

Planning Trails with Wildlife in Mind Outline

Introduction: Wildlife and Trails Overview

- Vision
- Core Principles
- Purpose, Use, and Orientation of Document
- Document Audiences and Their Needs
- What the Document is Not
- Current context and the future of trails in Colorado

Chapter 1. Communicate and Collaborate Early

- Partner with Agency Stakeholders.
- Consider Land Ownership Implications on the Process.
- Integrate with Larger Regional Planning Processes.
- Outreach to the Community Early and Thoughtfully.
- Partner with Additional Stakeholders.
- Understand Competing Priorities.
- Be open to a “no-trail” option.
- Maximize Data-Informed Decisions.
- Understand This As An Iterative Process.
- Incorporate Public Engagement Again.

Chapter 2: Evaluate Wildlife Habitat ~ Researching and Inventorying

- Engage Biologist Advisors.
- Use Desktop Analysis Tools.
- Consider Threatened, Endangered, Imperiled, and Declining Species.
- Conduct a Site Visit.
- When Determining Specific Trail Locations, Discuss Siting Considerations During the Visit.
- Identify Human Wildlife Conflict.
- Share Wildlife Concerns with the Public.

Chapter 3: Consider Additional Human Dimensions That Impact Wildlife

- Identify *Leave No Trace* Principles and Relevant Research.
- Incorporate Needs and Outcomes Based Planning.
- Anticipate Conflicts Between Users.

Chapter 4: Plan for Wildlife Management and Monitoring

- Establish Wildlife Baselines When Feasible.
- Plan for Habitat Mitigation Projects (Compensatory Mitigation).
- Limit Human Access to Protect Wildlife When Necessary.
- Implement Dog Prohibitions and Leash Regulations When Necessary.
- Mitigate Trash and the Illegal Feeding of Wildlife.
- Reduce Impacts on Agriculture and Ranching.
- Follow Trail Construction Best Management Practices.
- Implement Adaptive Management Planning.
- Design Education and Enforcement Planning

Chapter 5: Case Studies

This section will include case studies that demonstrate agencies, projects, and partners that have lessons that can be learned in regards to their impacts on wildlife, landscapes, or biodiversity. We are collecting these from Task Force Members, the Advisory Group, and the CPW Technical Advisory Team, and deciding how to best include and manage these examples.

Chapter 6: The Science and Existing Tools

- Definitions & Descriptions of Terms Used
- Species
- Habitat
- Trails and Their Zones of Influence
- A Site's Existing Impacts
- Human Dimensions
- What Happens to Plants Near Trails

Appendix A. Field Guide: A checklist version of the sequencing, actions, and principles pulled from this document

Appendix B. Management Capacity and Trail Stewardship Resources:

Add an appendix on management capacity including volunteers, interns, equipment, support organizations and other existing resources. List to existing resources in the state that cover this incredibly well already.

Examples of text below:

Introduction: Wildlife and Trails Overview

Purpose, Use, and Orientation of Document

Document Goals

These goals are derived from the audiences and their needs as outlined in the previous sections.

1. Help people, organizations and groups be proactive in considering wildlife when thinking about trails, trail planning, and management. Framework for how we work together, providing direction to get you going.
2. Guidance for what wildlife issues should be considered for a trails grant application (see last three below), from the forefront.
3. Provide relevant up-to-date science surrounding the impact of trails and trail recreation on wildlife while remaining accessible to readers of all backgrounds.
4. Improve communication between government agencies around trails and wildlife by establishing common language, and by providing consensus around best practices.
5. Inform interest groups (trail construction nonprofits, funding entities, environmental advocacy nonprofits - "the public") about the efforts across agencies to address trail and trail recreation impact on wildlife in meaningful ways.
6. Provide guidance to groups interested in advocating for new trail construction on how to factor wildlife impact into their plans, and generally how to work with agencies to find solutions which balance recreation and wildlife needs.
7. Act as a guide which helps resolve conflicts between conservation and recreation interests by emphasizing the value of communication and collaboration between, and within, communities.
8. Educate land managers, nonprofit groups, and interested stakeholders on the current state of the science surrounding trails and recreation impacts on wildlife.
9. Written to be easily understood and digested by individuals who do not have subject matter expertise in trails or wildlife.
10. Offer high quality frameworks, processes, and models that can be utilized by individuals, organizations, and agencies for effective planning and management of trails and wildlife.
11. Easy to quickly share and reference in conversations with outside groups.
12. Provide a clear statewide vision for trails and wildlife which incorporates changing future conditions, increasingly diverse use, growing populations, and other emergent challenges.

What the Document is Not

While there is a desire for this document to achieve many goals and serve many purposes, it remains focused on trails and wildlife. Here are some expectations that have come up for this document that are outside of its scope:

1. The document is not intended to supersede agency-specific policies or processes - it is a guide for those that wish to enhance their policies or processes, and an explanation to the public for why certain policies and processes already exist.
2. The document does not attempt to address broad environmental issues that are not related to trail construction or maintenance.
3. The document does not attempt to address in great detail every discipline that intersects with trails (i.e. hydrology, GIS systems, park rangers, etc.), but provides access to those resources as appropriate.
4. The document is grounded in the best science available, not anecdotes and "common knowledge."
5. The document does not attempt to provide guidance to nonprofit groups on how to apply for grants or construction approval from specific agencies.

Planning Trails with Wildlife in Mind

Best Management Practices

This document contains best management practices (BMPs) for recreational trail planning and construction, which are intended to avoid and minimize adverse impacts to Colorado's wildlife species and their habitats. These recommendations are based on peer-review scientific literature that has been conducted to assess potential impacts to wildlife from trail-based recreation, and management actions to avoid and minimize those potential adverse impacts. The wildlife species and habitats contained within this document are primarily composed of Colorado Parks & Wildlife (CPW) High Priority Habitats (HPH), which are habitats that CPW has geographic information (i.e. habitat activity layers) for and management recommendations based on peer-reviewed scientific studies. The species included below do not capture all of the threatened, endangered, and species of concern located in Colorado. For detailed information on Colorado's most vulnerable wildlife species and their habitats, please refer to CPW's State Wildlife Action Plan (SWAP).

Definitions & Descriptions of Terms Used:

- Seasonal Timing Restrictions – Defined date ranges that capture an important and sensitive life history stage for a given species. Examples include reproduction and wintering periods when animals are in a vulnerable state.
- Trail Density – A measurement to assess the amount of given trails within a defined geographic area. For the sake of this document, densities are indicated as the number of trail miles per square mile. This can be averaged across different scales depending on the scope of a proposed project and wildlife habitats present.
- Nest/Lek Buffers – A defined distance (radius) surrounding a sensitive wildlife location such as nest sites and grouse lek locations. This distance is the minimum amount needed to protect the given wildlife resource from human disturbance. Each recommended buffer distance is based on the best available science and CPW's field staff expertise.
- Production Area – That part of a species' overall range where calving, fawning, nesting, etc. occurs. This activity typically occurs during a period in the spring each year.
- Migration Corridor – A specific mappable site through which large numbers of animals migrate and loss of which would change migration routes
- Winter Concentration Area - That part of the winter range where densities are at least 200% greater than the surrounding winter range density during the same period used to define winter range in the average five winters out of ten.
- Severe Winter Range - That part of the overall range where 90% of the individuals are located when the annual snowpack is at its maximum and/or temperatures are at a minimum in the two worst winters out of ten.

General Best Management Practices for Trail Planning & Wildlife

These general recommendations should be considered and incorporated into trail planning and design processes regardless of the wildlife habitat types present in the project area. These measures are intended to avoid and minimize adverse impacts to wildlife and wildlife habitats, while also protecting recreational users from wildlife conflicts.

- ✓ Adaptive Management Planning:
 - Monitoring Use and Impacts - Consider methods to track human use of newly constructed trails and facilities. These may include trail counter devices to track daily and seasonal timing of use, total number of users, and different types of recreational users (i.e. dog walkers, hikers, equestrian, mountain bikers). Additionally, where available, consider methods to track potential wildlife impacts/reactions. Tracking wildlife use and responses through collar data, human conflict reporting, and general observations may help discern trends through time.
 - Management Thresholds and Implications - In addition to monitoring recreation and wildlife usage, consider monitoring and recording violations of regulations and the creation of illegal user created trails. Set thresholds for these numbers with clear management implications should the thresholds be surpassed (e.g. temporary closures of trail segments, etc.)
- ✓ Early Consultation with CPW and Federal Land Managers:
 - Consult with local [CPW field staff](#) and federal land management agencies (where applicable) early in the trail planning process. Identifying unique wildlife resource concerns and siting trial projects to avoid impacts is the most effective method to avoid and minimize impacts to wildlife from recreational activities.
- ✓ Siting Considerations:
 - Co-locate trails and facilities outside of sensitive habitat areas. Consolidating high-density trail networks and recreation facilities in less sensitive wildlife areas provides recreational opportunity, while reducing impacts to wildlife species and their habitats.
 - Avoid bisecting open meadow habitats with new trails and consider maintaining native vegetation (i.e. trees and shrubs) between trails, open areas, and other sensitive sites. Vegetative screening may reduce the distance that animals perceive recreational users to be a threat.
 - Establish adequate buffers between new trails and riparian/wetland habitat types. A large portion of Colorado's wildlife species utilize riparian habitat for some portion of their life history and minimizing disturbance within these areas is important.
- ✓ Enforcement Planning (closure violations, illegal trail use, dogs off leash):
 - Staffing and Funding - Consider how rules and regulations will be enforced on newly proposed trails in perpetuity. Seasonal closures and other regulations are only effective if there are adequate levels of education and enforcement.
 - Education and Outreach - One of the most effective methods to curb violations and illegal trail use is to create an informed public and instill a wildlife-friendly etiquette. Self-policing and reporting can be very effective methods of increasing user compliance with rules and regulations
 - Consider the most effective methods for implementing seasonal closures and other restrictions. These may include placement of signage, gates, fencing, remote cameras, etc.
- ✓ Habitat Mitigation Projects (Compensatory Mitigation)

- Not all adverse impacts to wildlife from a proposed project can be avoided and minimized. For unavoidable residual impacts, consider working with local CPW staff to design and implement habitat mitigation strategies. Options to restore or enhance wildlife habitat may include: decommissioning and reclaiming illegal (user created) trails, enhancing habitat through mechanical vegetation treatments, noxious weed management, wetland restoration, and permanent conservation easements.
- ✓ Dog Prohibitions and Leash Regulations:
 - In certain wildlife habitat areas indicated below, implement seasonal or permanent dog-on-leash regulations. These measures are intended to protect the safety of wildlife (calves, fawns, nesting birds, small mammals), the safety of pets (reducing attacks, bites, etc.), and the safety of pet owners (reduced moose attacks, etc.).
 - Within the most sensitive wildlife habitat areas and in consultation with CPW staff, consider seasonal or year-round dog prohibitions for some trail segments.
- ✓ Trash and Illegal Feeding of Wildlife:
 - Utilize certified bear-proof trash receptacles at trailheads, picnic areas, campgrounds, etc.
 - Post signage at recreation facilities to inform users about the ethics and dangers of feeding wildlife ([Feeding Wildlife](#), [Feeding Wildlife Puts Everyone at Risk](#)).
- ✓ Fencing:
 - Avoid new fencing to the maximum extent possible.
 - When new fencing is necessary, such as around new parking areas or trailheads, construct fencing to the specifications outlined in [CPW's Fencing with Wildlife in Mind Document](#).

Species & Habitat Specific Best Management Practices

The species specific recommendations found below are derived from the best available science and represent necessary avoidance and minimization actions to protect wildlife, wildlife habitats, and the safety of recreationists during the trail siting, design, and approval processes.

BIG GAME

◆ **Rocky Mountain & Desert Bighorn Sheep:**

- ✓ Avoid locating new trails within CPW-mapped bighorn sheep production areas, migration corridors, and winter range habitats.
- ✓ Limit trail densities (including existing trails) to less than one linear mile of trail per square mile within all CPW-mapped bighorn sheep habitats.
- ✓ For any trail within bighorn sheep production areas, implement seasonal timing restrictions for all trail users between the dates of April 15 and June 30 (Rocky Mountain bighorn sheep) and February 1 to May 1 (desert bighorn sheep).

- ✓ For any trail within bighorn sheep winter range habitats, implement seasonal timing restrictions for all trail users between the dates of November 1 and April 30.

◆ **Elk:**

- ✓ Avoid, to the maximum extent possible, locating new trails within CPW-mapped elk production areas, migration corridors, severe winter range, and winter concentration areas.
- ✓ Limit trail densities (including existing trails) to less than one linear mile of trail per square mile within elk production areas, migration corridors, severe winter range, and winter concentration areas.
- ✓ For trails within elk production areas, implement seasonal timing restrictions for all trail users between the dates of May 15 and June 30.
- ✓ For trails within elk winter range, implement seasonal timing restrictions for all trail users between the dates of December 1 and April 30.
- ✓ For trails within elk winter range, production areas, and summer concentration areas, implement year-round dog-on-leash restrictions.

◆ **Moose:**

- ✓ For trails within moose habitat, prohibit dogs or implement year-round dog-on-leash regulations.
- ✓ For trails within moose habitat, post signage to protect human safety ([Moose In Area](#), [Yield to Moose](#), [Attention Snowmobilers](#))

◆ **Mountain Goats:**

- ✓ For trails within mountain goat production areas, implement seasonal timing restrictions for all trail users between the dates of May 15 and June 30.
- ✓ For trails within mountain goat habitat, post signage prohibiting feeding and harassment of wildlife.

◆ **Mule Deer:**

- ✓ Avoid, to the maximum extent possible, locating new trails within CPW-mapped mule deer migration corridors, severe winter range, and winter concentration areas.
- ✓ Limit trail densities (including existing trails) to less than one linear mile of trail per square mile within mule deer migration corridors, severe winter range, and winter concentration areas.
- ✓ For trails within mule deer winter range, implement seasonal timing restrictions for all trail users between the dates of December 1 and April 30.

- ✓ For trails within mule deer winter range and summer concentration areas, implement year-round dog-on-leash regulations.

◆ **Pronghorn Antelope:**

- ✓ Avoid, to the maximum extent possible, locating new trails within CPW-mapped pronghorn migration corridors, severe winter range, and winter concentration areas.
- ✓ Limit trail densities (including existing trails) to less than one linear mile of trail per square mile within pronghorn antelope migration corridors and winter concentration areas.
- ✓ For trails within pronghorn antelope winter concentration areas, implement seasonal timing restrictions for all trail users between the dates of January 1 and April 30.

GROUSE

◆ **Columbian Sharp-Tailed Grouse:**

- ✓ Avoid locating new trails within 0.6 miles of Columbian sharp-tailed grouse lek sites.
- ✓ For trails within Columbian sharp-tailed grouse winter range, implement seasonal timing restrictions for all trail users between the dates of November 15 and March 15.
- ✓ For trails within Columbian sharp-tailed grouse production areas, implement seasonal timing restrictions for all trail users between the dates of March 15 and July 30.
- ✓ Limit trail densities (including existing trails) to less than one linear mile of trail per square mile within Columbian sharp-tailed grouse production areas.

◆ **Greater Sage-Grouse:**

- ✓ Prohibit new trails within 1.0 mile of greater sage-grouse lek sites.
- ✓ Avoid, to the maximum extent possible, new trails within greater sage-grouse priority habitat management areas.
- ✓ Within CPW-mapped greater sage-grouse priority habitat management areas, general habitat management areas, and production habitat, implement seasonal timing restrictions for all trail users between the dates of March 1 and July 15.
- ✓ Limit trail densities (including existing trails) to less than one linear mile of trail per square mile within greater sage-grouse priority habitat management areas, general habitat management areas, production areas, and undesignated habitat.

◆ **Gunnison Sage-Grouse:**

- ✓ Prohibit new trails within 0.6 miles of Gunnison sage-grouse lek sites.
- ✓ Avoid, to the maximum extent possible, new trails within Gunnison sage-grouse occupied habitat and production areas.

- ✓ Limit trail densities (including existing trails) to less than one linear mile of trail per square mile within Gunnison sage-grouse occupied habitat and production areas.
- ✓ Within CPW-mapped Gunnison sage-grouse production areas and within 4 miles of a lek site, implement seasonal timing restrictions for all trail users between the dates of March 1 and June 30.

PREDATORS

◆ Black Bears:

- ✓ For trails, trailheads, campgrounds and other facilities within black bear overall range, install certified bear-proof trash receptacles
- ✓ For established campgrounds and trail use within black bear habitat, implement [CPW Camping and Hiking in Bear Country](#) recommendations and practices.
- ✓ For backcountry camping and trail use within black bear habitat, implement [CPW Backcountry Camping in Bear Country](#) recommendations and practices.

◆ Canada Lynx:

- ✓ Limit trail densities (including existing trails) to less than one linear mile of trail per square mile within Canada lynx breeding habitat.
- ✓ Restrict winter grooming operations to outside the hours of 10pm-4am within lynx breeding habitat.
- ✓ Implement seasonal trail closure of winter trails on May 1 annually within lynx breeding habitat.
- ✓ Avoid trail placement and habitat fragmentation within identified lynx linkages to maintain landscape connectivity.
- ✓ Avoid/limit tree thinning and removal of trees and/or woody debris to protect snowshoe hare habitat within lynx habitat.
- ✓ Discourage the introduction and expansion of snow compaction activities within lynx habitat.
- ✓ Locate winter trailheads, parking areas and access roads outside of lynx habitat.
- ✓ Concentrate activities in existing developed areas, rather than developing new areas in lynx habitat.
- ✓ Plan trail and recreational development, and manage recreational and operational uses to provide for lynx movement and to maintain effectiveness of lynx habitat.

◆ Coyotes:

- ✓ For new and existing trails within areas that have well-documented human-coyote interactions, implement year-round dog-on-leash regulations and consider signage at

trailheads to inform trail users ([Coyotes Active in Area](#), [Protect Your Pets](#), and [Living with Coyotes](#)).

◆ **Mountain Lions:**

- ✓ For trails within mountain lion habitat and in consultation with CPW field staff, implement year-round dog-on-leash regulations..
- ✓ For trails within mountain lion habitat and in consultation with CPW field staff, post signage to inform trail users ([Mountain Lions in Area](#), [Living With Mountain Lions](#), etc.).

RAPTORS and OTHER AVIAN SPECIES

For raptor species that are in [CPW's Raptor Buffer Guidelines Document](#), please refer to the nest buffer distances and avoidance dates located in that document. The below recommendations are for species not included in the Raptor Buffer Guidelines document or where more detailed information/recommendations are necessary to protect the given species.

◆ **Least Tern:**

- ✓ Prohibit new trail construction within 300 feet of the ordinary high water mark of any stream within mapped least tern production areas.
- ✓ Implement seasonal trail closures for all trail users between the dates of April 1 and July 31 within 0.5 miles of mapped least tern production areas.
- ✓ When adjacent to least tern production areas, consult with local CPW field staff to determine if pre-construction field surveys are needed to identify least tern breeding and production area habitats.

◆ **Mexican Spotted Owl:**

- ✓ Prohibit new trail construction within Mexican spotted owl [USFWS designated critical habitat](#) and protected activity centers.
- ✓ Implement seasonal trail closures for all trail users between the dates of March 1 and August 31 within 0.5 miles of Mexican spotted owl USFWS designated critical habitat and protected activity centers.
- ✓ When adjacent to Mexican spotted owl designated critical habitat and/or protected activity centers, consult with local CPW field staff to determine if pre-construction field surveys are needed to identify Mexican spotted owl breeding activity sites.

◆ **Mountain Plover:**

- ✓ Implement seasonal timing restrictions for all trail users between the dates of April 1 to August 15 within 300 feet of active mountain plover nesting sites (pre-construction surveys

within suitable nesting habitat of known range may be required per USFWS survey protocol).

◆ **Piping Plover:**

- ✓ Prohibit new trail construction within 300 feet of the ordinary high water mark of any stream within mapped piping plover production areas.
- ✓ Implement seasonal trail closures for all trail users between the dates of April 1 and July 31 within 0.5 miles of known piping plover nesting sites (pre-construction surveys may be required to identify active nesting sites).

◆ **Southwest Willow Flycatcher:**

- ✓ Avoid removal or disturbance of willow patches, boxelder, salt cedar, and cottonwood stands
- ✓ Maintain a 300-foot buffer from wetlands.
- ✓ Implement weed control measures to prevent establishment of invasive, non-native plant species in riparian areas.
- ✓ Within USFWS proposed critical habitat, contact your nearest USFWS office to satisfy any federal consultation requirements.

◆ **White-tailed Ptarmigan:**

- ✓ Implement seasonal trail closures for all trail users between the dates of May 1 and July 15 within white-tailed Ptarmigan winter habitat and overall range.

SMALL MAMMALS

◆ **Black-footed Ferrets:**

- ✓ Consult with local CPW field staff for trail projects within mapped black-footed ferret release sites. Where deemed necessary, implement seasonal timing restrictions for all recreational users between the dates of May 1 and September 1.

◆ **Gunnison's & White-tailed Prairie Dog Overall Range:**

- ✓ Implement seasonal timing restrictions for all recreational users between the dates of March 1 and June 15 within Gunnison's and white-tailed prairie dog overall range.

◆ **New Mexico Meadow Jumping Mouse:**

- ✓ Prohibit new trail construction within 300 feet of the ordinary high water mark of any stream within the overall range for New Mexico meadow jumping mice.

◆ **Preble's Meadow Jumping Mouse:**

- ✓ Prohibit new trail construction within 300 feet of the ordinary high water mark of any stream within the overall range for Preble's meadow jumping mice.

◆ **Swift Fox:**

- ✓ Implement seasonal timing restrictions for all recreational users between the dates of March 15 to June 15 within 0.25 miles of active swift fox den sites.

◆ **Townsend's Big-eared Bat, Mexican Free-tailed Bat, Myotis species winter hibernacula:**

- ✓ Prohibit new trail construction within 350 feet of the cave or mine entrance for any known winter hibernacula (site where hibernation activity occurs).

RIPARIAN & AQUATIC SPECIES

◆ **Boreal Toads:**

- ✓ Prohibit trail construction within 300 meters of boreal toad breeding sites.
- ✓ Limit tree removal and minimize trail width/winter grooming/snow compaction within boreal toad overall range.
- ✓ Within boreal toad overall range, consult with local CPW field staff to identify and avoid specific boreal toad breeding sites.

◆ **Northern Leopard Frogs:**

- ✓ Prohibit trail construction within 300 meters of wetland ponds.
- ✓ Maintain a 300-foot buffer around Northern Leopard Frog breeding sites (emergent marshes, .
- ✓ Avoid native grass removal and clear-cutting of trees in wet meadows and riparian areas.

Sources:

Anderson, S. H. 1995. Recreational disturbance and wildlife populations. Knight and K. Gutzwiller, editors. *Wildlife and recreationists: coexistence through research and management*. Island Press, Washington, D.C.

Bender, LC, J. G. Cook, R. C. Cook, and P, B Hall. 2008. Relations between nutritional condition and survival of North American elk *Cervus elaphus*. *Wildlife Biology*.

Ciuti S, Northrup JM, Muhly TB, Simi S, Musiani M, et al. (2012) Effects of Humans on Behaviour of Wildlife Exceed Those of Natural Predators in a Landscape of Fear.

Cook, J. G., L. J. Quinlan, L. L. Irwin, L. D. Bryant, R. A. Riggs, and J. W. Thomas. 1996. Nutrition-growth relation of elk calves during late summer and fall. *Journal of Wildlife Management*.

Hebblewhite, M. 2008. A literature review of the effects of energy development on ungulates: Implications for central and eastern Montana. Report prepared for Montana Fish, Wildlife and Parks, Miles City, MT.

Johnson, B.K.,M.J. Wisdom, and J.G. Cook. 2014. Issues of Elk Productivity for Research and Management. Transactions of the 69th North American Wildlife and Natural Resources Conference.

Larson CL, Reed SE, Merenlender AM, Crooks KR. 2016. Effects of Recreation on Animals Revealed as Widespread through a Global Systematic Review.

Naylor, L. M., M. J. Wisdom, and R. G. Anthony. 2009. Behavioral responses of North America elk to recreational activity. *The Journal of Wildlife Management*

Parker, K. L., M. P. Gillingham, T. A. Hanley, and C. T. Robbins. 1999. Energy and protein balance of free-ranging black-tailed deer in a natural forest environment. *Wildlife Monographs*

Phillips, G.E and Alldredge, A.W. 2000. Reproductive success of elk following disturbance by humans during calving season. *Journal of Wildlife management*.

Preisler, H. K., A. A. Ager, and M. J. Wisdom. 2013. Analyzing animal movement patterns using potential functions. *Ecosphere* 4(3):32.

Taylor A. R., and R. L Knight. 2003. Wildlife response to recreational and associated visitor perceptions. *Ecological Applications*.

Trombulak, S.C. and C.A. Frissell. 2000. Review of the ecological effects of roads on terrestrial and aquatic communities. *Conservation Biology*.

Wisdom, M. J., A. A. Ager, H. K. Preisler, N. J. Cimon, and B. K. Johnson. 2004. Effects of off-road recreation on mule deer and elk. Transactions of the North American Wildlife and Natural Resources Conference

Wisdom, M. J., H. K. Preisler, L.M. Naylor, R.G. Anthony, B.K. Johnson, M.M. Rowland. 2018. Elk response to trail based recreation on public forests. *Forest Ecology and Management*

How Might We Plan Trails and Protect Wildlife? Advisory Group Session Summary Themes

The following summarize the major themes identified from conversations with conservation groups, recreation groups, and other outdoor stakeholders around the state. These themes are not exhaustive of every comment, but rather elevate the common areas of suggested focus for the revised document.

- **Increased collaboration between science and recreation interests, especially early on in the process.** There were many mentions of how important it is to bring wildlife and recreation interests to the table very early on to define the “outer limits” of success for the project. Those conversations contribute to understanding the requirements of the project before too much investment has occurred. There were multiple suggestions to bring wildlife experts into the process very early on to identify challenges and consult with trail planners directly.
- **Increased wildlife science considerations in the project evaluation.** There was broad consensus that a heavier emphasis on wildlife considerations during the planning and review process was necessary for successful projects. However, it was also noted that the science being included should be sound and peer reviewed to remove doubt about “which science is most valid.”
- **Increased broad public participation in planning stages.** It is critical to bring multiple stakeholders to the table early on in the process, and to ensure that those stakeholders have a real influence on the direction of the project.
- **Clear public communication and education.** Answering the “why” for seasonal closures, restrictions, lack of trails in an area is critical to compliance. Public education, both during trail planning and after construction, has a significant positive impact on trail user behavior, as well as helping the public understand why trails can or can’t be built in certain areas.
- **Seasonal trail closures.** There was broad consensus that seasonal trail closures have been an effective method of management. More specifically, seasonal closures with physical barriers (gates) or active monitoring (increased patrols) were the highest regarded systems.
- **Increased focus on maintenance of existing trails.** There is broad support for increased funding and support for maintenance of existing trails, and on realignment of unsuitable trails over new trail creation.
- **Increased public access to scientific findings.** There was a desire by those engaged in the work of advocating for and planning trails to have tools and easily accessible science to better inform decision-making. Landscape level GIS information, accessible (both in location and readability) peer reviewed science for the local area, and greater access to local wildlife

experts were identified as areas that would improve project planning. These tools would help non-scientific planners and advocates understand the outer limits of trail development in an area, and could reduce the amount of frustration involved in learning about wildlife or science considerations too late in the process. The ability to anticipate those wildlife-related questions early on helps with the process.

- **Increased consideration of human psychology and desires in trail recreation.** It was shared multiple times that it is important to not only look at the science surrounding wildlife impact and environmental protection, but also understanding the human behavioral factors that lead to that impact. Where do humans want to recreate (near water, access to peaks, etc), how do they want to recreate (use types based on region), and how do they consume information (signage, education, communication methods)? These variables should be factored into a holistic understanding of not only the science behind wildlife's response to humans, but also how human behavior influences trail development and wildlife impact. The document doesn't want to do everything, but visitor use management is really important in considering trails and has led to a lot of the conflicts, rather than designs of the trails themselves. We've often seen less attention to the ancillary effects of those trails
 - primitive camping, human waste, parking and road impacts. It's more a question of the way humans react around trails more broadly when it comes to the overall impact
- **Define where this document fits in the larger context of guidance and policy.** There are many efforts underway to deal with wildlife and recreation around the state - how does this document stand out and what unique value does it provide in the context of other efforts like regional partnerships, federal guidelines, etc.
- **Access to trails in underserved populations.** There is a question of equitable access to recreation in this conversation as well. Restricting trail development broadly can have an adverse impact on underserved communities and their participation in outdoor recreation. For instance, a recent grant has catalyzed more trail development in Alamosa city open space, and that is increasing the health and wellness of our youth and families and gives us a closer place to recreate. It's important to recognize that some areas of the state don't have the existing trail systems and infrastructure as the front range, so we have different challenges that maybe don't focus so much on maintenance but more on new trails. We need to balance the recreation economies of those more rural towns and their stage of trail development with environmental aspects and other concerns. In these communities that have the potential for more development of community trails, it will be important to work with County and Municipal Governments to ensure wildlife and cultural assessments are completed. We have heard loud and clear directly from our communities that there is a need to provide more equitable access to open space for under resourced neighborhoods in communities.