield would be incredibly eye opening and influencing. Finally, both Gerard and Jones are concerned for the future of open, agricultural lands. Gerards sees the number of ranches diminishing in Eagle County as land prices increase. Jones worries as the ranching population ages, so will the number of ranches. She sees a need to engage younger generations and educate the general population on local food systems. After all, if society wants to continue to eat beef locally grown, we cannot turn ranch land into neighborhoods.

Although only two Eagle County residents participated and provided valuable insight into their beliefs and practices regarding conservation, this conversation is not indicative of all ranchers and land managers in the county. This information is conceptually relevant, however, and made for a successful focus group. This conversation demonstrates a need to accommodate private landowners and engage with them on their schedules in familiar territory. It also shows a need for the dissemination of knowledge and the value of landowner coalitions and local conservation groups. These groups can serve as a nexus in the advancement of NCS projects and circulation of accessible information.

Case Study 1: Western Collaborative-Conservation Network

The Western Collaborative-Conservation Network (WCCN) is a Colorado-based organization dedicated to promoting and supporting collaborative conservation efforts throughout Colorado and the American West. The organization has a rich history spanning over a decade, during which it has fostered collaborations among various stakeholders in the conservation community, including government agencies, non-governmental organizations, private landowners, and community groups.

One of the notable achievements of the WCCN is its ability to create a conducive environment for collaboration among diverse groups. Through its collaborative approach, the organization has been able to promote the use of science-based decision-making, respect for different values and perspectives, and the recognition of shared goals among stakeholders.

The WCCN has also made significant strides in promoting landscape-scale conservation efforts across the American West. This has been made possible through the organization's ability to bring together stakeholders with a shared vision for conservation and support them in the development of conservation plans through the dissemination of knowledge and financial assistance programs.

The outcomes of WCCN's collaborative approach is a testament to the profound impact partnerships between private landowners and conservation groups can have. Facilitating the protection of millions of acres of land across the country, WCCN has restored degraded habitats and increased the

resilience of ecosystems to an ever changing climate. Additionally, the organization has helped to foster more collaborative relationships among stakeholders, which have led to increased trust, improved communication, and greater understanding of the challenges facing the conservation community.

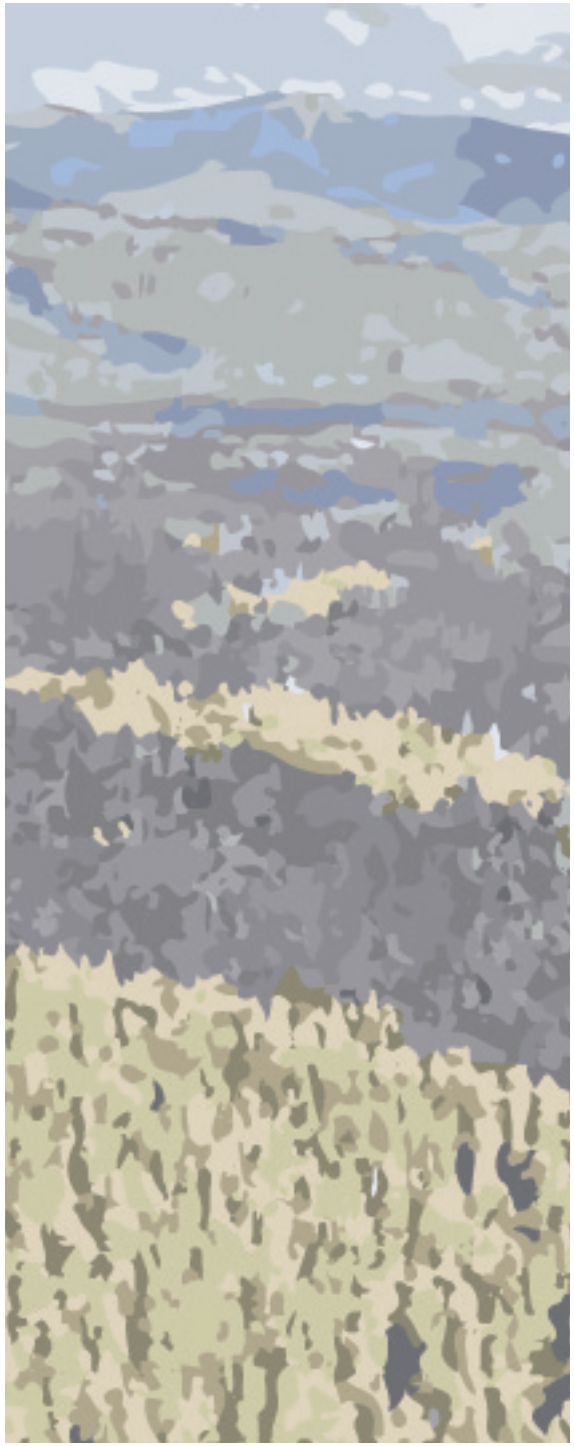
Overall, the WCCN is a remarkable organization that has played a critical role in promoting collaborative conservation efforts across the United States. Its ability to bring together diverse stakeholders and support them in developing science-based, socially acceptable conservation plans has resulted in significant conservation gains, making the organization an invaluable asset to the conservation community.

Case Study 2: Malpai Borderlands Group

Malpai Borderlands Group (MBG) is a non-profit organization that works towards the conservation of land in Southeast Arizona and Southwest New Mexico. The organization's primary objective is to collaborate with private landowners to promote land conservation and restore ecological health to the region. MBG works closely with local landowners to develop sustainable and effective land management practices that benefit both the environment and the private landowners' interests. They recognize that the private landowners play a significant role in the conservation of this area in the American Southwest.

MBG has successfully conserved over 78,000 acres of private and public land in the region and contributed to the restoration of several threatened and endangered species' habitats, including the Chiricahua Leopard Frog and Mexican Wolf. Other efforts include an innovative cooperative land management technique known as grassbanking and reinstating fire as a natural management process have both relieved drought-stricken properties and improved ecological conditions over thousands of acres. Furthermore, MBG has a successful community outreach program hosting meetings several times a year in order to share information on innovative conservation practices with neighbors.

Overall, Malpai Borderlands Group has achieved successful outcomes through private landowner collaboration and sustainable land management practices. Their efforts have resulted in significant environmental and economic benefits, making them an exemplary case study on partnerships with private landowners.



Best Practices Overview

When it comes to partnering with private landowners, a number of techniques can promote effective and respectful engagement. Ultimately, it is necessary to come into engagement with an open mind, a willingness to actively listen to private landowner's concerns and opinions, and meet private landowners where they are at in the conservation process. By practicing the following methods, the opportunity to facilitate partnerships with private landowners is much more likely.

01. *Understand attitudes.*

    One of the most salient findings throughout this project is how crucial it is to understand private landowners' perceptions and attitudes regarding land management styles and conservation practices. While understanding does not always correlate with agreement, it is necessary to acknowledge private landowners' reasoning for practicing the land management styles they do. By understanding private landowners' attitudes and values, conservation professionals can better engage with landowners and describe conservation practices and reasoning in ways that are meaningful to them.

02. *Tap into existing social networks.*

    Many private landowners have formed alliances with other private landowners, in attempts to educate one another, share resources, and build communal support. These coalitions are invaluable to conservation partnerships and projects, and are comprised of trusted members who have formed strong relationships. Several studies (CITE) and focus group conversations reinforce that social networks are a driving force as to whether or not a private landowner will adopt a particular mindset or practice. In Eagle County specifically, landowners have partnered with conservation districts and land trusts to further conservation practices. These groups are made up of like-minded landowners and are an opportune starting place to begin partnerships. Overall, it is imperative to recognize, understand, and use social networks to create private landowner partnerships and improve the conservation practice adoption rate.

03. *Nurture relationships with participating private landowners.*

    Nurturing relationships involves making purposeful and deliberate attempts to establish and maintain connections and networks between private landowners and conservation professionals. Developing strong relationships is a key component of successful cooperation. Genuine and transparent communication is an integral part of building strong relationships, which eventually fosters trust between project partners and results in more effective collaborations. Practices to nurture existing and potential relationships include methods to keep communication open, from emails and phone calls, to meals together and social events. While this practice is less tangible, strong relationships are at the heart of effective collaboration and therefore necessary to nurture relationships with private landowners.

04. *Provide accessible education on conservation practices.*

    Based on several studies and focus group conversations, private

BEST PRACTICES FOR PRIVATE LANDOWNER PARTNERSHIPS

UNDERSTAND ATTITUDES

TAP INTO EXISTING SOCIAL NETWORKS

NURTURE RELATIONSHIPS

PROVIDE ACCESSIBLE EDUCATION

SHARE FUNDING OPPORTUNITIES

landowners do not have the time to research cutting edge conservation practices. Furthermore, these practices are published in places mostly inaccessible to private landowners. This shows a dire need for freely accessible information and disseminating it to landowners in ways that are efficient and comprehendible. Not only does the dispersal of information impact private landowners' willingness to adopt conservation practices, the type of practice and associated benefits influence adoption rates. Most private landowners seek practices that are multi beneficial, favoring land quality improvements, future production yields, and decreased input factors. In terms of knowledge sharing, possible outlets include pamphlets in local Sunday newspapers and disseminating knowledge through existing social networks listed in #2.

05. *Share funding opportunities and application assistance.*

A number of federal and state conservation programs offer financial resources and technical assistance to private landowners who are willing to participate. However, the complexity of the programs, specifically the finding of such programs and the completion of their application processes, can be daunting and time consuming for many potential applicants. As a result, private landowners may opt-out of the programs altogether. To overcome this hurdle, it is necessary to provide landowners with an overview of available programs including their benefits and assistance through the application process. By providing this information and assistance, private landowners are more likely engage in partnerships for NCS projects.

Mapping and Identification Analysis

Using a number of spatial analyses and queries, Eagle County's 1,083,985 acres are divided into the following land ownership categories:

- Federal: Total = 849,521 acres (BLM = 249,480 acres; U.S. Forest Service = 600,041 acres)
- State: Total = 11,237 acres
- Municipal: Total = 4,885 acres
- Private: Total = 218,342 acres (NGO/Land Trust = 1,941 acres; Private = 197,120; Private Conservation = 19,281 acres)

Within these publicly and privately owned lands 135 conservation easements exist, 96 managed under private conservation and 39 managed under EVLT conservation easements, totaling an area of 31,937 acres (EVLT = 12, 656 acres; private = 19,281 acres) under conservation easements. Given this information and assuming NCS projects are already taking place on privately owned lands under conservation easements, that leaves 186,405 acres of privately owned land without conservation easements using unknown land management practices. Of these 186,405 acres, 21,296 acres are within town center boundaries. Since this project seeks tracts of land outside of town centers, these 21,296 acres will be excluded from the search for ideal privately owned properties for NCS, leaving 165,109 acres to locate ideal private properties for NCS projects.

Criteria used to identify parcels on privately owned land ideal for NCS projects are as follows:

01. Area ≥ 1 acres
02. Active ranching or agricultural use
03. Buffers wildlife habitat
04. Shares boundary with, or is in close proximity to federal lands (BLM and USFS)
05. Adjacent to land that is already protected
06. Adjacent to Areas of Critical Environmental Concern
07. Borders a significant river, stream, creek, or body of water

This analysis calculates 955 parcels covering 128,211 acres of privately owned land outside of town centers are suited for NCS projects. These parcels fall under Resource and Agriculture Zoning Classes and are classified as Resource, Resource Limited, Agricultural Residential, and Agriculture Limited. Parcels sharing boundaries with or are in close proximity to federal lands are as follows:

- Resource = 852 parcels
- Resource Limited = 4 parcels
- Agricultural Limited = 2 parcels
- Agricultural Residential = 55 parcels

Parcels sharing boundaries with or are in close proximity to Areas of Critical Environmental Concern are as follows:

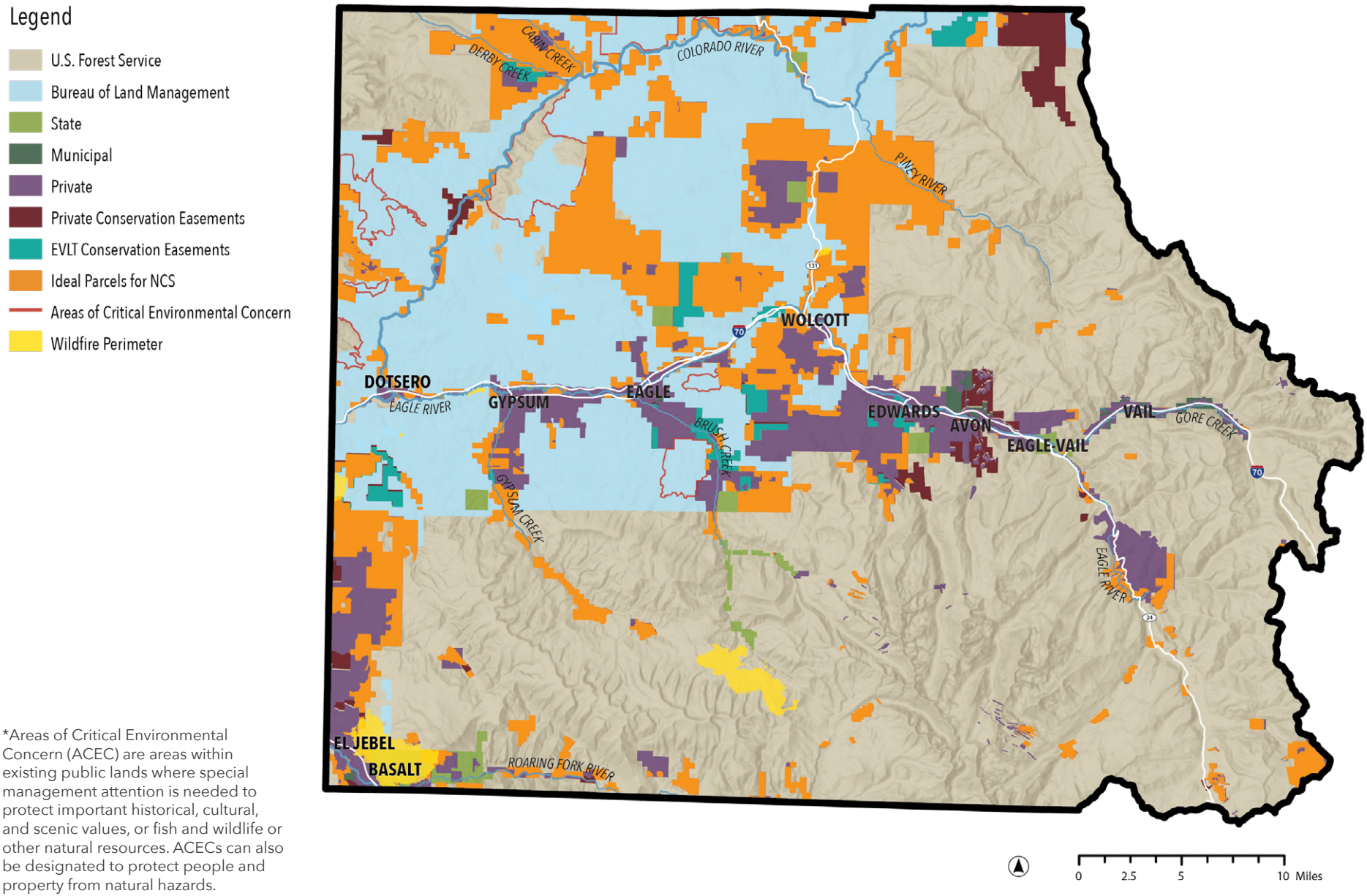
- Resource = 35 parcels
- Resource Limited = 0 parcels
- Agricultural Limited = 1 parcel
- Agricultural Residential = 6 parcels

The 128,211 acres suited for NCS projects incorporate a number of vegetative land covers and mountainous ecosystems. The area of land cover type is listed below:

- Agricultural/Crops = 6,507 acres
  - Alfalfa = 5,992 acres
  - Background = 69 acres
  - Barley = .5 acres
  - Canola = 2 acres
  - Cherries = .2 acres
  - Dry Beans = .3 acres
  - Fallow/Idle Cropland = 11 acres
  - Hops = 368 acres
  - Millet = .6 acres
  - Oats = 26 acres
  - Other Crops = .2 acres
  - Other Hay = 101 acres
  - Peaches = 1 acre
  - Potatoes = .8 acres
  - Sorghum = .03 acres
  - Spring Wheat = .3 acres
  - Triticale = .3 acres

Eagle County Ideal Private Land Parcels for NCS Projects

Ideal parcels for NCS Projects. These parcels are zoned under Resource and Agriculture classses; with areas ≥ 1 acre; adjacent to Federal Land, Areas of Critical Environmental Concern, and Wildfire Perimeters; outside of town centers; in proximity to major waterways.



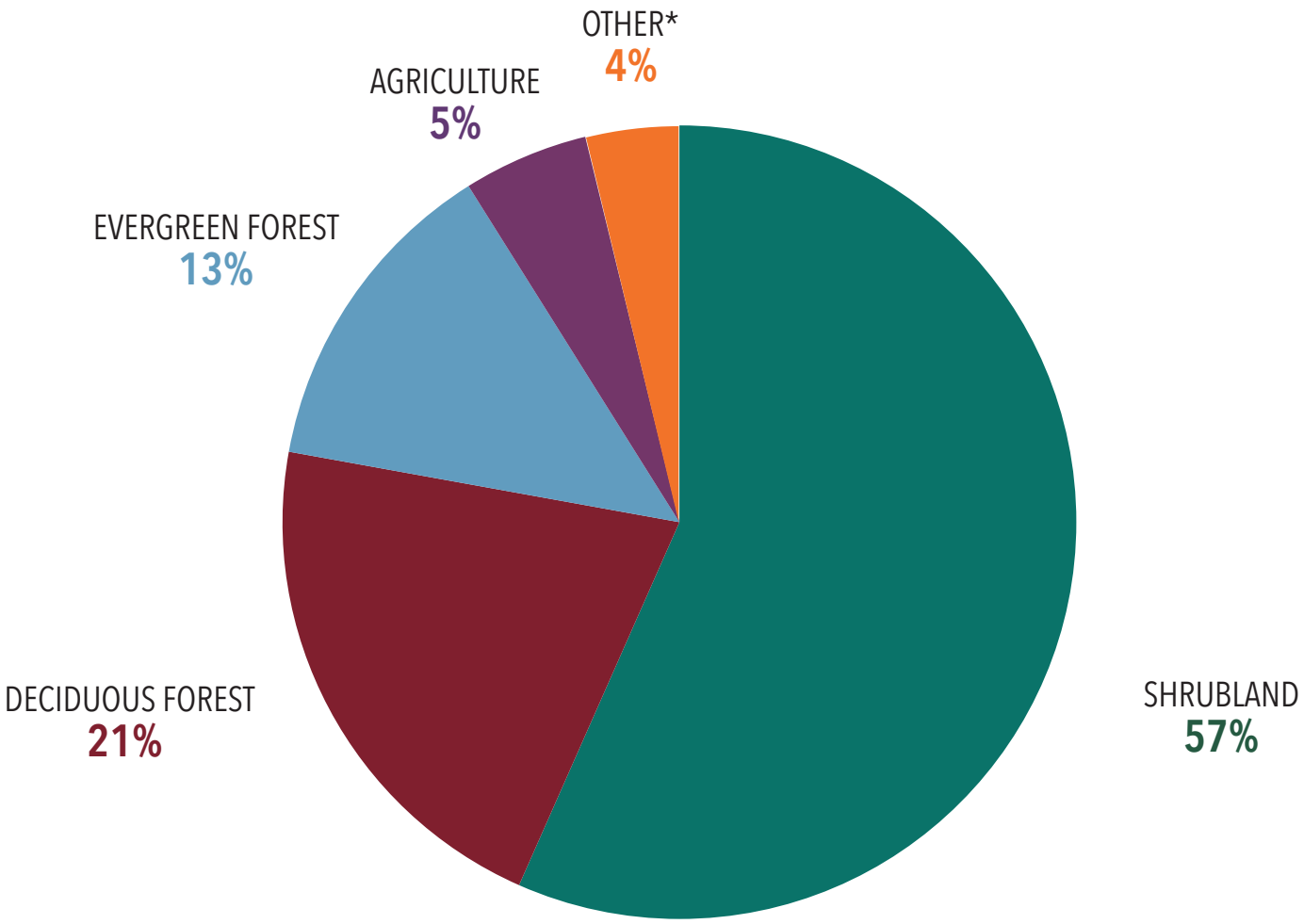
*Areas of Critical Environmental Concern (ACEC) are areas within existing public lands where special management attention is needed to protect important historical, cultural, and scenic values, or fish and wildlife or other natural resources. ACECs can also be designated to protect people and property from natural hazards.

- Winter Wheat = 3 acres
- Barren = 147 acres
- Deciduous Forest = 27,071 acres
- Developed = 1,024 acres
- Evergreen Forest = 16,889 acres
- Herbaceous Wetlands = 368 acres
- Mixed Forest = 651 acres
- Grassland/Pasture = 818 acres
- Open Water = 494 acres
- Perennial Ice = 3 acres
- Shrubland = 72,221 acres
- Woody Wetlands = 1,360 acres

Of the 128,211 acres suited for NCS projects, 119,993 acres totaling 913 parcels lay adjacent to federally owned land. These parcels are the most sought after parcels for this project's scope, as they provide a chance for continuity of NCS projects already existing within federal and state owned land. A list of these identified parcels can be found in Appendix A.

The collection of maps in Appendix A locate ideal private land parcels for implementing NCS projects and partnerships. The first series are various base maps including Zoning, Land Ownership, Land Cover, Conservation Easements, and Areas of Critical Environmental Concern. These maps served as the base from which to run spatial analyses.

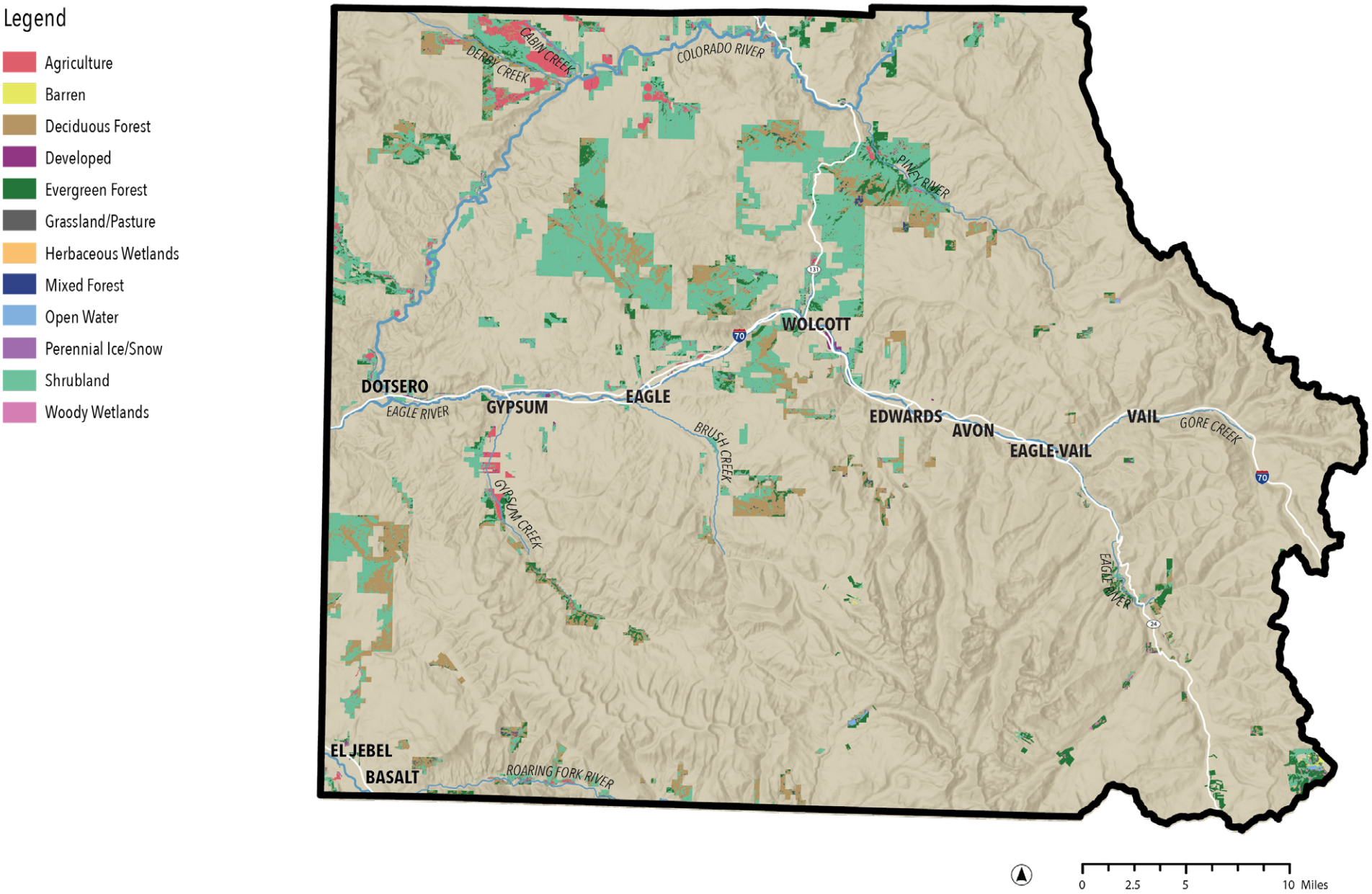
IDEAL PARCEL LAND COVER



ABOVE: By identifying existing land cover on an ideal parcel, appropriate place-based NCS projects can be determined and implemented.

Eagle County Ideal Private Land Parcels for NCS Projects Land Cover

Land Cover for ideal parcels for NCS Projects.



RECOMMENDATIONS

01

LOCATE

Use the interactive map to locate private property ideal for connected NCS project.

02

IDENTIFY

Using the interactive map and the Eagle County Assessor's Property Search, identify the private land's property owner using parcel number.

03

ESTABLISH

Using *Best Practices for Building Partnerships with Private Landowners*, establish partnership with private landowner.

04

IMPLEMENT

Based on the property's land use and land cover, implement place-based NCS project.

Recommendations

Based on the scale of the county and large quantity of parcels suited for NCS projects and partnerships, we recommend utilizing the Eagle County Ideal Private Land Parcels for NCS Projects and Partnerships interactive ArcGIS map in conjunction with Appendix B: List of Private Parcel Identifiers to connect with various private landowners. Once the parcel has been identified through this process, we recommend searching for the project using Property Record Search on Eagle County's Assessor website found here: https://www.eaglecounty.us/departments___services/departments___services/assessor/property_record_search.php. By doing so, the property owner can be identified and steps can be taken open communication with the landowner using methods from the best practices report for building partnerships with private landowners.

Conclusion

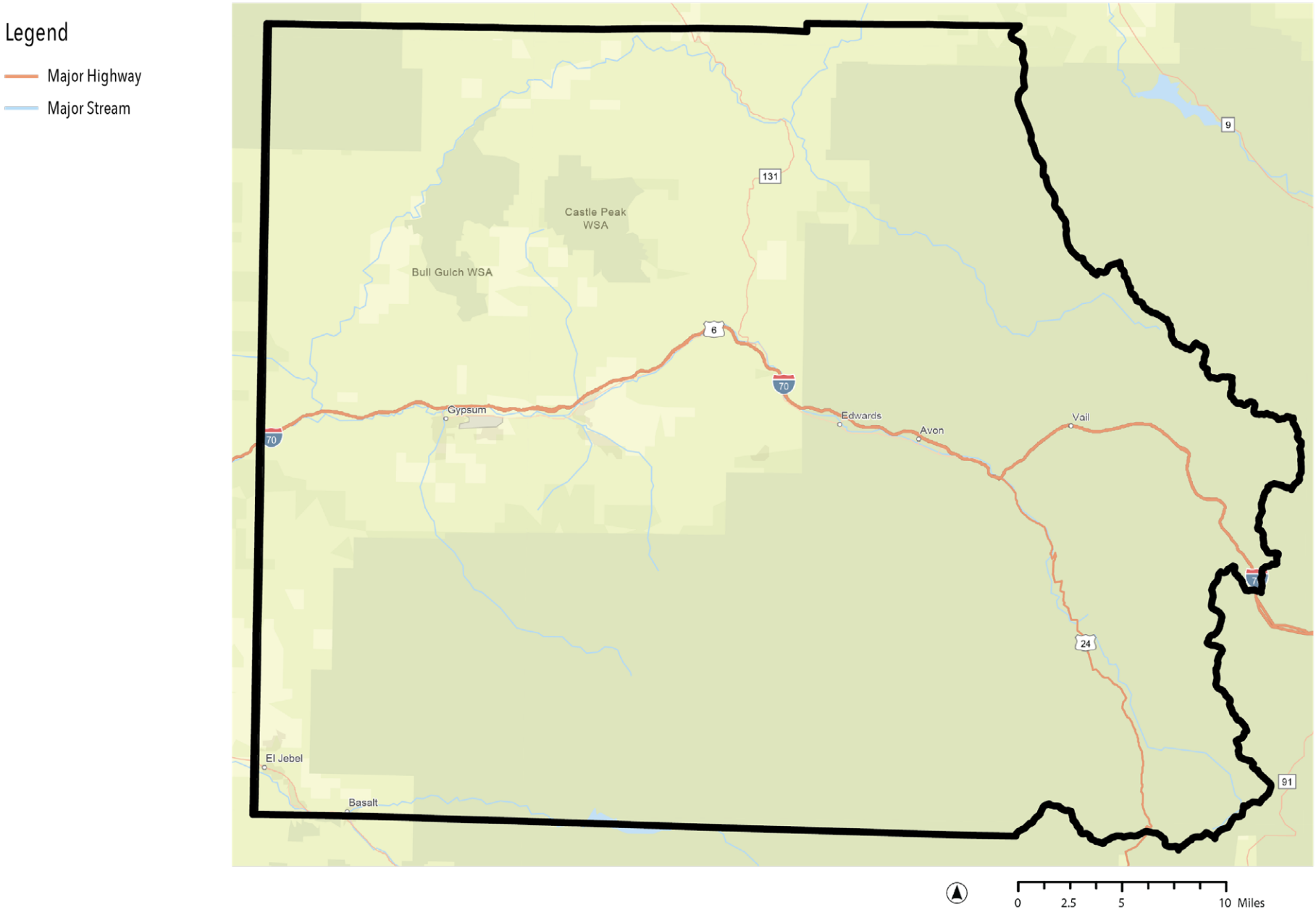
Eagle County, Colorado is composed of an intricate patchwork of public and private land ownership. This landscape complexity is exasperated by the boundlessness of climatic effects and extreme weather events, as such factors do not recognize ownership, boundaries, or established land uses. Due to the environmental pressures Colorado currently faces, the land ownership, use, and management discrepancies pose a dire need for the collaboration between governments, non-profits, and private landowners in order to reduce environmental threats, provide adaptations to the changing climate, and sequester carbon through connected NCS.

Land ownership varies in Eagle County, and these discrepancies in ownership and cohesion have created challenges for local governments & environmental non-profits looking to minimize the climate crisis' impact utilizing NCS.

This project successfully provides resources for the CAC to collaborate with private land owners. Utilizing GIS and planning methods, a visual understanding and a list of private land parcels have been identified as a means to target partnerships with private land owners for NCS projects. Additionally, the Best Practices Report for Partnering with Private Land Owners provides methods for respectfully and effectively engaging with private land owners in Eagle County. Overall, the products created through this project allow the Walking Mountains Science Center CAC group to identify parcels best suited for NCS projects, engage with private landowners respectfully and effectively, and implement connected NCS projects, ultimately minimizing various land management style's impact on climate change.

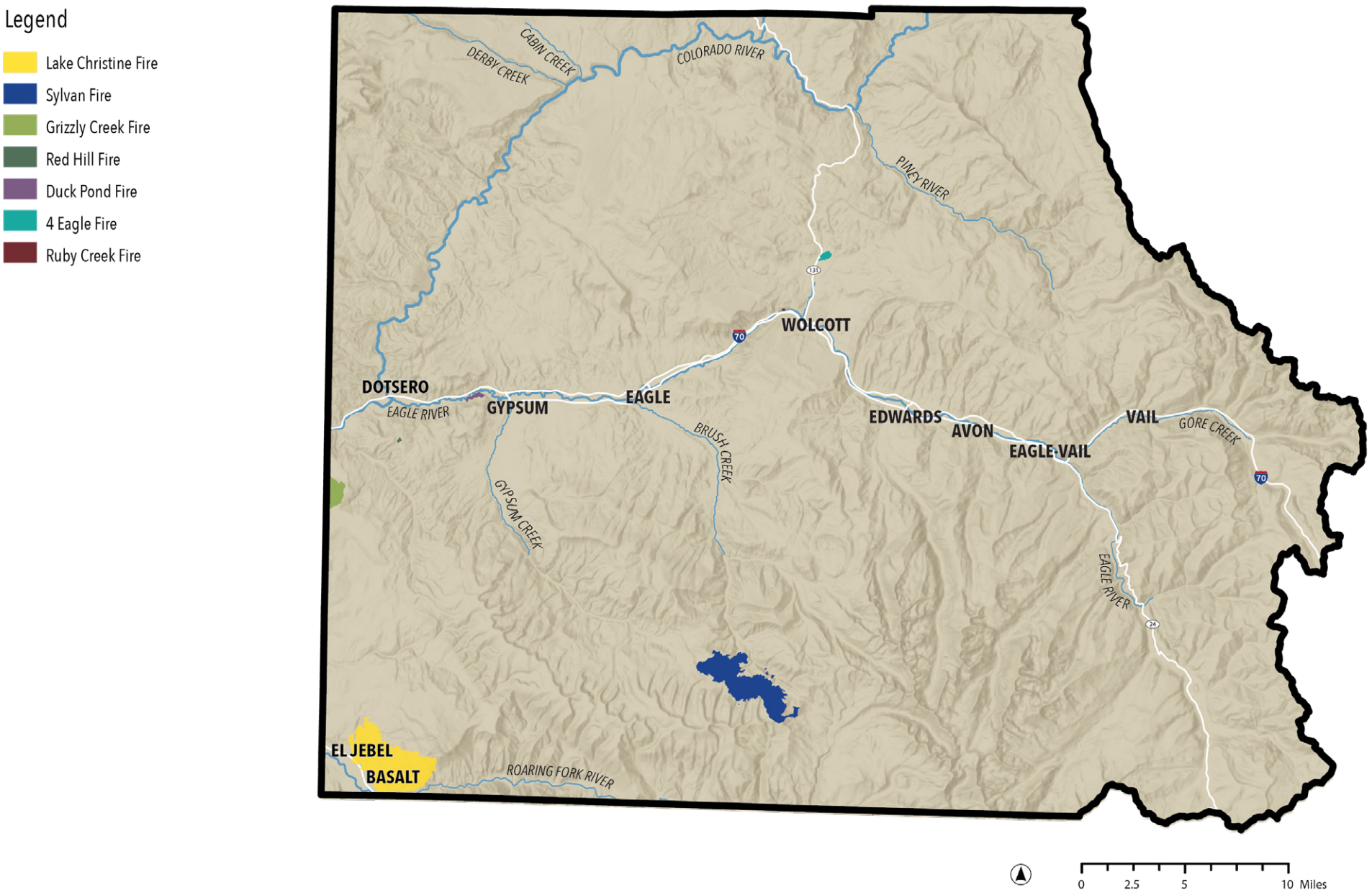
Eagle County Base Map

Major Towns, Highways, and Streams



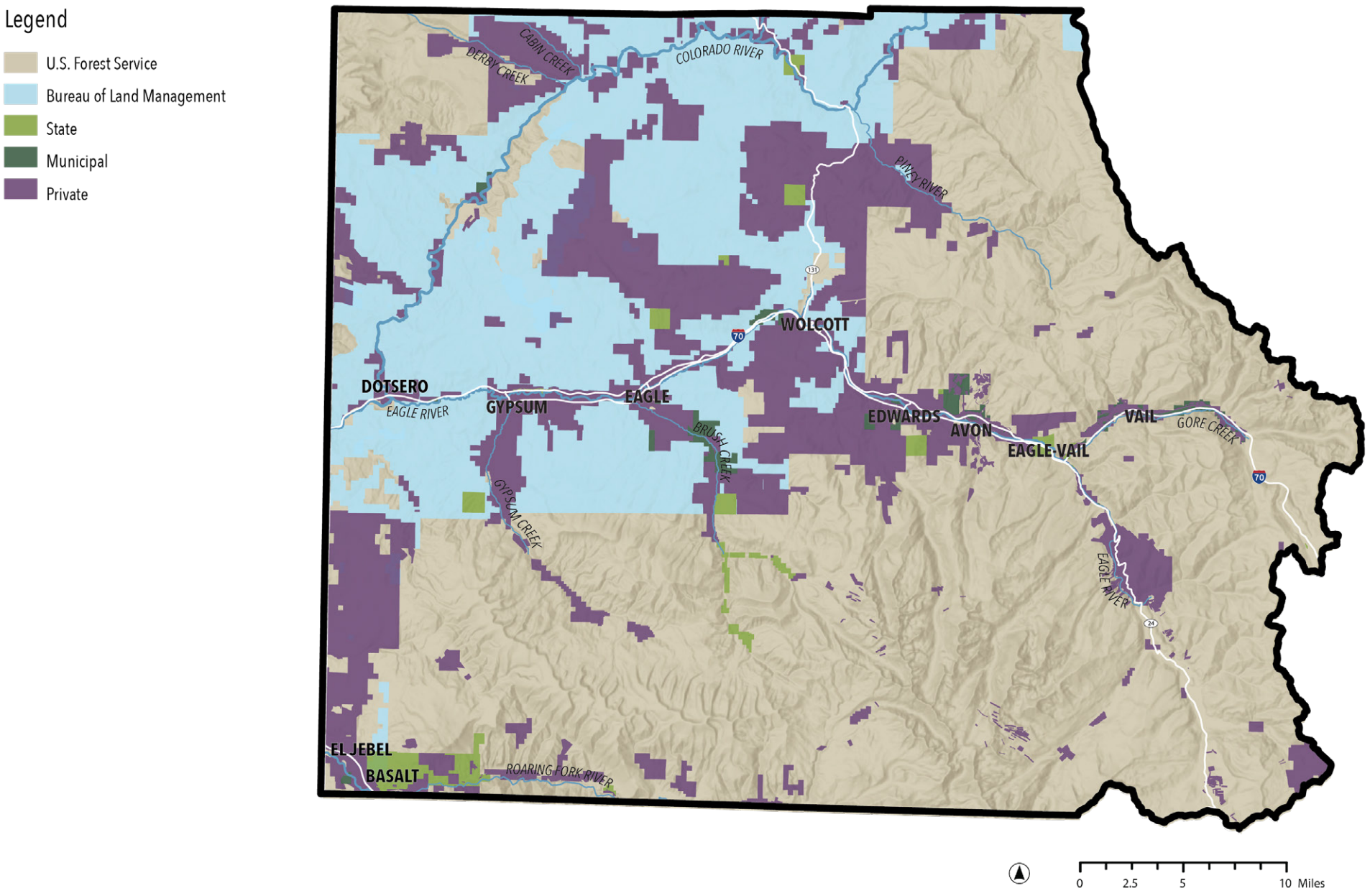
Eagle County Wildfire Perimeters

Major wildfire perimeters within Eagle County, 2021-2023. Source: National Interagency Fire Center.



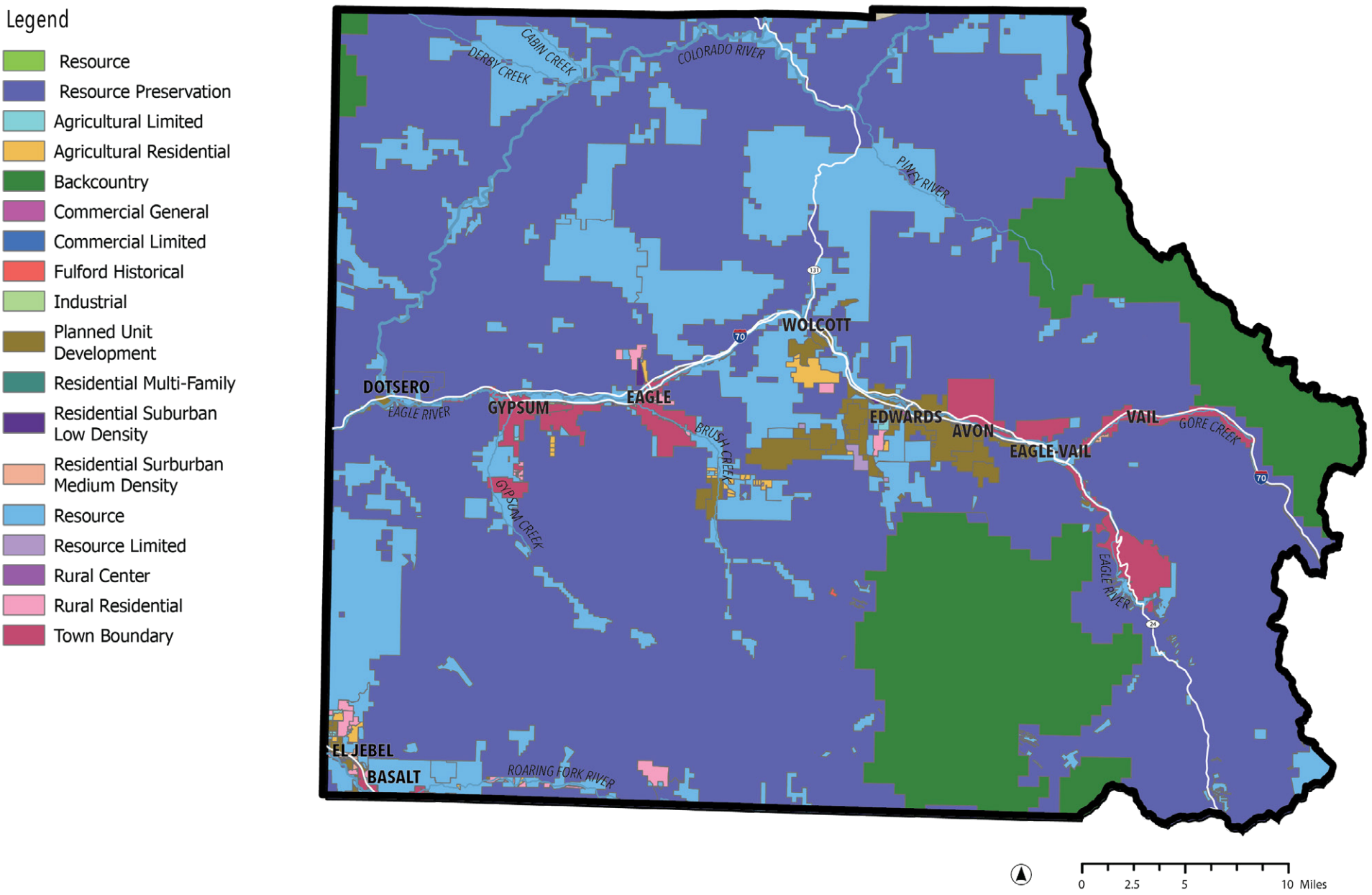
Eagle County Land Ownership

Eagle County, CO



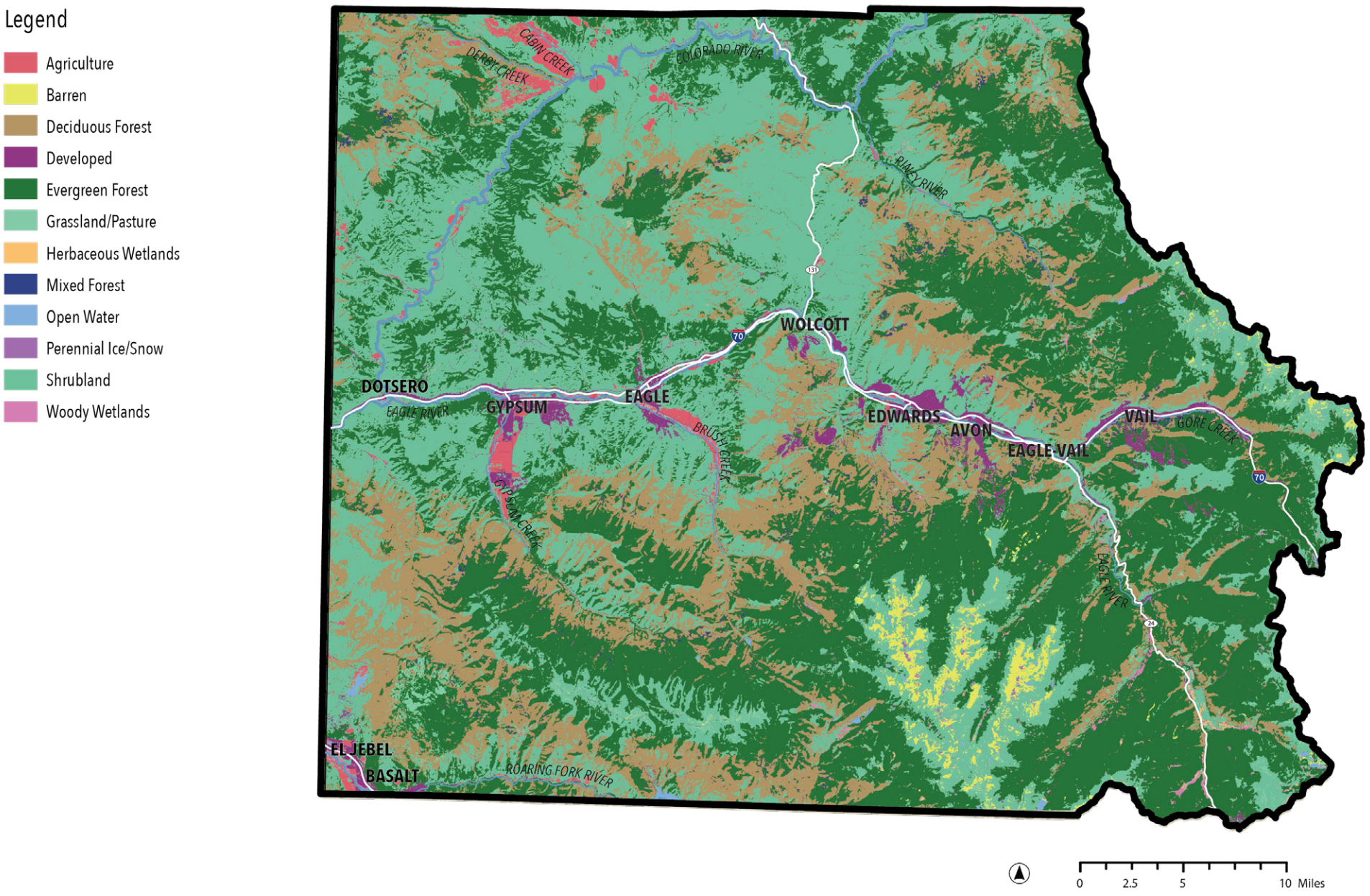
Eagle County Zoning

Eagle County, CO



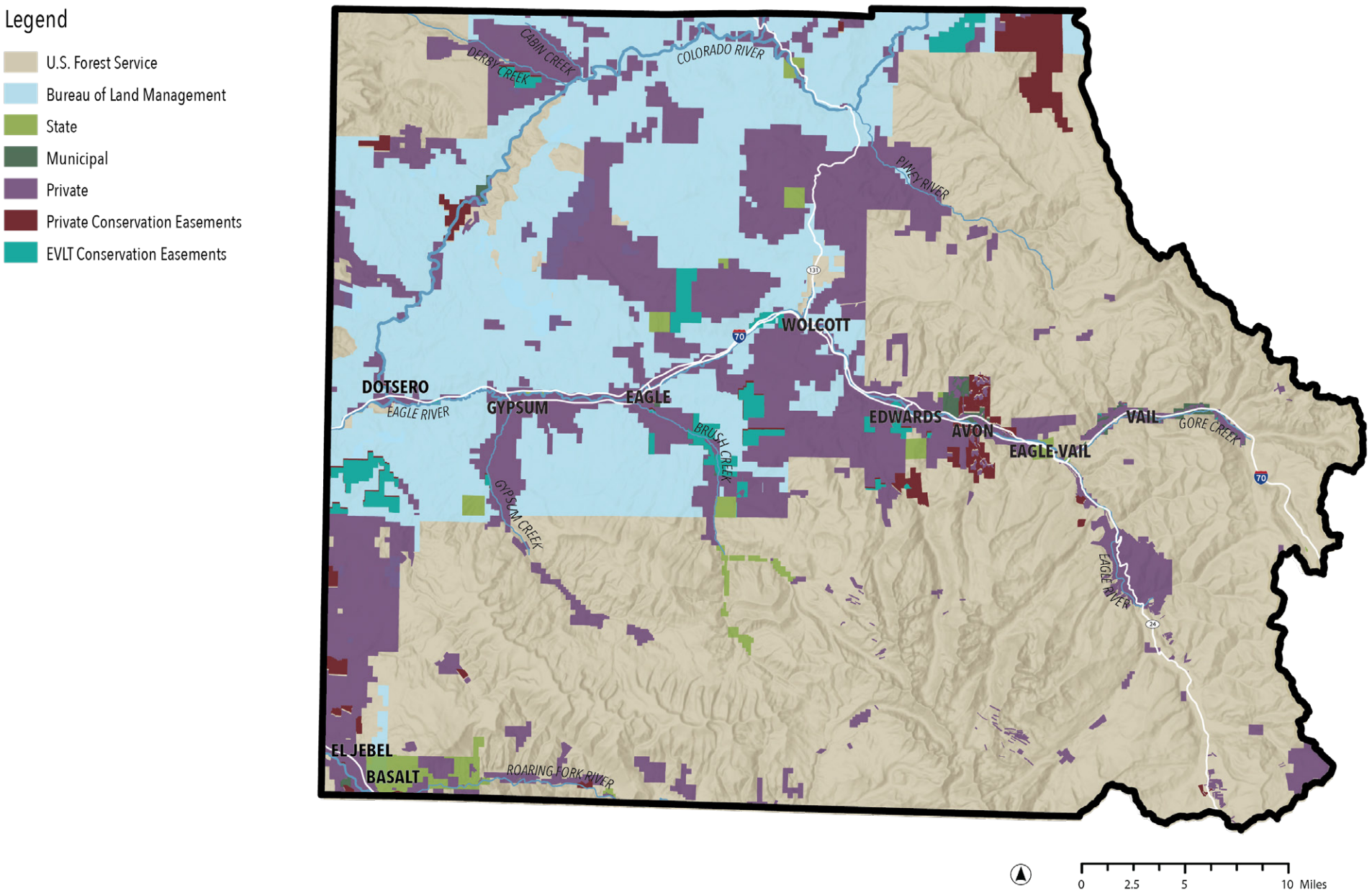
Eagle County Land Cover

Land Cover by U.S. Department of Agriculture, CropScape - Cropland Data Layer



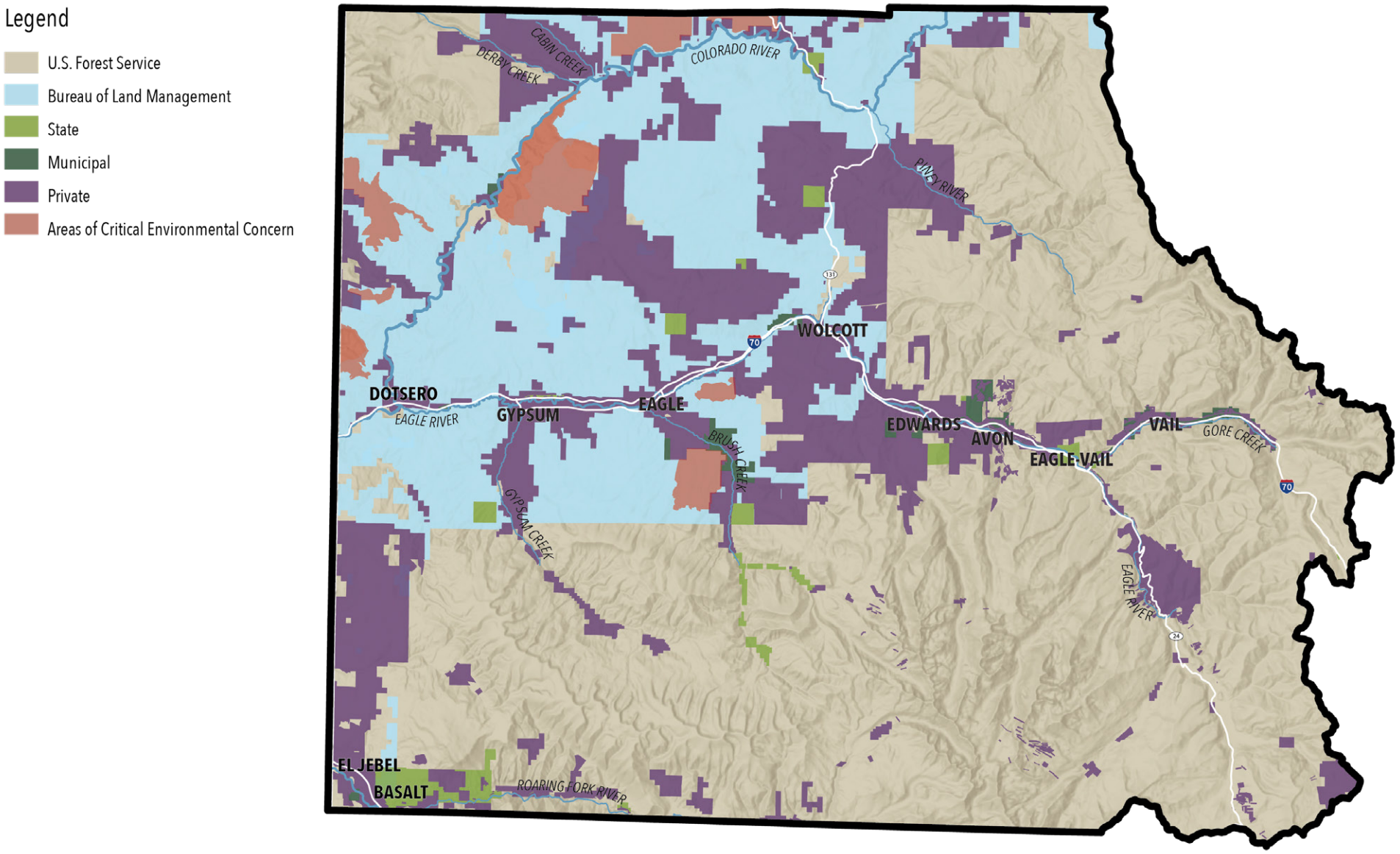
Eagle County Conservation Easements

Easements managed by Eagle Valley Land Trust (EVLT) and other private organizations



Eagle County Areas of Critical Environmental Concern

Bureau of Land Management's Areas of Critical Environmental Concern*



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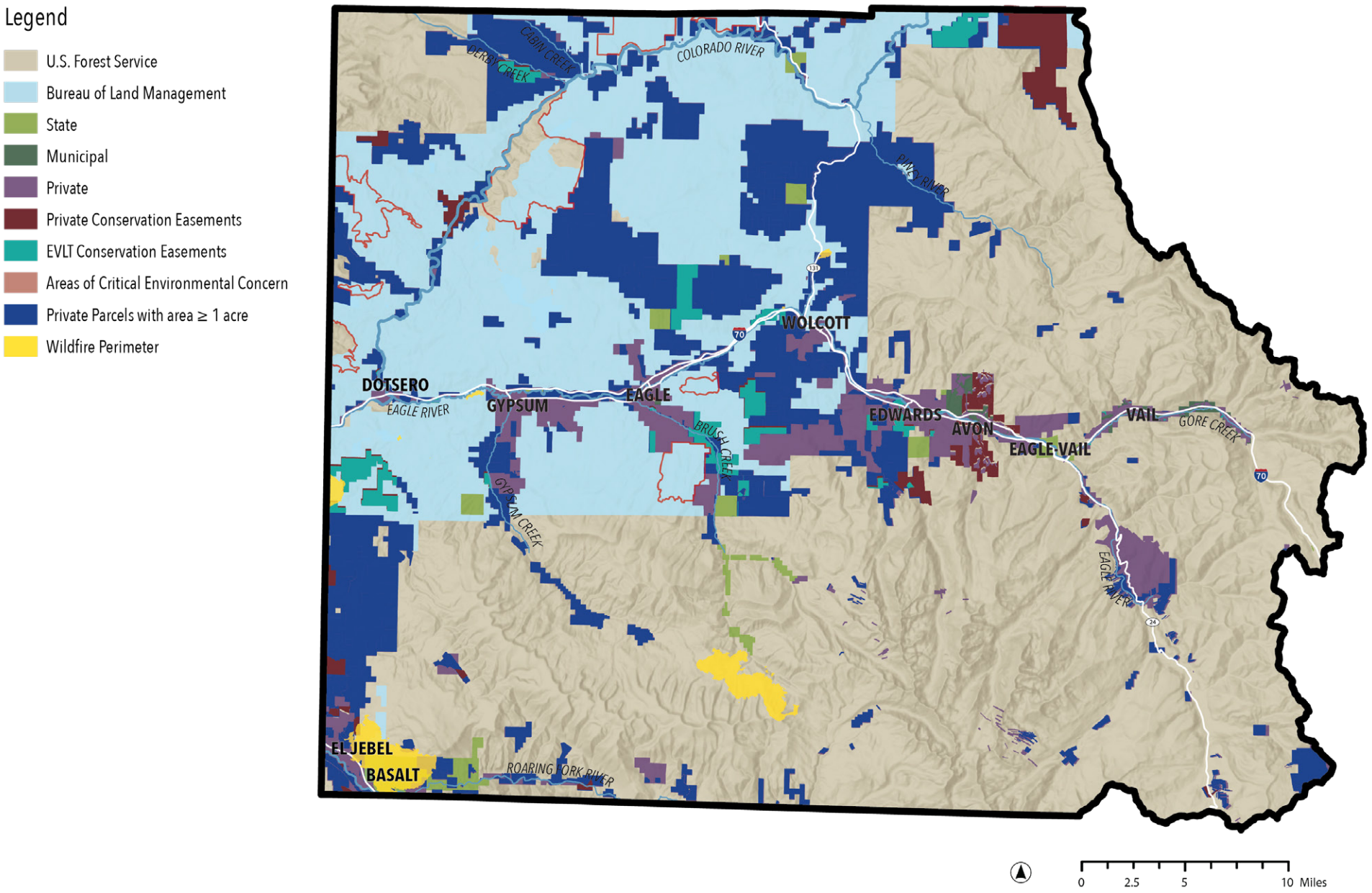
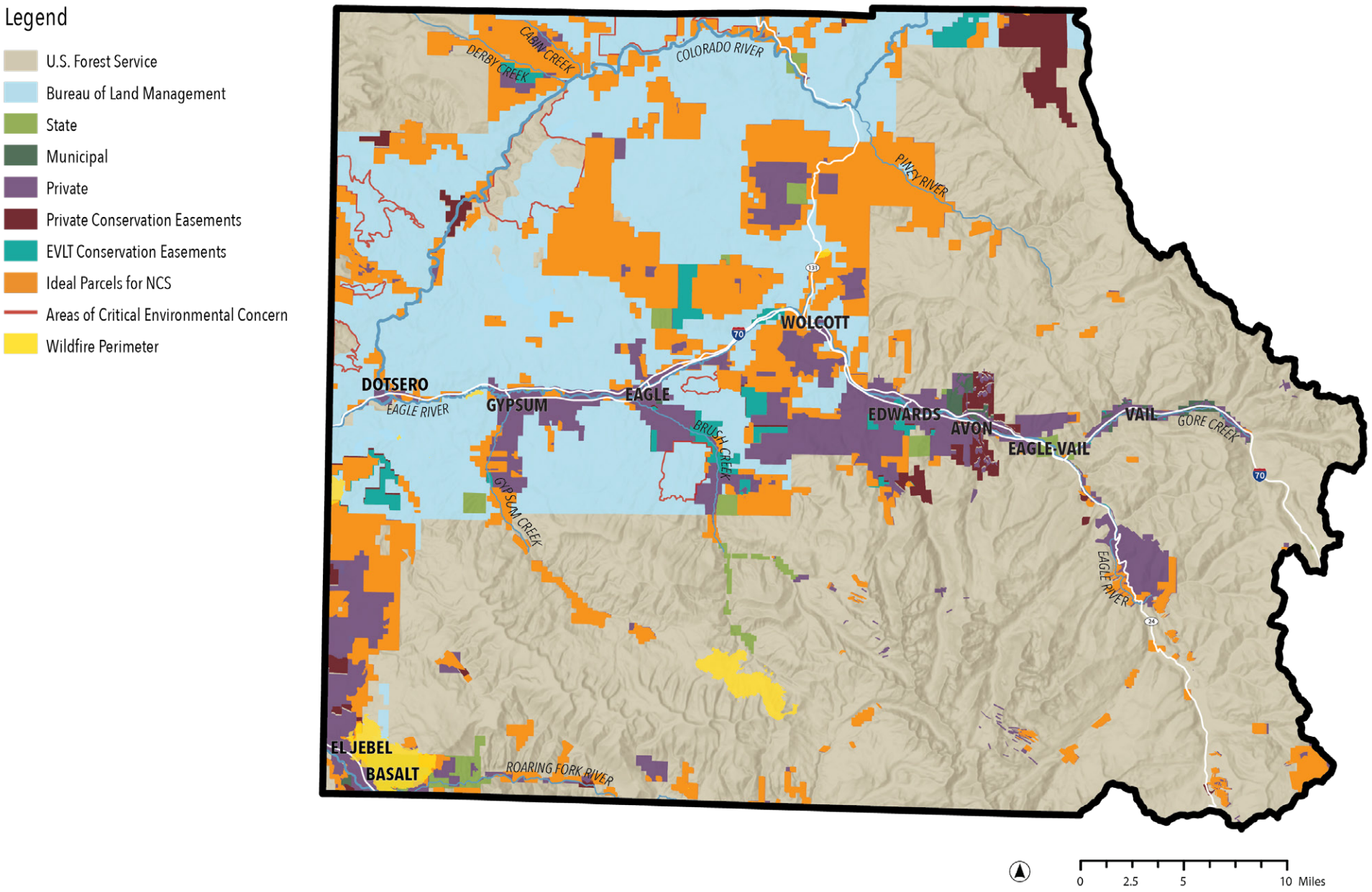
Eagle County Private Land Parcel Partnership Criteria

Parcels zoned under Resource and Agriculture classses; with areas ≥ 1 acre; adjacent to Federal Land, Areas of Critical Environmental Concern, and Wildfire Perimeters; outside of town centers; in proximity to major waterways.



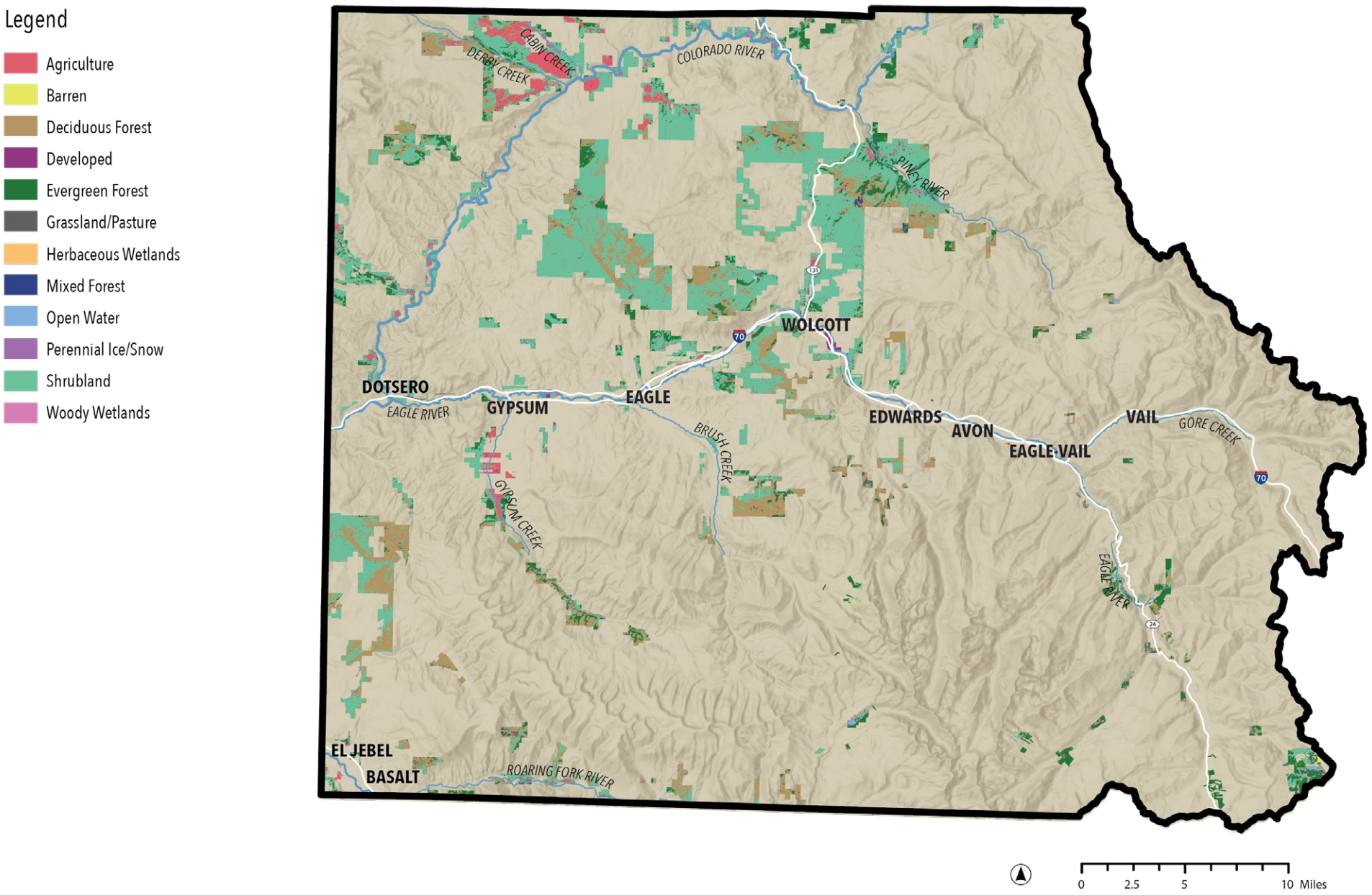
Eagle County Ideal Private Land Parcels for NCS Projects

Ideal parcels for NCS Projects. These parcels are zoned under Resource and Agriculture classses; with areas ≥ 1 acre; adjacent to Federal Land, Areas of Critical Environmental Concern, and Wildfire Perimeters; outside of town centers; in proximity to major waterways.



Eagle County Ideal Private Land Parcels for NCS Projects Land Cover

Land Cover for ideal parcels for NCS Projects.



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About the Author

Allie is pursuing a dual Master's degree in Landscape Architecture & Urban and Regional Planning at the University of Colorado Denver. Community gatherer and forever student, her belief of the kinship and reciprocity between the human and non-human worlds served as a catalyst into these fields, and has remained a steady theme throughout her research and designs. During her time as a student, Allie has worked as a design intern in high-end residential and as a research design assistant serving rural towns throughout Colorado. Out of these experiences comes an enthusiasm for project details and the desire to function from a community-driven design ethos. Her curious nature and aptitude for intentional listening have served her well in these positions, allowing Allie to deepen relationships with clients and communities and serve as a thoughtful self-inquiring team member. Raised in Nebraska, she is informed by her background in kinesiology and yogic traditions as well as a deep awe for the prairie landscapes of the Midwest. Drawing parallels between the systems of the human body and those of nature, she intends to remind humanity of our interconnected and symbiotic relationship with each other and the natural world around us. Ultimately, there is something about this planet that renders her speechless and makes her heart skip a beat. It is Allie's hope to make these feelings part of our collective's daily experience through the creation of nature-forward spaces accessible to everyone.

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