A Landscape Level of Integrated Valued Ecosystems Program and its Contribution to the I-70 Mountain Corridor Programmatic Environmental Impact Statement

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A Landscape Level of Integrated Valued Ecosystems Program and its Contribution to the I-70 Mountain Corridor Programmatic Environmental Impact Statement

1. Introduction

In 2004, Colorado Department of Transportation (CDOT) published a Draft Programmatic Environmental Impact Statement (PEIS) to address transportation issues in the I-70 Mountain Corridor. The Draft PEIS was prepared by J.F. Sato and Associates (JFSA) and contained considerable information on wildlife, their habitat, and the barrier effect that a major highway has on wildlife. Wildlife information in the Draft PEIS was compiled, in part, by the ALIVE Committee (A Landscape Level of Integrated Valued Ecosystems), a multi-agency committee of wildlife professionals.

In early 2007, the Southern Rockies Ecosystem Project (SREP), a private, non-profit organization working to protect and restore ecological integrity throughout the southern Rocky Mountains by connecting networks of land and networks of people, approached JFSA about background information on the ALIVE Committee. Specifically, SREP was interested in the process that the ALIVE Committee followed in preparing the wildlife information and mitigation measures for wildlife, especially for proposed wildlife crossing structures in the Corridor.

With the concurrence of CDOT, JFSA has prepared this document to respond to the SREP inquiry.

- Section 2 of this document presents the background and purpose of the ALIVE Committee and describes the political framework that led to the creation of the ALIVE Committee.
- Section 3 describes how the committee was formed under the auspices of CDOT and includes a review of the Committee's mission, meeting schedule, and the deliberative process that was used. Because the Committee was a multi-agency effort, the Memorandum of Understanding is presented in Appendix A.
- Section 4 presents general background discussions of wildlife issues and pressures that exist in the I-70 Corridor. The wildlife issues and pressures were prepared by JFSA for the Draft PEIS and were used by the ALIVE Committee to assist in their evaluation of potential impacts and formulation of mitigation measures.
- One of the major efforts of the ALIVE Committee was the identification of wildlife linkage interference zones (LIZ). Section 5 describes this effort and presents unpublished information from the ALIVE Committee meetings. Appendix B presents a summary of the ALIVE Committee meeting notes.
- Section 6 identifies the information from the ALIVE Committee that was actually published in the Draft PEIS, and Appendix C presents excerpts from the Draft PEIS.
- Section 7 presents the final ALIVE recommendations for wildlife mitigation in each LIZ along the I-70 Corridor.

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2. Background and Purpose of ALIVE

As part of a streamlining program, CDOT initiated the ALIVE program in response to strategic planning efforts by Federal Highway Administration (FHWA) as contained in Section 1309 of the Transportation Equity Act for the 21st Century (TEA-21) of 1998. Seven federal agencies, including the US Department of Transportation, signed a Memorandum of Understanding (MOU) endorsing the strategic planning effort. Under this national framework, the states formulated their own strategic action plans to implement TEA-21. CDOT prepared an action plan and a draft MOU for state resource agencies. In the MOU, the I-70 Mountain Corridor was included as a "pilot project" to test new ways of cooperatively addressing concerns and mitigation early in the planning process. The Draft PEIS for the I-70 Mountain Corridor emphasized (1) proactive agency coordination and public involvement programs and (2) a work plan that includes directions to develop scopes of work for each resource area. The scopes of work were developed in coordination with the respective agency representatives to achieve agreement or acceptance.

In 2000, CDOT started the environmental streamlining program for the I-70 PEIS related to wildlife conservation by contacting various state resource agencies and convening organizational meetings that led to the creation of the ALIVE Committee. The program was intended to streamline activities related to special status plant communities, species habitats, ecological processes, and the barrier effect of the Corridor for early coordination and up-front interagency agreement on priorities for the I-70 Corridor. The streamlining goals included not only enhancing the timeframe normally needed to secure interagency agreement but also optimizing expenditures for wildlife enhancement and mitigation toward the best application along the I-70 Corridor.

The primary issue affecting wildlife in the Corridor is the interference of I-70 with wildlife movement and animal-vehicle collisions (AVCs). Barriers to wildlife movement include structural, operational, and behavioral impediments to wildlife trying to cross I-70. The potential for increased structural barriers was analyzed in the PEIS based on horizontal (additional lanes) and vertical (walls, Jersey and Texas barriers, fencing), and operational (guideway systems, rail systems) components that would present various kinds of barriers to wildlife movement across the I-70 Corridor.

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3. The ALIVE Committee

Following an organizational meeting by CDOT Office of Environmental Services (OES) on March 7, 2000, and agency contacts, the first ALIVE Committee meeting was convened on February 9, 2001. CDOT and FHWA enlisted four other agencies—Colorado Division of Wildlife (CDOW), US Bureau of Land Management (BLM), US Forest Service (Forest Service), and US Fish and Wildlife Service (USFWS)—to participate in the program to address the barrier effect issues of the Corridor. The specific member agencies of the ALIVE Committee were:

- Arapaho-Roosevelt National Forests (ARNF)
- Colorado Department of Transportation
- Colorado Division of Wildlife
- Federal Highway Administration
- Bureau of Land Management
- US Fish and Wildlife Service
- White River National Forest (WRNF)

The ALIVE Committee was composed of wildlife professionals from agencies with jurisdictional concerns in the Corridor. The objective was to streamline agency activities for early coordination and up-front interagency agreement on priorities for the Corridor. Goals included not only to enhance the timeframe normally needed for interagency agreement but to optimize expenditures for wildlife enhancement and mitigation for the best application along the Corridor. Appendix A provides the MOU signed by the agencies.

The mission of the ALIVE Committee was stated as follows:

"It is the intent of the Parties to increase the permeability of the I-70 Corridor to terrestrial and aquatic species, including but not limited to deer, elk, the boreal toad, fish (for example, greenback cutthroat trout), and forest carnivores (for example, Canada lynx). This includes development of management strategies that will result in the long-term protection and restoration of wildlife linkage areas that intersect the I-70 Corridor, improve habitat connectivity, and preserve essential ecosystem components."

To meet this intent, the following actions were undertaken:

- Designation of key wildlife habitat, including Canada lynx habitat
- Identification and characterization of LIZs
- Analysis of specific conflict areas for wildlife crossing the roadway within the LIZs
- Recommendations for mitigating conflicts through wildlife crossings and other techniques including fencing and land conservation strategies
- Evaluation of goals for the development of conservation measures such as the design of structures suitable for wildlife crossings, and protective land purchase to preserve habitat linkage for lynx and other wildlife species in the Corridor

Because the first meeting was attended by 28 persons, the large group agreed to form a subgroup of one or two persons from each agency who would be

responsible for coordinating the data gathering at each agency and working with the consultant (J.F. Sato & Associates) doing the geographic information system (GIS) mapping for the PEIS. The chronology of the 16 meetings was as follows:

- February 9, 2001
- March 15, 2001
- April 19, 2001
- May 23, 2001
- August 15, 2001
- September 20, 2001 (teleconference)
- October 1, 2001
- November 27, 2001
- March 6, 2002 (Workshop with SWEEP)
- July 30, 2002 (MOA Group)*
- August 27, 2002 (MOA Group)*
- September 30, 2002 (MOA Group)*
- October 28, 2002 (MOA Group)*
- November 20, 2002 (MOA Group)*
- January 14, 2003
- March 6, 2003

*Memorandum of Agreement

Discussions from the ALIVE Committee meetings were recorded as part of the administrative record for the PEIS. The meeting minutes comprise more than 250 pages of notes and transcripts. This record, including lists of attendees, was summarized on a meeting-by-meeting basis and is presented in Appendix B.

As a result of their efforts, the ALIVE Committee made significant contributions to the PEIS. A wide range of ecological data was collected and evaluated, including assessments of high-value conservation sites as well as impaired landscape components, all of which helped target effective landscape-level mitigation strategies. All data used were gathered in spatial formats using GIS-based analytical tools. This approach supports a long-term strategy for identifying direct, secondary, and cumulative effects of alternative actions. The Committee also recommended site-specific mitigation measures that would enhance the permeability of the I-70 Corridor to wildlife crossings.

4. Wildlife Issues and Pressures in the I-70 Corridor

The Corridor and surrounding area contain various man-made features that influence the structure and function of the natural environment. The I-70 Draft PEIS identified interference with wildlife movement due to the barrier effects created by I-70 as one of the most serious issues affecting wildlife in the Corridor. Highways, roads, towns, single-home sites, and recreational developments along the Corridor influence which areas are available for wildlife. Current and historic human activities within the Corridor have been instrumental in creating the current distribution of habitats and wildlife species in the Corridor. Important man-made factors include fire regime, mining, agricultural development, livestock grazing, land development, road construction, and recreation development. Secondary or indirect impacts from these activities include non-native plant invasions, degraded water quality, and human intrusion into wildlife habitats. Although mining, logging, and grazing historically had the greatest influence, human settlements currently have the greatest indirect effect on the natural systems in the Corridor. Because development tends to be concentrated in the valley bottoms, some of the most notable effects are loss of high-quality riparian, wetland, and floodplain habitats and habitat fragmentation that includes reduced access to these habitats.

Figure 1 illustrates the relationships of key wildlife habitats, lynx linkage areas, and LIZs. Lynx linkage areas are areas with suitable lynx habitat on both sides of the Corridor and where lynx are thought to cross the Corridor. LIZs are areas with suitable habitat for various species located on both sides of the Corridor and where those species have traditionally traveled. This diagrammatic illustration is provided for comparison of key biological features throughout the Corridor.

4.1 Existing Highway-Related Impacts

The footprint of the existing highway occupies relatively little habitat, compared to the amount available in the surrounding area. However, because I-70 is often located along valley bottoms throughout the Corridor, it impinges upon some of the less common and more valuable habitats in the area of potential effect. In general, valley bottoms contain watercourses that support riparian vegetation and wetlands. These habitat types are important to a wide variety of wildlife in Colorado and are easily compromised by disturbance.

Fragmentation of large animal ranges/habitats and movement corridors caused by I-70 is an even more important issue than habitat loss. Identification of LIZs was used to estimate the amount of movement interference caused by the existing highway in the Corridor. LIZs are locations along the Corridor where evidence suggests that the existing highway's barrier effect impedes traditional wildlife movement patterns. LIZs were identified based largely on expert opinion and the location of existing barriers to at-grade crossings, including guardrails and fencing. AVC data were also considered. A high rate of AVCs in an area was assumed to indicate that that portion of the highway intersected an important animal movement corridor. Additional information about historic movement patterns of mule deer, elk, bighorn sheep, and, when data were available, carnivores, was also considered.

The Colorado State Patrol reported a total of 923 AVCs in the Corridor for the 1990 to 1999 period. These data are considered an incomplete picture of AVCs along the Corridor because only animals large enough to damage a vehicle when struck were included, and only a small number of those AVCs are reported. Based on interviews with Department of Transportation and wildlife agency personnel nationwide, Romin and Bissonette (1996) estimated 16 to 50 percent of all AVCs are reported. A study conducted in Nevada compared observed roadkilled deer to reported AVCs along a stretch of highway and estimated that only 20 percent of AVCs were reported (Messmer et al. 2000).

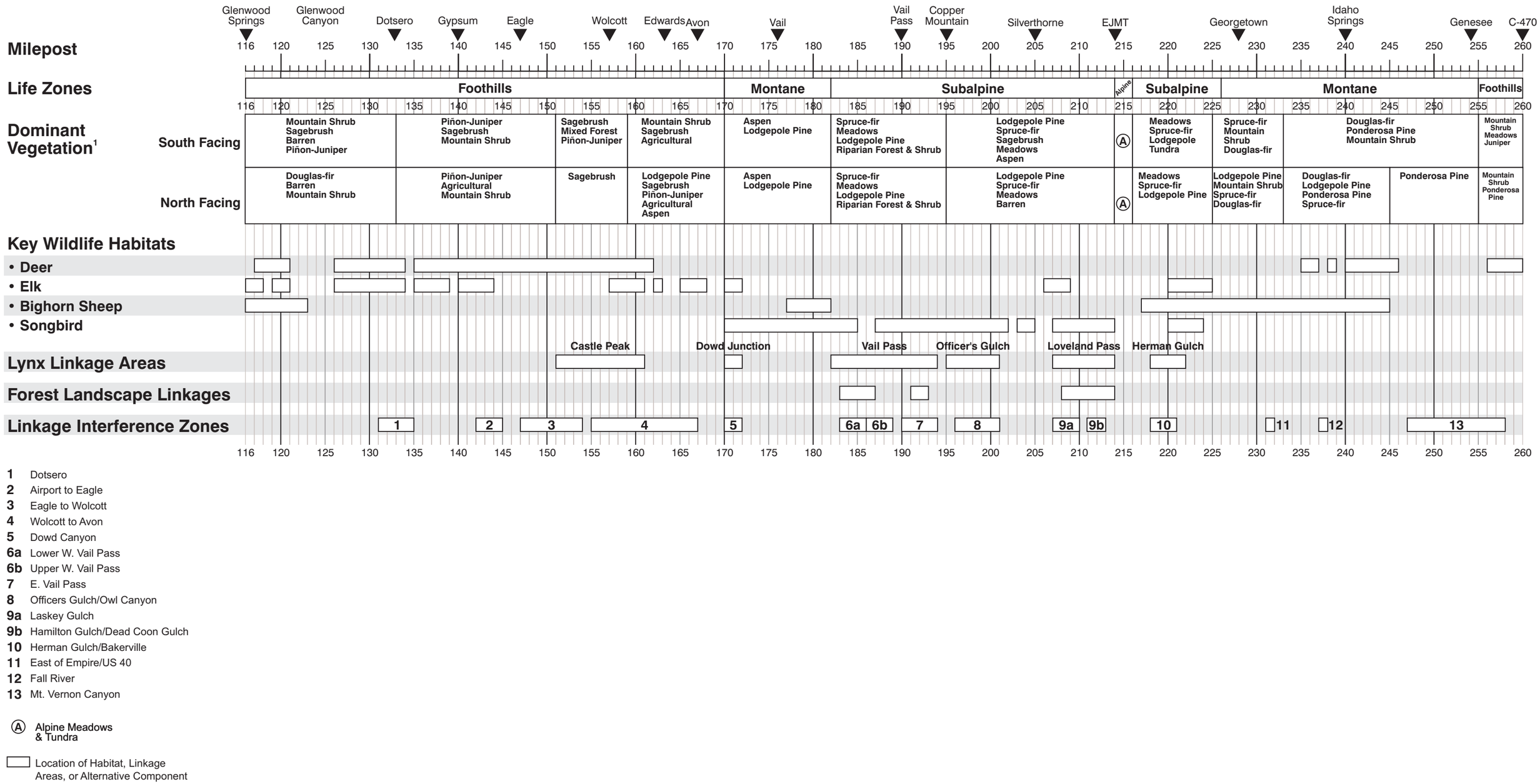
Forman and Alexander (1998) coined the term "road effect zone" to encompass a wide range of impacts on wildlife including noise and traffic disturbances, as well as input of contaminants into habitats from road maintenance and operations. The width of the road effect zone varies with species and terrain (Singleton et al. 2002). Rost and Bailey (1979) indicated effects occurred approximately 600 feet for mule deer and elk in forest habitats but could extend up to 1,200 feet in shrub habitats. Forman and Deblinger (2000) addressed moose, deer, amphibians, forest birds, and grassland birds and calculated an average road effect zone of almost 2,000 feet for their Massachusetts study. Influences of highway activity and noise may be greater for the more sensitive species such as lynx or wolverine and may limit their movements through areas adjacent to the road (USDA 2002a,b). Winter maintenance material used to improve traction and/or melt ice from roadways is known to affect downstream (downgradient) habitats. Sand is especially evident at the higher elevations of the Corridor, such as on Vail Pass and approaches to the Eisenhower-Johnson Memorial Tunnels (EJMT) where application is more frequent than at lower elevations. CDOT is currently studying the means to control winter maintenance material and reduce the amount that escapes the roadway.

4.2 Development Influence

In addition to I-70, human population centers, increasing development, and human intrusion act as barriers to wildlife that historically crossed the Corridor in their migration or daily movements. Animals cross such barriers to access key habitats that supply forage, prey, cover, and water; to repopulate additional areas; and to fulfill breeding and young-rearing requirements. Transportation corridors and the communities that have developed have been a prominent cause of habitat fragmentation in the Colorado mountains in general (USDA 2002b). Mountain valleys that contain important habitats and serve as wildlife migration and movement pathways are often subject to development.

4.2.1 Wildlife and Threatened, Endangered, and Special Status (TES) Species Issues

The most important wildlife cumulative effects issues associated with the I-70 project include planned development in the Corridor, possible induced growth associated with the project, fragmentation of habitat, and barrier effects on wildlife movement.



1 Dotsero
2 Airport to Eagle
3 Eagle to Wolcott
4 Wolcott to Avon
5 Dowd Canyon
6a Lower W. Vail Pass
6b Upper W. Vail Pass
7 E. Vail Pass
8 Officers Gulch/Owl Canyon
9a Laskey Gulch
9b Hamilton Gulch/Dead Coon Gulch
10 Herman Gulch/Bakerville
11 East of Empire/US 40
12 Fall River
13 Mt. Vernon Canyon

Ⓐ Alpine Meadows & Tundra

▭ Location of Habitat, Linkage Areas, or Alternative Component

Figure 1. Project Alternatives in Relation to Life Zones, Dominant Vegetation, and Key Wildlife Areas

4.2.2 Geographic Scope

Figure 2, Cumulative Impacts Analysis Study Area, illustrates the geographic scope of the analysis. The study area encompasses portions of the Eagle River, Blue River, and Clear Creek watersheds adjacent to I-70 that are within the immediate development influence zone, based on a compilation of future land use zoning. In addition, cumulative effects on the regional economy and employment from the project are addressed within a nine-county region, including Garfield, Eagle, Pitkin, Summit, Lake, Park, Grand, Gilpin, and Clear Creek counties. The Colorado River watershed is not included in the cumulative impacts study area because project impacts would be extremely limited or nonexistent.

4.2.3 Cumulative Effects Baseline (Past and Present)

Many factors have influenced natural ecosystems within the Corridor, including transportation, community development, mineral exploration, grazing, increased fire frequency, and, conversely, fire suppression. These factors have contributed to the creation of barrier effects on wildlife movement, habitat fragmentation, increased impervious surface, modified vegetation composition and wildlife habitats, erosion, and the increase and spread of weeds, including those that are considered noxious.

Human development has had, perhaps, the greatest effect on natural systems throughout the Corridor (USFS 2002b). Relatively large areas of vegetation have been removed or altered in conjunction with the larger concentrations of developments. One of the most notable effects of such development along the Corridor over approximately the last 120 years is habitat fragmentation. Habitat fragmentation occurs when large patches of habitat are divided into smaller patches, and the connections between these smaller patches are compromised or lost. A timber sale area or an isolated area of land use conversion also serves to disrupt connectivity and is considered a habitat “perforation.” Factors that reduce connectivity between habitats include community development, associated road systems, and fencing. If individual animals cannot move freely between habitat patches, entire populations may become separated. As a consequence, each smaller population becomes more susceptible to genetic degradation and extirpation from a single catastrophic event, such as a disease outbreak (Jackson 1999). Recent resort development, including ski areas and golf courses, has also reduced the amount of habitat available in some parts of the Corridor. Human intrusion into adjacent habitats from these areas further reduces the amount of habitat available to federally listed species. Another effect of development is the introduction of weed species that often gain a foothold when land is cleared for construction.

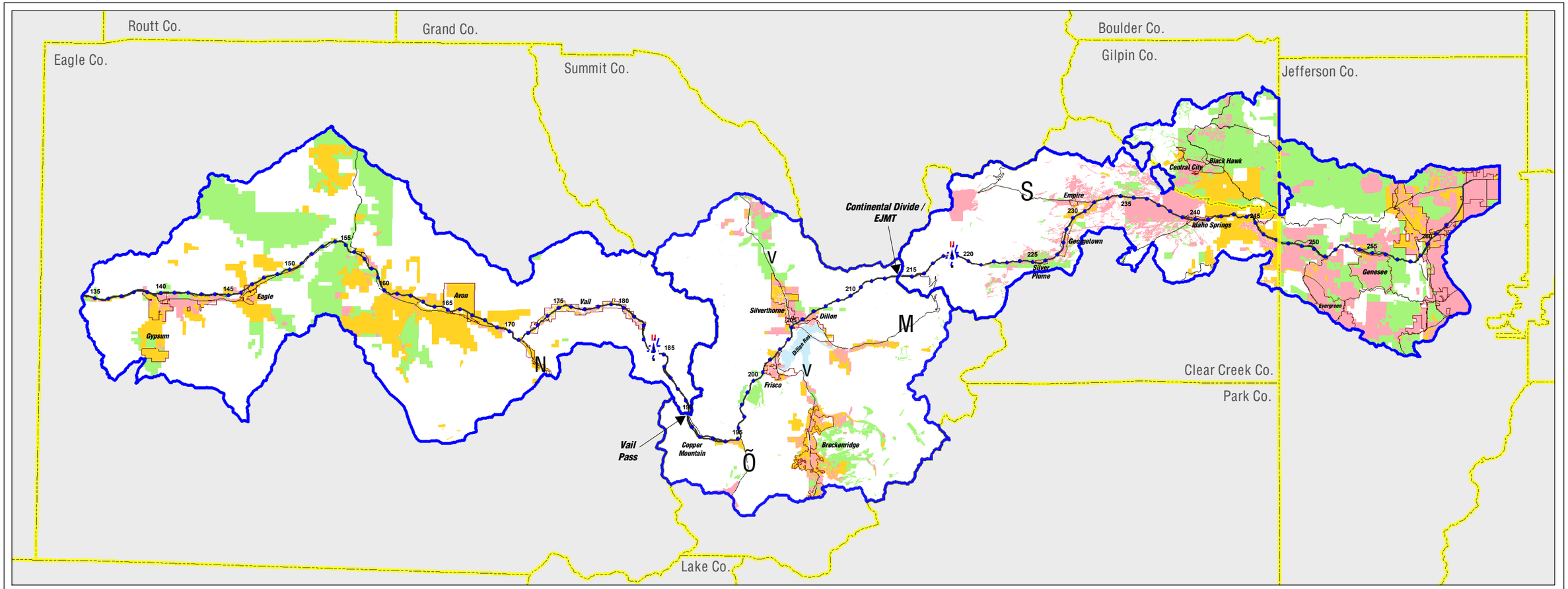
I-70 has become a barrier to wildlife movement, especially where the interstate interferes with linkage areas. Effects on wildlife and plants are difficult to quantify, although the construction of I-70, along with other roads in the vicinity, has caused considerable habitat fragmentation (USFS 2002b). The road effect zone, as defined by Forman and Alexander (1998), varies depending on adjacent terrain and habitats, with noise extending farther into more open habitats than forest habitats. Noise from traffic also affects the use of adjacent habitat to varying degrees by different species, depending on their sensitivity. Other road effects along I-70 include the change of both surface and groundwater flows that are bisected and often diverted beneath I-70 in culverts. The degradation of roadside habitats from traction sand and chemical deicers is another road effect. Finally, the ability of animals to physically cross the road ("crossability") is another important element of the road effect. Small animals cannot climb over Jersey barriers or are relatively slow-moving, and large animals are subject to AVCs.

Referring to Figure 2, it is clear that the planned urban and rural development will increase the amount of developed areas in the three watersheds by a tremendous amount. Currently, 4 percent of the Eagle River watershed (HUC 6) is developed, but plans are that by 2025, the developed area will be 29 percent. The Blue River watershed is currently 5 percent developed and is projected to be 18 percent developed in 2025. Development has been affecting the Clear Creek watershed for several years, and it is currently 13 percent developed. By 2025, development in the Clear Creek watershed is projected to be 68 percent.

AVCs were documented from 1988 to 1998 along I-70. The average rate of AVCs was 0.6 collisions per mile per year (collisions/mile/year), but AVCs at different locations ranged from 0.0 to 2.4. The data indicated that LIZs with AVCs of 1.4 or less could be considered "normal" and AVCs greater than 1.4 could be considered a trouble spot where animals were frequently trying to cross I-70. Of the 15 LIZs along the Corridor, the greatest rate of AVCs (2.4) was in LIZ 13, Mount Vernon Canyon. The second highest AVC (1.4) was reported for LIZ 1 near Dotsero. These two LIZs are in the foothills or low-elevation montane life zones. All other LIZs had AVCs below 1.2, and two LIZs had zero AVCs.

4.2.3.1 Growth Effects

Corridor populations in mining areas experienced "boom and bust" cycles from the 1850s to the 1890s. Access provided by the initial construction of I-70 spurred Corridor population growth from the late 1950s to the current time. Corridor counties (encompassing a nine-county area) are projected to grow by 100 percent from 2000 to 2025. Past trends in Corridor population growth and I-70 traffic are evident, based on population and Annual Average Daily Traffic (AADT) data since 1985. Based on past growth patterns (past 15 years), the population in Eagle County has grown at the greatest rate in relation to I-70 traffic, and this relationship is expected to continue into the future. Summit County population growth can also be related to I-70 traffic growth but is not as sensitive to such growth as Eagle County. Based on past growth patterns of population and traffic, Garfield County was not found to be particularly sensitive or susceptible to possible induced growth from project alternatives.



EAGLE RIVER WATERSHED Study Area

BLUE RIVER WATERSHED Study Area

CLEAR CREEK WATERSHED Study Area

RESOURCE DESCRIPTION		Geographic Areas (Aggregated HUC 6 Watersheds)	Acres	Past, Present, and Future Development Activities in Corridor: COUNTY AND TOWN DEVELOPMENT — Historic and Existing (Before I-70 and 2000 Eras)	Planned Urban Development (Zoning and FLUM*)	Planned Rural Development (Zoning and FLUM*)	Total	FOREST MANAGEMENT, RECREATION, OPEN SPACE — Special Management Areas (Wilderness, Nonmotorized, Open Space)	Active Recreation Management Areas (Developed Recreation, Motorized, Ski Areas)	ROADS AND HIGHWAYS — Roads (Not Including I-70)	Existing I-70 (Footprint and Roadside Cut and Fills)
				acres / percent	acres / percent	acres / percent	acres / percent	acres / percent	acres / percent	miles / acres / percent	miles / acres / percent
SELECTED HUC 6 WATERSHED AREAS	Watershed areas in acres (HUC 6) adjacent to I-70 Corridor (includes existing and future development)	Eagle River	342,820	13,187 4%	38,377 11%	47,703 14%	100,247 29%	149,932 44%	91,507 27%	900 / 13,642 / 4%	58 / 1,653 / 0.5%
		Blue River	222,420	10,476 5%	13,261 6%	16,799 8%	40,536 18%	140,796 63%	46,838 21%	600 / 9,094 / 4%	24 / 1,039 / 0.5%
		Clear Creek	287,370	37,597 13%	59,915 21%	68,856 24%	196,713 68%	50,277 17%	87,097 30%	1,490 / 23,500 / 8%	46 / 1,589 / 0.6%
		Total	852,610	61,240 7%	99,965 12%	113,558 13%	337,486 40%	336,178 39%	196,249 23%	2,990 / 46,236 / 5%	126 / 4,280 / 0.5%

Existing Development (includes mining - Clear Creek Co.)

Planned Urban Development

Planned Rural Development

Forest Management / Open Spaces

Watershed Study Area

Surrounding Counties

0 2.5 5 10 Miles

0 2.5 5 10 Kilometers

N W E S

SCALE - 1:468,000 or 1" = 39,000'

Cumulative Impacts Analysis Study Area
Figure 2

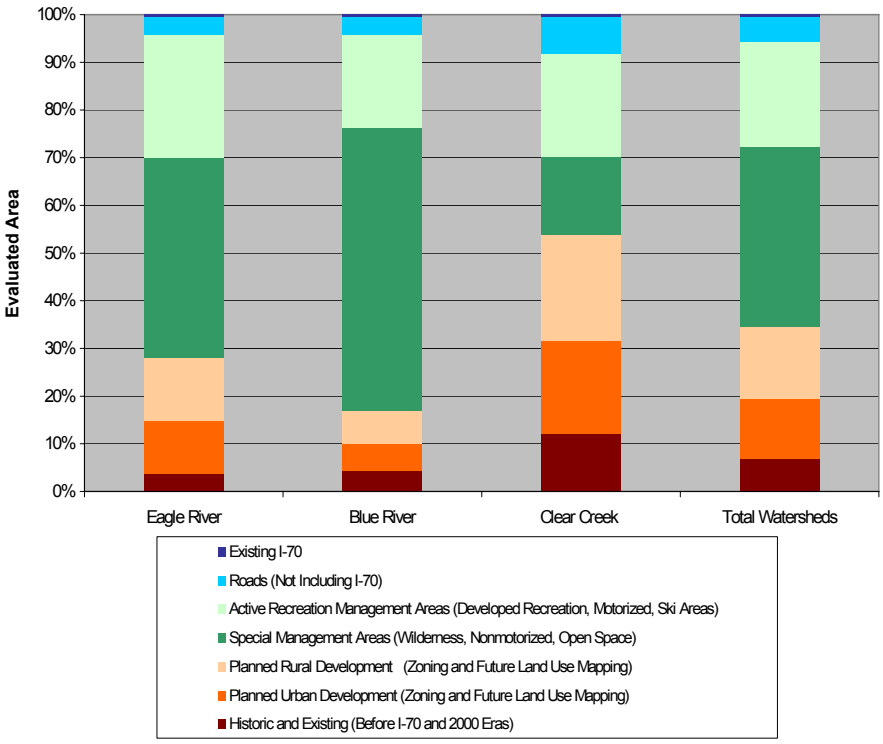
I-70 has influenced land use patterns in the Corridor since it was built. A relationship among growth in I-70 traffic, land use change, and population increases in the Corridor region over the past 15 years suggests that changes in future travel demand due to increased capacity of I-70 would be growth-inducing to the region. Corridor land use before I-70 was constructed was predominantly associated with tourism, mining, and agriculture. Changes in future travel demand would continue to affect land use in the region. Susceptibility to changes in population due to induced or suppressed travel demand would be limited to Eagle and Summit counties. Clear Creek County is not expected to experience growth-inducing effects from project alternatives (as discussed in Chapter 3, Section 3.9 of the Draft PEIS).

4.2.3.2 Estimate of Land Use Growth in Watersheds

Chart 1 provides the percentage of existing and planned land use within the cumulative study area. A primary area of interest for cumulative impacts is the high degree of planned urban and rural developments in relation to existing development and land use as a whole. “Past and present” actions are represented by historic and existing development, while “reasonably foreseeable future” actions are represented by planned development.

The total area of planned urban and rural development in the combined watershed area (approximately 246,000 acres) is four times the existing developed area (61,240 acres). Planned development is expected to increase the total developed area within the watersheds from approximately 7 percent to 35 percent (approximately 307,000 acres). The remaining watershed area is in forest management, recreation, and open space uses. Existing I-70 is estimated to represent 0.5 percent of the evaluated land area, while other roads and highways represent 5 percent of the area. The area reported for roads and highways overlaps with the developed and forest management land area. Chart 1 also shows the relative percentages of land use types by watershed and for the total three-watershed area.

Chart 1. Past, Present, and Reasonably Foreseeable Future Actions in Watershed Study Area



4.2.3.3 Cumulative Effects on Threatened, Endangered, and Sensitive Species

Threatened, endangered, and sensitive species in the Corridor have been affected by increased human intrusion from land development into their habitats and their movement corridors, as well as by habitat losses. Most of the habitat for these species occurs on National Forest System and BLM lands, which afford management and protection from direct habitat losses. However, increased use of these areas for recreation has increased the potential for human disturbance to wildlife and vegetation. I-70 currently and in the future would contribute the following effects for different classes of species:

1. For mobile (wide-ranging) species, the highway is a barrier with the potential for AVCs and direct mortality. Lynx, for example, have large home ranges that are likely to be affected by future land development. Lynx linkage areas have been identified on National Forest System and BLM lands along the Corridor and include the following areas:

    - Dowd Canyon connects north and south habitats. Residential development on the north along the Eagle River and to the south toward Minturn is expected to affect lynx crossing in this area.
    - West Vail Pass is an ideal linkage between habitats and might be affected by increased winter recreation use.
    - Officers Gulch connects habitat between the Tenmile Mountain Range, the Leadville area, and the Eagles Nest Wilderness Area. Continued development of the Breckenridge area will affect this linkage, which is the principal lynx habitat connection between Copper Mountain and Frisco.

- Laskey Gulch is part of a large linkage area that connects Loveland Pass, Peru Creek, and Jones Gulch. Continued development in parts of this linkage (such as in Keystone Resort, Jones Gulch, Breckenridge-Frisco area) will affect wildlife movements.
- Herman Gulch connects lynx habitat north and south of the Clear Creek drainage. Increased recreation that occurs from increased access and population centers outside the area is likely to affect the lynx (and other sensitive species).

2. For localized ground-dwelling species, the highway is a barrier with the potential for AVCs, direct mortality, and habitat removal that would affect many individuals, especially small mammals and amphibians. Possible cumulative effects would include:
   - Encroachment and disturbance on wildlife habitat as a result of development activities, recreational use, and roadways
   - Barrier effects and movement interruption (between traditional habitat areas) caused by rural development and roadways
   - Fragmentation, decreased connectivity, and "habitat isolation" of wildlife habitat caused by rural development and roadways
   - Displacement of sensitive wildlife populations
   - Direct mortality

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5. Linkage Interference Zones

LIZs are areas along the Corridor where the wildlife evidence suggests that the I-70 barrier-effect impedes traditional wildlife movement through historic wildlife corridors. These corridors include migration routes and pathways used by a species to access required parts of their habitat on a more frequent basis than seasonally. In all instances, these movement pathways connect two important components of a species' habitat needed to complete their lifecycle. When I-70 is in between those two components, the Corridor interferes with movement in the habitat. The specific information used to define LIZs that was provided by the agencies is discussed in the following paragraphs.

Numerous datasets were readily available for the analyses, including data complied by the Colorado Natural Heritage Program (CNHP), Forest Service, BLM, CDOW, CDOT, and local counties and municipalities. Data sets of interest for the ALIVE program included both natural and manmade components of the landscape.

The Forest Service maintains vegetation datasets derived from 1:12,000 to 1:24,000 scale aerial photography that served as a primary base for habitat analyses for species inhabiting the respective forests. On a regional scale, the Geographic Analysis Program (GAP) data, a satellite-based mapping and classification of vegetation, was used to supplement Forest Service vegetation data, which did not include an inventory of non-forest lands. GAP data have a resolution ranging from 25 meters to approximately 1 square kilometer and was, therefore, used only to supplement the Forest Service vegetation datasets due to the low accuracy of the data. Forest Service watershed boundaries for the state were used for habitat analyses.

The Wildlife Resource Information System (WRIS), operated through CNHP, maintains data for a variety of species and served as the primary source of species distribution data at the watershed and regional level. The Arapaho and Roosevelt, White River, and Pike/San Isabel National Forests provided additional digital datasets of species distribution information, including Lynx Analysis Unit (LAU) datasets for each respective forest district. Maps were produced to show the distribution and shared habitats of key species, including but not limited to Canada lynx, elk, mule deer, black bear, mountain lion, and wolverine. Watersheds supporting boreal toad populations were identified and considered in the analysis process.

For inventory and analysis on a local scale, digital, high-resolution 0.5-meter color infrared aerial photography from 2000, covering approximately 0.5 miles on each side of I-70, was used and served as a base for mapping purposes. Through data sharing agreements, additional high-resolution aerial photography was used from Clear Creek and Eagle counties. Primary data collection for the Corridor included a terrestrial photographic and spatial inventory of all bridges, culverts, drainage structures, guardrails, and median barriers. Existing impedances, including walls and cut-and-fill slopes, were included in the analysis. CDOW District Wildlife Managers (DWMs) provided input on species activity through the Corridor and supplemented WRIS data with detailed knowledge of specific locations, including site-specific AVC data.

Through data agreements with local counties, GIS-based land use parcel and zoning data were obtained and used to identify existing and future potential

wildlife habitat conflict areas. AVC data in the form of "hot spots" were also used when available on the wildlife maps. Hot spots indicate areas where animals are more likely to attempt to cross I-70 and are areas that depart significantly from the average number of AVCs/year/mile for every 1,000 vehicles for the whole study area (CDOT 2001). Ultimately, this led to the development of LIZ maps displaying the host of impedances to wildlife through the zones, including median and guardrail barriers and land developments. All the LIZs are shown in Figure 3, and the 15 individual LIZ maps are presented as part of Appendix C. Existing crossing structures were also inventoried and displayed on the maps with terrestrial photos to display the relative dimensions and setting.

5.1 Habitat Ranking and Analysis

A key focus of the ALIVE program was the identification of natural landscape features important to specific ecological functions and impaired landscape features not functioning properly. A wide range of ecosystem components including, but not limited to, contiguous blocks of habitat, wildlife linkages, migration routes, vegetation, slope, and summer and winter ranges and concentrations were studied. Obvious gaps between blocks of habitat, fragmented ranges of elk herds or deer herds, barriers to animal movement, blocked flows of streams and wetlands, and habitats threatened by development were identified and analyzed. Areas of development and unsuitable habitat were, in turn, identified as a part of the process. The findings of this analysis represent a component of an effective mitigation plan for the entire Corridor.

A species-specific example of the habitat analysis is provided by Canada lynx. CDOT developed a statewide least-cost model for impedance for the Canada lynx. The model incorporated multiple factors affecting movement, including vegetation, slope, developed areas, and physical barriers. Forest Service LAU and linkage areas were incorporated to identify critical areas of habitat and probable lynx movement. On a local scale, these patterns were looked at more closely, taking into account game trails, roadkill patterns, and DWM's knowledge. Through this process, key watersheds were identified where lynx were most likely to cross I-70; other non-suitable habitats were identified as a result. This ultimately resulted in the identification of areas where crossing structures were needed.

For all wildlife species, zones along I-70 were identified based on the present and past utilization as a movement corridor, their adjacencies to suitable habitat, and the potential improvement value. Distinct LIZs were developed. The zones were ranked based on their potential and existing value, and mitigation strategies were developed uniquely for each zone.

CDOW identified severe winter ranges, winter concentration areas, and lambing and calving areas for large game animals. In combination with the WRIS mapping developed by CNHP, CDOW identified key habitat areas along the Corridor including:

- Elk severe winter range, winter concentrations, and calving areas (Figure 4)
- Mule deer severe winter range and winter concentrations (Figure 5)
- Bighorn sheep summer range, winter range, winter concentrations, and lambing areas (Figure 6)
- Mule deer fawning areas, which are too scattered to be mapped

- Black bear summer/fall concentrations and black bear and mountain lion human conflict areas (Figure 7)

Because terrain features also were key to habitat value and important in defining key wildlife habitat, areas with steep slopes were mapped separately. The Forest Service provided the areas of forested habitats and characterized the different kinds of forests according to their species richness. Vegetation types (riparian and aspen forests) of the Corridor with the highest potential to be used for nest sites were used to measure the extent that songbirds could be affected by the alternatives.

The Forest Service designates certain species as management indicator species and monitors their populations to get an indication of the overall health of ecosystems. The management indicator species habitat also was mapped. Threatened, endangered, and special status species habitat also was mapped for both ARNF and WRNF, and for Clear Creek, Summit, Eagle, and Garfield counties. Noxious weeds and threatened and endangered plants were mapped to show whether and where they occurred in the Corridor. Other mapping in the Corridor included wetlands, riparian areas, streams, and standing water bodies.

Various members of the ALIVE Committee also reviewed the literature for wildlife crossing structures and control methods. The literature review contributed to the development of mitigation recommendations. Selected articles from different web pages are presented in the bibliography.

After evaluating the kinds of data listed above and overlaying those data on the Corridor map, it was possible to identify areas along the Corridor where wildlife had a high potential to occur. Comments by the wildlife professionals on wildlife movement patterns in and across the Corridor were among the final elements that allowed the definition of LIZs. The wildlife LIZs are shown in relation to the entire Corridor in Figure 3. Each individual LIZ is illustrated in large format in Appendix C. Table 1 presents the data layers that were used to map each LIZ.

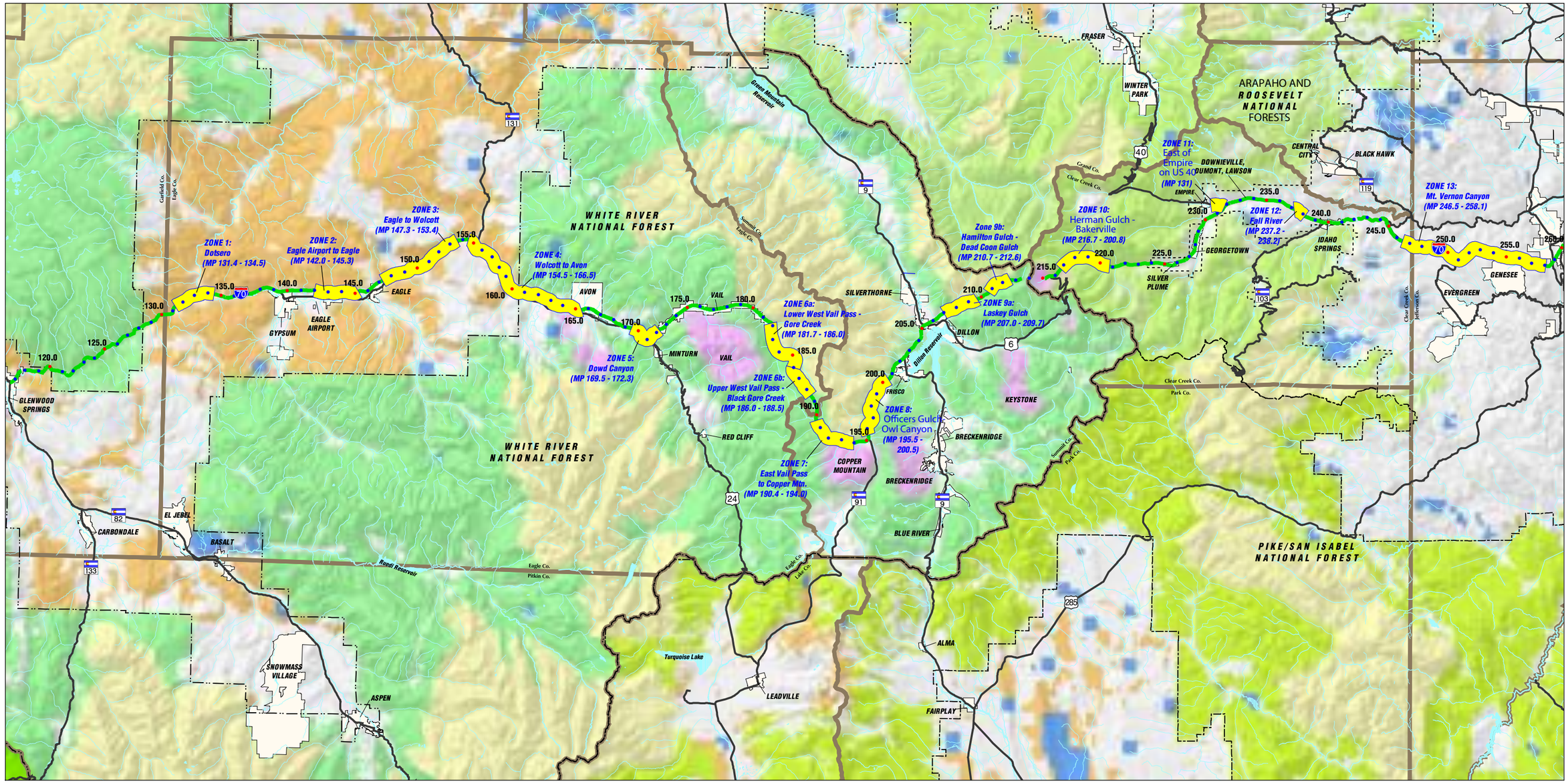
Table 1. Data Layers in Each LIZ Map

LIZ No.	1	2	3	4	5	6a	6b	7	8	9a	9b	10	11	12	13
Layers															
Parcels	X	X	X	X	X	X	X	X	X	X					X
CDOT Fencing	X	X	X		X	X	X								
Shoulder Barriers			X	X	X	X	X	X	X	X	X	X	X	X	X
Median Barriers			X	X	X	X	X	X	X	X	X	X	X	X	X
Stream Names	X	X	X			X	X	X	X		X				
Notes					X	X		X			X			X	
Irrigation Ditches		X													
Bridges, Culverts					X	X	X	X	X	X	X	X	X	X	X
CDOW Leases					X										

After data acquisition and analyses were complete, specific LIZs were identified and described. Final adjustments were made to the LIZ descriptions as late as November 2004. Table 2 identifies the LIZs by name and shows how the LIZs were identified over time. Some of the LIZs were defined early in the process, while others were defined much later.

Table 2. Evolution of Linkage Interference Zones During the Course of the ALIVE Meetings

LIZ No.	October 2002	March 2003	March 2004 and Draft PEIS
1	Dotsero, mp 131.4 to mp 134.5	Dotsero	Dotsero
2	Eagle Airport to Eagle, mp 142.0 to mp 145.3	Eagle Airport to Eagle	Eagle Airport to the Town of Eagle
3	Eagle to Wolcott, mp 147.3 to mp 153.6	Eagle to Wolcott	Eagle to Wolcott
4	Wolcott to Avon, mp 154.5 to mp 166.5	Wolcott to Avon, mp 154.5 to mp 166.5	Wolcott to Avon, mp 154.5 to mp 165.5 (mapped)
5	Dowd Canyon, mp 169.5 to mp 172.3	Dowd Canyon	Dowd Canyon
6	West Vail Pass, mp 182.5 to mp 188.5	6A – West Vail Pass (lower), mp 182.5 to mp 186	West Vail Pass (lower), mp 181.7 to mp 186.0 (as mapped)
		6B – West Vail Pass (upper), mp 186.0 to mp 188.5	West Vail Pass (upper), mp 186.0 to mp 188.5
7	East Vail Pass, mp 190.4 to mp 194.0	East Vail Pass	East Vail Pass to Copper Mountain
8	Owl Canyon to Officers Gulch, mp 195.5 to mp 200.9	Officers Gulch/Owl Canyon mp 195.5 to mp 200.9	Officers Gulch/Owl Canyon
9	Laskey Gulch, mp 207.0 to mp 209.7	Laskey Gulch	9A – Laskey Gulch, mp 207.0 to mp 209.7
			9B – Hamilton Gulch to Dead Coon Gulch, mp 210.7 to mp 212.6
10	Empire Junction (US 40) mp 231.2 to mp 231.8	Herman Gulch/Bakerville, mp 218.0 to mp 221.0	Herman Gulch/Bakerville, mp 216.7 to mp 220.8 (as mapped)
11	Fall River, mp 237.2 to mp 238.2	Empire Junction	East of Empire on US 40, ~mp 231.9
12	Mount Vernon Canyon, mp 246.5 to mp 258.1	Fall River, mp 237.2 to mp 238.2	Fall River
13		Mount Vernon Canyon, mp 246.5 to mp 258.1	Mount Vernon Canyon



General Features

- I-70 Mileposts
- I-70
- State & Federal Highways
- White River NF
- Arapaho and Roosevelt NF
- Pike / San Isabel NF
- Rivers & Streams
- Lakes & Water Bodies
- County Boundaries
- Cities & Towns

Jurisdiction

- Arapaho and Roosevelt NF
- White River NF
- Bureau of Land Management
- Pike/San Isabel NF
- NF Wilderness

Wildlife Linkage Interference Zones

- State of Colorado
- Ski Areas
- Private Lands
- Wildlife Linkage Interference Zones

N W E S

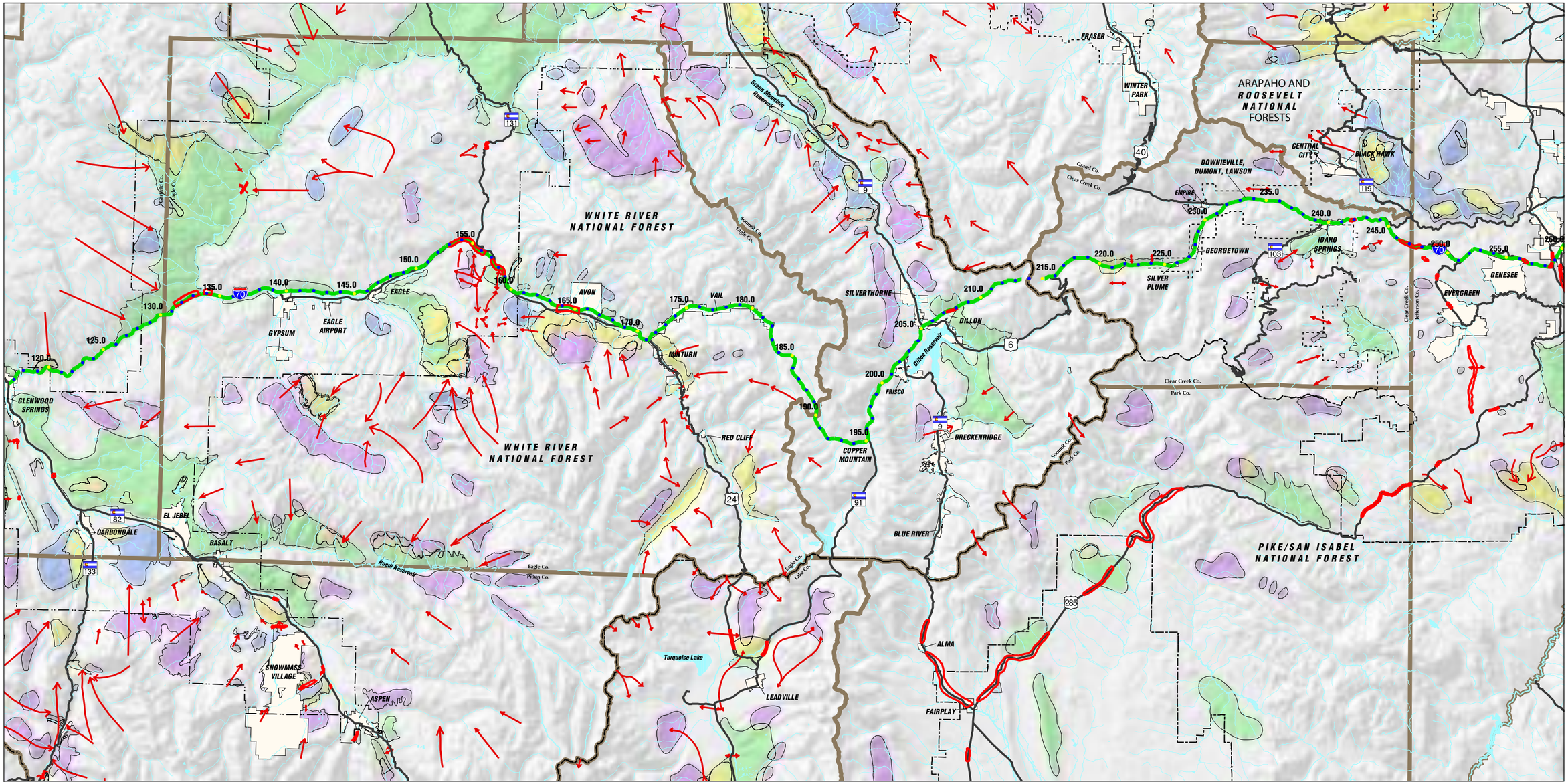
4 0 4 Miles

SCALE - 1:471,000 or 1" = 39,250'

I-70 Mountain Corridor PEIS

Wildlife Linkage Interference Zones

Figure 3



General Features

- I-70 Mileposts
- I-70
- State & Federal Highways
- White River NF
- Arapaho/Roosevelt NF
- Pike / San Isabel NF
- Rivers & Streams
- Lakes & Water Bodies
- County Boundaries
- Cities & Towns

Elk Habitats

- Elk Severe Winter Range
- Elk Severe Winter Range and Winter Concentration Area
- Elk Winter Concentration Areas
- Elk Calving Areas
- Combined Calving, Winter Concentration, and Severe Winter Range Area
- No Elk Critical Range
- Elk Migration Corridors
- Elk Highway Conflict Areas

N W E S

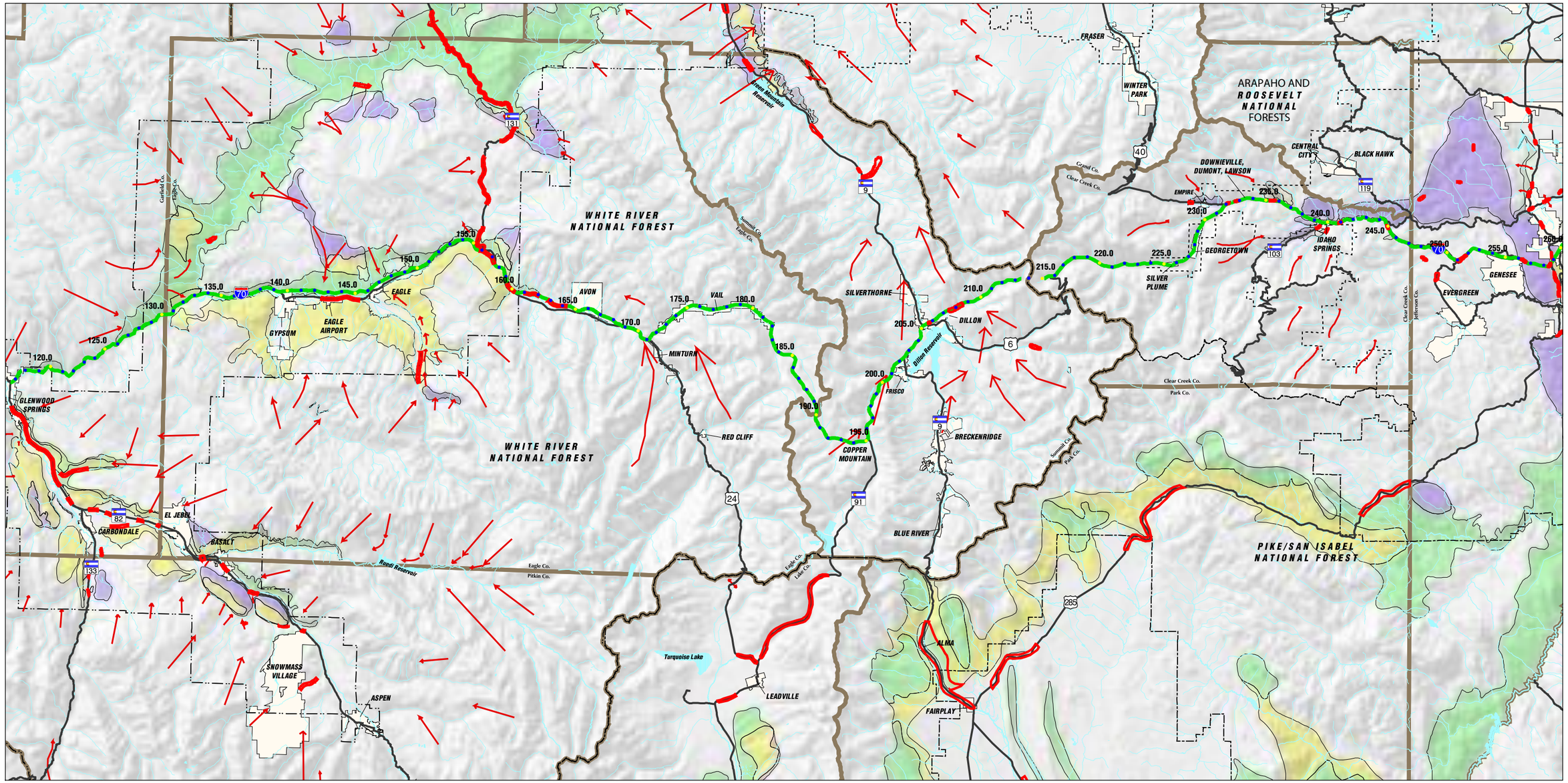
4 0 4 Miles

SCALE - 1:471,000 or 1" = 39,250'

I-70 Mountain Corridor PEIS

Elk Severe Winter Range, Winter Concentrations, and Calving Areas

Figure 4



General Features

- I-70 Mileposts
- I-70
- State & Federal Highways
- White River NF
- Arapaho and Roosevelt NF
- Pike / San Isabel NF
- Rivers & Streams
- Lakes & Water Bodies
- County Boundaries
- Cities & Towns

Mule Deer Habitats

- Mule Deer Severe Winter Range
- Mule Deer Severe Winter Range and Winter Concentration Area
- Mule Deer Winter Concentration Areas
- No Mule Deer Critical Range
- Mule Deer Migration Corridors
- Mule Deer Highway Conflict Areas

N W E S

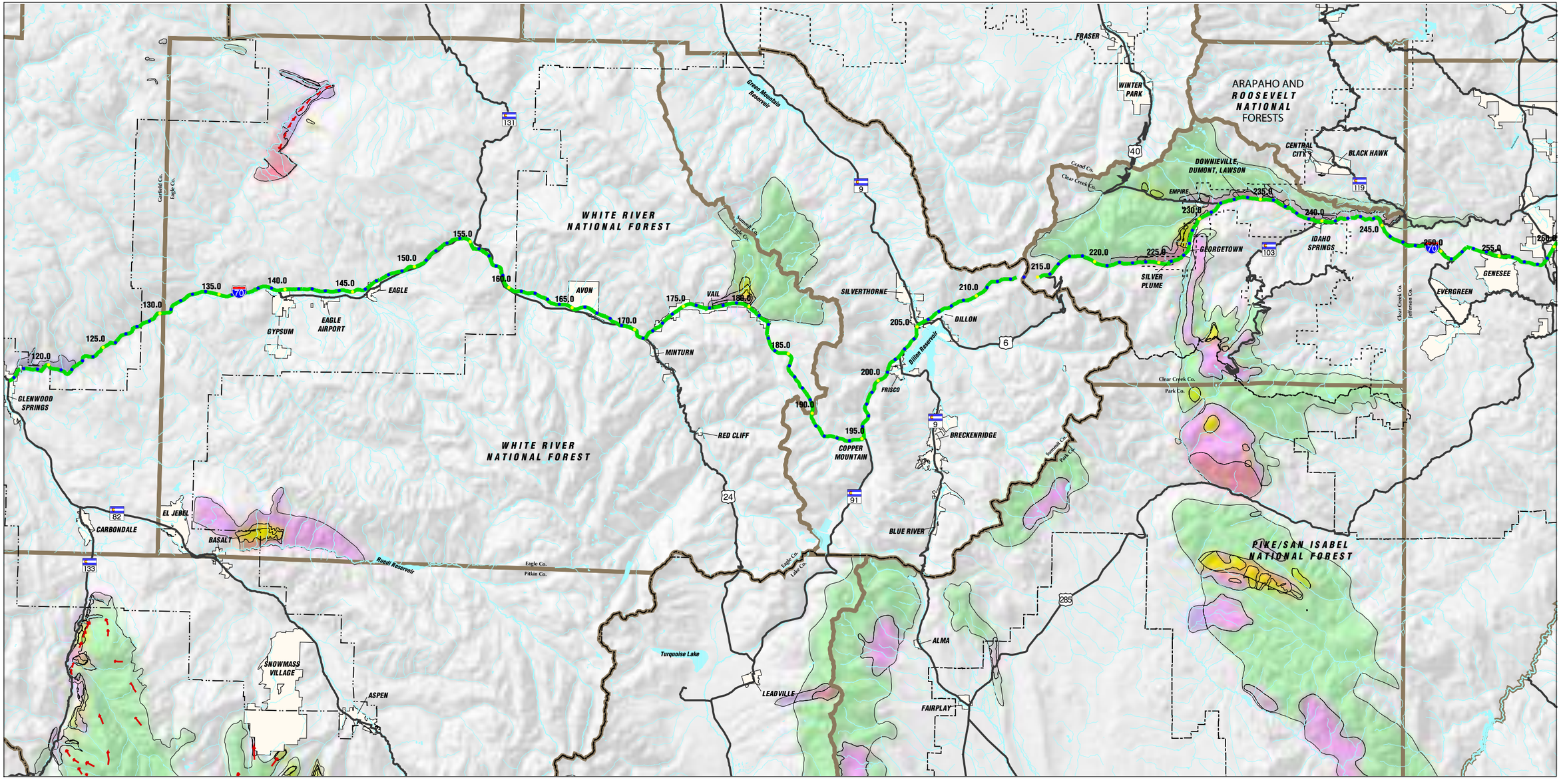
4 0 4 Miles

SCALE - 1:471,000 or 1" = 39,250'

I-70 Mountain Corridor PEIS

Mule Deer Severe Winter Range and Winter Concentrations Areas

Figure 5



General Features

- I-70 Mileposts
- I-70
- State & Federal Highways
- White River NF
- Arapaho and Roosevelt NF
- Pike / San Isabel NF
- Rivers & Streams
- Lakes & Water Bodies
- County Boundaries
- Cities & Towns

Bighorn Sheep Habitats

- Bighorn Sheep Winter Range
- Bighorn Sheep Summer Range
- Bighorn Sheep Winter & Summer Range
- Bighorn Sheep Winter Concentrations
- Bighorn Sheep Lambing Areas
- No Bighorn Sheep Critical Range
- Bighorn Sheep Migration Corridors

N W E S

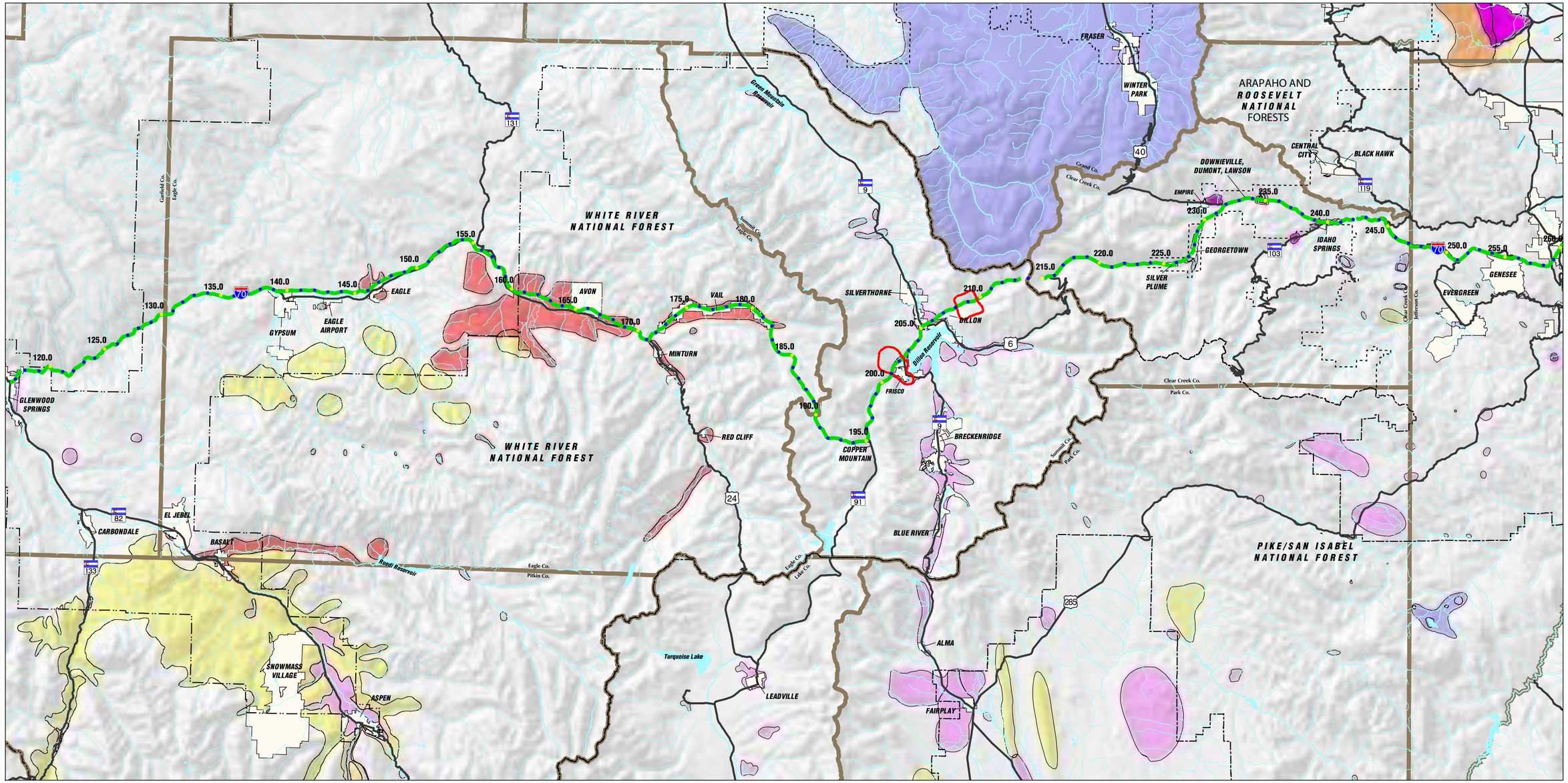
4 0 4 Miles

SCALE - 1:471,000 or 1" = 39,250'

I-70 Mountain Corridor PEIS

Bighorn Sheep Winter and Summer Range with Winter Concentrations and Lambing Areas

Figure 6



General Features

- I-70 Mileposts
- I-70
- State & Federal Highways
- White River NF
- Arapaho and Roosevelt NF
- Pike / San Isabel NF
- Rivers & Streams
- Lakes & Water Bodies
- County Boundaries
- Cities & Towns

Black Bear and Mountain Lion Habitats

- Black Bear Fall Concentrations
- Black Bear Summer Concentrations
- Black Bear Fall & Summer Concentrations
- Black Bear Human Conflict Areas
- Mountain Lion Human Conflict Areas
- Black Bear & Mountain Lion Human Conflict Area
- No Black Bear Critical Range
- Black Bear Migration Corridors

N W E S

4 0 4 Miles

SCALE - 1:471,000 or 1" = 39,250'

I-70 Mountain Corridor PEIS

Black Bear and Mountain Lion Human Conflict Areas and Black Bear Summer/Fall Concentrations

Figure 7

5.2 Existing Conditions in the LIZs

Following are thumbnail sketches of each LIZ, including a list of parameters characterized for each zone. A rationale for prioritizing is also included. The rationale was part of the evaluation process by the ALIVE Committee as to why the LIZ was considered important or not, and what were the major issues affecting the LIZ.

5.2.1 LIZ 1 – Dotsero (milepost 131.4 to milepost 134.5)

Sitting at the mouth of Glenwood Canyon, LIZ 1 is adjacent to the BLM Glenwood Canyon lynx linkage that provides movement through shrub-steppe habitats between Flattops Wilderness and Red Tables on the WRNF. CDOW DWM Bill Andree suggested that as few as 30 percent of the roadkills in this area are ever reported. Most deer and elk in this zone cross from milepost 133 west to the mouth of the Glenwood Canyon, avoiding the nearby lakes south of I-70 where several planned developments will be built.

There is game fencing between milepost 131.9 and milepost 133.5 north and south of I-70. This is a known movement corridor for deer and elk, and the area is fairly heavily used for crossing. There are four I-70 bridges in the LIZ: two for roads, one for railroad, and one for Colorado River, but the transportation underpasses in this area are not being well used as wildlife crossings as they are not suitable for wildlife. The area is predominantly sagebrush with little tree cover. The Nature Conservancy (TNC) recently purchased the Bair Ranch property near this zone.

- **Wetlands:** Palustrine (old gravel quarries), palustrine scrub shrub (PSS), and riverine wetlands surround the Eagle and Colorado rivers through this LIZ.
- **Major drainages:** The confluence of the Colorado and Eagle rivers occurs here, and West Cottonwood Creek runs south of I-70 at the western end of this LIZ; three other unnamed drainages exist through this area.
- **Culverts and bridges** (not always including interchanges)**:** Four sets of open span bridges over two cross roads, the Colorado River, and the Union Pacific Railroad (UPRR) between milepost 133 and milepost 134, also a concrete box culvert (CBC) of unknown dimensions within that mile distance.
- **Barriers**: Primarily fencing along the north side of the Corridor from the Colorado River area east, and on the south side near private parcels.
- **Land ownership/management:** Surrounded by mostly BLM lands with some private industrial lands on the south side.
- **Slopes:** Surrounded by slopes generally under 50 percent.
- **Dominant vegetation:** Piñon-juniper woodland, herbaceous understory.
- **Surrounding lands used or zoned as:** BLM resource lands; private lands in the area are zoned for agriculture through this area, though lands to the west of the confluence of the Eagle and Colorado rivers have scattered commercial and industrial zoning.
- **Recreation:** The Ute Trailhead lies just to the northwest of the intersection of I-70 and the Colorado River; the trail extends west through BLM lands.

- **Wildlife:** Elk and mule deer severe winter range to the north of I-70 and west of the Colorado River through this LIZ; mule deer severe winter range and winter concentration areas to the south and east.
- **Animal-Vehicle Collisions (AVC):** Average for entire Corridor was 0.63 AVCs/mile/year from 1990 to 1999 for the documented events; numbers are undoubtedly low due to inconsistency of documentation across the Corridor. Average in this LIZ is 1.40/mile/year, which is high relative to the fairly low traffic volumes and suggests high animal use and attempts to cross.
- **Special Management Areas:** The BLM's Deep Creek Area of Critical Environmental Concern (ACEC) is located approximately 5 miles north of this LIZ.

Rationale for Prioritizing

This area is rapidly being developed; 475 acres on two parcels south of I-70 are planned for development, including high-density residential (trailer park) and a school. Current land uses in the surrounding area are not conducive to wildlife crossing, but this is a historic migration corridor. Because of continuing development, conservation easements are crucial to maintain the integrity of this zone.

5.2.2 LIZ 2 – Eagle Airport to the Town of Eagle (milepost 142.0 to milepost 145.3)

The area around Eagle Airport, which constitutes LIZ 2, provides for movement to and from deer and elk severe winter range, winter concentration areas, and fawning/calving habitat to the north and south of I-70, and has experienced rapid development through the 1990s. This section of I-70 experiences greater than 6 AVCs/year/mile and is described by CDOW as a highway crossing area for big game. The recorded AVC rate is 0.4. There is game fencing throughout the entire length of LIZ 2 on both sides of I-70. I-70 has a large median between the separated lanes; three bridge underpasses at milepost 143.1, milepost 143.8 (Cottonwood Creek), and milepost 144.4 with wing fences at drainages allow wildlife under I-70.

Numerous potential future developments may be built near this zone depending on water availability and other factors. Potential future developments include Adam's Rib, Frost Creek, and Diamond S Ranch developments south of I-70. The area has virtually no tree cover. Lands managed by the WRNF as elk habitat are located several miles to the south of LIZ 2.

- **Wetlands:** Palustrine, palustrine forested (PFO), and palustrine emergent (PEM) wetlands exist predominantly on the south side of the Eagle River through LIZ 2.
- **Major drainages:** Cottonwood Creek, Skillmans Gulch, and numerous irrigation ditches (5 total) flow through LIZ 2; the Eagle River runs parallel to I-70 through the center of LIZ 2.
- **Culverts and bridges:** There are three sets of open span bridges over drainages in the middle of LIZ 2 (milepost 143.1 to milepost 144.4), Cottonwood Creek surveyed to be used frequently in fall by wildlife, another to the west also was well used.

- **Barriers:** Deer fencing on both sides of the Corridor from milepost 142 to milepost 146.
- **Land ownership/management:** BLM lands along the north side; private agricultural low-density estates surround the Eagle River in between the Corridor and US 6 south; gravel operations also on the south side.
- **Slopes:** Generally under 50 percent.
- **Dominant vegetation:** Piñon-juniper woodland and some irrigated agriculture.
- **Surrounding lands used or zoned as:** BLM resource lands; private lands in this area include significant new commercial, light industrial, and residential developments to the south of US 6; private lands immediately surrounding the Eagle River are zoned as residential (very low density); Eagle County Airport lies at the western edge of LIZ 2.
- **Recreation:** Eagle County Fairgrounds are at the eastern edge of LIZ 2; numerous BLM trails exist to the north and south of I-70 through LIZ 2.
- **Wildlife:** Mule deer severe winter range and winter concentrations are located to the north and south of LIZ 2, mule deer migration corridors and elk severe winter range are located along the northern side of I-70 through LIZ 2.
- **AVCs:** Average approximately 0.39/mile/year, which is relatively low and is probably due to the heavy use of wildlife exclusion fencing on both sides of I-70 throughout LIZ 2.
- **Special Management Areas:** BLM's Bull Gulch Wilderness Study Area (WSA) is approximately 4 miles north of this LIZ.

Rationale for Prioritizing

One existing structure could be modified to improve the potential for use by larger animals. In steep areas where fence damage occurs, repairs and realignment are necessary to prevent animals from getting onto the Corridor. Conservation easements along the Eagle River would ensure future winter range is available primarily for mule deer.

5.2.3 LIZ 3 – Eagle to Wolcott (milepost 147.3 to milepost 153.6)

LIZ 3 extends through Red Canyon, with steep slopes on both sides of the highway for most of its length. Providing for lynx movement across shrub-steppe habitats from Flattops Wilderness in the east to Castle Peak in the west, LIZ 3 is designated as a lynx linkage area by the BLM. Large areas of BLM lands are located to the north and south with mixed private lands in between. CDOW DWM Bill Andree stated that carnivores frequently cross through this zone and that the existing CDOT game fencing through this zone is well maintained. The south side game fence ends at milepost 152.8 while the north side fence ends at milepost 153.2.

LIZ 3 has an AVC rate of 0.39 kills/mile/year despite the solid 8-foot fencing on both sides of I-70 through the entire zone. No suitable game crossing structures currently exist through most of this area. Recreation uses near the zone include numerous BLM trails. The eastern portion of the LIZ is moderately forested, while the western portion closer to the Town of Eagle is sparsely forested.

Easements have been suggested as a part of mitigation because of the development occurring in the area.

- **Wetlands:** PSS, PFO, and PEM wetlands exist predominantly along the Eagle River through LIZ 3.
- **Major drainages:** Eagle River, Rube Creek, and Castle Creek are the major water features through this section; Rube Creek is at milepost 153.4, Castle Creek at milepost 148.2, and the Eagle River parallels the highway.
- **Culverts and bridges:** Two sets of open span bridges over county roads at approximately milepost 149.7 and milepost 152.8 allow crossing; none noted at Rube Creek so animals may cross at grade there (milepost 153.3).
- **Barriers:** Scattered shoulder guardrail and center median barriers exist from milepost 149 to the eastern edge of LIZ 3, generally not on both the westbound and eastbound lanes through the same areas; game fencing throughout zone.
- **Land Ownership/management:** BLM lands to the northwest and southwest; private lands surround the Eagle River in between the BLM lands; more private lands to the southeast end of LIZ 3.
- **Slopes:** Greater than 50 percent through Red Canyon.
- **Dominant vegetation types:** Piñon-juniper woodland and sagebrush shrubland; some mixed forest to the north.
- **Surrounding lands used or zoned as:** BLM resource lands; private lands in this area include mixed agriculture, commercial, and rural residential, all at very low densities.
- **Recreation:** Hell's Pocket Trailhead lies at the northwest end of the zone, north of I-70; numerous trails and recreation roads are found on the surrounding BLM lands. Fishing easements to the Eagle River occur at irregular intervals through the area.
- **Wildlife:** Mule deer severe winter range and winter concentrations are located to the south of LIZ 3; elk severe winter range at the southwest end of the zone.
- **AVCs:** Same low rate as that for LIZ 2 (0.39/mile/year) due to fencing on one or both sides of I-70, but not contiguous on both sides.
- **Special Management Areas:** The BLM Castle Peak WSA southern boundary is approximately 4 miles northwest of LIZ 3.

Rationale for Prioritizing

Development exists to the south and west. A crossing of some sort is greatly needed in this zone; no suitable underpasses exist primarily because of topography. One area at milepost 151.8 may have the potential for some type of crossing; further investigation is needed to assess costs.

5.2.4 LIZ 4 – Wolcott to Avon (milepost 154.4 to milepost 166.5)

Rapid development around Avon and Edwards occurring through the 1990s and to the present combined with habitats historically occupied by deer, elk, and forest carnivores has created significant wildlife issues in this sparsely forested LIZ. CDOW DWM Bill Andree indicated that Bellyache Ridge, south of I-70

near milepost 155 to milepost 157, is a heavily traveled area by forest carnivores, including black bear and mountain lion. Significant development is still occurring through the eastern half of LIZ 4, including 250 housing units, soccer fields, a school, and a church south of milepost 163.

WRNF recently exchanged a 400-acre parcel of land north of milepost 165 that will be developed into 300 employee-housing units on 40 acres of the property for Vail Resort, with the remaining acreage to remain as conservation easement. Red Sky Ranch, a large development of 35-acre lots southwest of the zone, is being subdivided into 15-acre lots. The BLM recently completed a 1,400-acre land swap to private interests near the zone in exchange for lands outside Grand Junction.

LIZ 4 is located at the western edge of the Castle Peak area lynx linkage. The federal lands to the north are managed by the WRNF for deer and elk winter range, while the Holy Cross Wilderness Area is several miles to the south. The area south of I-70 through the eastern portion of this zone is elk severe winter range and calving areas. The majority of LIZ 4 sees more than 6 roadkills/mile/year. The recorded value is 1.2/mile/year. DWM Andree suggested that as many as two elk per week are killed through this zone every year. This LIZ currently has no CDOT game fencing. Most of the area is considered a highway conflict zone for deer and elk. Easements have been suggested as a part of mitigation due to the private lands in the area.

- **Wetlands:** PSS, PEM, palustrine and PFO wetlands surround the Eagle River.
- **Major drainages:** Numerous creeks enter the Eagle River in LIZ 4 including Alkali, Ute, Travis, Red Canyon, Squaw, Spring, Tames, Lake, Beard, Berry, Beaver, McCoy, Metcalf, and June, as well as Brett, Dodd, Howard, and Winslow ditches, and several other unnamed drainages. The Eagle River runs the length of this zone.
- **Culverts and bridges:** There are five open span bridge sets along LIZ 4, primarily over roads, with one over the Eagle River.
- **Barriers:** Guardrails and median barriers are intermittent throughout LIZ 4.
- **Land Ownership/management:** LIZ 4 includes BLM, WRNF, municipal, and private lands (including ski area lands primarily on the east end).
- **Slopes:** Primarily under 50 percent and become steeper on the north and south sides at milepost 158.5 to milepost 160.5.
- **Dominant vegetation types:** Sagebrush shrubland, agricultural, mountain shrubland, and piñon-juniper woodland.
- **Surrounding lands used or zoned as:** Deer and elk winter range (WRNF), agricultural, commercial, and resource lands (Eagle County) primarily around Wolcott; and resource, agricultural, commercial, residential, public facilities (three golf courses that may attract wildlife), open space, and planned unit development (Eagle County) in the Avon/Edwards area; heaviest residential from milepost 160.6 to the eastern edge of LIZ 4 at milepost 165.0.
- **Recreation:** BLM recreation site and Eagle River access near Wolcott, Berry Creek/Miller Ranch recreation area between the highway and Eagle River at milepost 163 to milepost 164, Nottingham Lake Park in Avon, the

private Arrowhead Ski Area near Avon, river rafting activity near milepost 160.6, and fishing easements and boat access to the Eagle River in several locations.

- **Wildlife:** Elk highway crossing conflict areas are found throughout LIZ 4, with elk severe winter range and migration corridors south of I-70 near milepost 160, elk winter concentration areas north and south of I-70 between the towns, elk severe winter range and winter concentration areas around Avon/Edwards, and an elk calving area south of Avon; mule deer highway crossing conflict areas are found throughout LIZ 4, with mule deer severe winter range and winter concentration areas north and south of I-70 near Wolcott and severe winter range spreading along the highway corridor to milepost 162; black bear and mountain lion human conflict areas are extensive throughout LIZ 4 north and south of I-70; the Wolcott area near milepost 154 to milepost 160 is thought to be a crossing used by lynx.
- **AVCs:** Average 1.2/mile/year, with an unusually high number reported for milepost 157 and milepost 165; AVCs include carnivores but relatively low traffic volume numbers in this area suggest high animal crossing use.
- **Special Management Areas:** The BLM Castle Peak WSA southern boundary is approximately 5 miles northwest of LIZ 4.

Rationale for Prioritizing

The eastern end of LIZ 4 from Edwards to Avon is heavily developed on both sides of I-70. Several large developments are underway, including a subdivision of sixty 35-acre lots into 15-acre lots at Red Sky Ranch PUD. The Vasser Land Exchange planned for the area between Avon and Forest Service just north of milepost 165.0 will add 40 acres of development (300 employee units for Vail Resorts). Land directly south of milepost 163.0 has recently been developed with 256 employee units for Colorado Mountain College, a high school, a church, and soccer fields. BLM is considering exchanging 1,400 acres of surrounding land where up to 1,000 potential housing units could happen. Priority ranking is high because opportunities for connecting with habitats on adjacent federally managed lands are becoming more scarce throughout the zone.

5.2.5 LIZ 5 – Dowd Canyon (milepost 169.5 to milepost 172.3)

Designated as a lynx linkage area by the Forest Service, LIZ 5 is a known elk roadkill area. A CBC and several land leases by CDOW exist in LIZ 5 for the purpose of wildlife movement. The existing crossing structure is long and only 10 feet in height, inhibiting the movement of large elk. Camera studies performed by CDOW have shown the area to be used by elk, deer, and mountain lion. WRNF surrounds the zone to the north and south, while pockets of residential development exist to the east and west. Good ungulate habitat is located both north and south of LIZ 5, which includes elk winter range and severe winter range on the south side.

The area has little forest cover adjacent to I-70. The majority of I-70 includes CDOT game fencing on both sides, but which is often damaged by rockfall on the north and winter snowplowing activities from residences to the south. A paved bike path with restricted winter usage is located near the existing crossing structure in addition to several trails and a river rafting “put-in” location. Eagle County has plans for expanding the paved bike path to the west. LIZ 5 has median and guardrail barriers along the majority of I-70.

- **Wetlands:** No major wetland areas have been identified for LIZ 5.
- **Major drainages**: Whiskey Creek, Eagle River, and Gore Creek.
- **Culverts and bridges:** Two open span bridge sets cross Gore Creek, the Eagle River, US 24, the bike path, and the UPRR; a CBC at approximately milepost 171.7 (101' x 10'w x 10'h) under I-70 allows some wildlife crossing in an important drainage. Neither the CBC nor the bridges are used frequently by elk; and the bridges also are not used by many other species.
- **Barriers:** Shoulder guardrails and median barriers throughout curves and in many other locations; game fencing from milepost 170.3 to milepost 173 on both sides helps funnel wildlife to the CBC crossing at milepost 171.7 and the bridge at milepost 171.1, but bike path traffic on the north side causes hesitation in some species, and damage to fencing on the south side in West Vail is a problem.
- **Land Ownership/management:** State, WRNF, and some private lands.
- **Slopes:** All of the north side and a small section in the southeast greater than 50 percent.
- **Dominant vegetation types:** Mountain shrubland, aspen forest, sagebrush shrubland, grass/forb meadows, and some spruce-fir forests occur primarily where slopes are not too steep.
- **Surrounding lands used or zoned as:** Deer and elk winter range, elk habitat, forested flora and fauna, and intermix (WRNF and CDOW), residential estate, agricultural, and resource lands (Eagle County).
- **Recreation:** Whiskey Creek trail system on CDOW lease land, North Vail Trailhead, Eagle County (ECO) bikepath along north side of rivers, rafting put in and take out, and two fishing access locations.
- **Wildlife:** Elk severe winter range and winter concentration area south of I-70 on both sides of US 24, mule deer migration corridors on both sides of US 24, black bear and mountain lion human conflict area around Minturn to the south.
- **AVCs:** Average of 0.59/mile/year, which is below average but because it is a major mule deer migration corridor, many must have success crossing here plus many AVCs are likely not reported; approximately two bear and one mountain lion per year are killed in LIZ 5 and the AVC rate for the wildlife underpass at milepost 171.7 is 0.70, about average for the Corridor.
- **Special Management Areas:** Holy Cross Wilderness Area (WRNF) is approximately 4 miles south of LIZ 5.

Rationale for Prioritizing

CDOW owns several properties surrounding Dowd Canyon and leases 114 acres from the State Land Board. LIZ 5 is developed on its east and west ends near West Vail and Eagle-Vail, respectively. A trail beginning at milepost 171.0 extends toward Vail; Eagle County has proposed extending that bike trail from milepost 171.0 west into Eagle-Vail. There are rafting put-in and take-out locations along Eagle River. Condominium owners adjacent to game fencing at the eastern end on the south side plow snow against the fences and cause damage.

5.2.6 LIZ 6a & 6b – Upper and Lower West Vail Pass (milepost 181.7 to milepost 186.0 and milepost 186.0 to milepost 188.5)

Surrounded by the WRNF, this zone is used heavily by wildlife and has a low rate of roadkill. Designated as a lynx linkage area by the Forest Service, the land on the southwest side of lower West Vail Pass is managed as forested landscape linkage, allowing a connection between Eagle's Nest Wilderness to the east and the Holy Cross Wilderness to the southwest. The termini for this zone were still under discussion as of March 2003. Six open span bridges exist matched in the eastbound and westbound direction of I-70 through lower West Vail Pass, although there are no existing crossing structures through upper West Vail Pass. A lynx was killed in a vehicle collision on upper West Vail Pass in 1999. The area is moderately forested and has forested cover close to I-70. Biologist Sarah Barnum performed a wildlife study of West Vail Pass that found animals in the area would readily jump over median barriers but showed reluctance to cross in areas with guardrail structures (Unpublished report presented to ALIVE Committee meeting November 20, 2002).

The Vail Pass–Tenmile Canyon paved bike path runs the length of this LIZ to the east. Forest lands at the top of upper West Vail Pass are managed for year-round motorized backcountry recreation to the west and for non-motorized backcountry recreation to the east. Improvements under the Sediment Control Action Plan (SCAP) have proposed walls for upper West Vail Pass and were considered in the proposed mitigation for the area.

- **Wetlands:** PSS, palustrine, and PEM wetlands are extensive along Gore Creek and Black Gore Creek.
- **Major drainages:** Gore Creek and Black Gore Creek and drainages tributary to them including Polk, Miller, Timber, Bighorn and three unnamed creeks.
- **Culverts and bridges:** Seven open span bridge sets, with eastbound and westbound spans closely aligned for excellent wildlife crossings, span Black Gore, Timber, Miller and Polk Creeks. A corrugated metal pipe (CMP) that is 5' x 5'near milepost 183.2 is probably used by some smaller animals.
- **Barriers:** Taller (Texas) barriers on shoulders and in median throughout the LIZ that end at the top of Vail Pass at Black Lake 2.
- **Land Ownership/management:** Primarily WRNF with some private ownership from milepost 180.7 to approximately milepost 182 in the northern portion of LIZ 6a.
- **Slopes:** Greater than 50 percent between milepost 184.5 to milepost 186.5 on the west side on the Corridor.
- **Dominant vegetation types:** Spruce-fir forests, grass/forb meadows, lodgepole pine forests, and aspen forests.
- **Surrounding lands used or zoned as:** WRNF managed as primitive and pristine wilderness, dispersed recreation, forested landscape linkages, backcountry motorized (south side) and non-motorized recreation (north side); various residential, resource, and open space near east Vail (Eagle County).

- **Recreation:** Vail Pass-Tenmile Trail follows the length of the LIZ and experiences various summer activities as well as by skiers in winter; Two Elk Trailhead at approximately milepost 183.7 (WRNF) experiences heavy hunter usage.
- **Wildlife:** Bighorn sheep summer range occurs on the north side of milepost 180.7 to milepost 182; black bear and mountain lion/human conflict areas occur from milepost 180.7 to milepost 182.
- **AVCs:** Average of 0.03/mile/year on west side of Vail Pass, most likely so low due to good opportunities for wildlife to cross under large bridges; however, one of the three lynx killed on I-70 occurred on the southern edge of this zone, which also seems to be used by coyotes, bobcats, and bighorn sheep for crossing I-70.
- **Special Management Areas:** Eagles Nest Wilderness Area is approximately 0.5 mile away from I-70 along the east of the LIZ, and the Holy Cross Wilderness Area is approximately 5 miles west of Vail Pass.
- **Sediment Control Action Plan:** A SCAP is planned for areas from milepost 186.1 to milepost 187.0 and from milepost 187.5 to milepost 187.9.

Rationale for Prioritizing

The termini for this zone are still under discussion. The northern end of the LIZ is near the east end of Vail. There is no development in the zone, except developed recreation along Vail Pass-Tenmile bike path, Black Lakes, and numerous trails along drainages. WRNF manages the area for forested landscape linkage. Any crossing or fencing structures need to be closely coordinated with the SCAP program, as the two could coincide in stretches near the top of the pass.

5.2.7 LIZ 7 – East Vail Pass to Copper Mountain (milepost 190.4 to milepost 194.0)

Five existing open span bridge structures exist in the eastbound direction through LIZ 7. Only one structure exists in the westbound direction and is not directly adjacent to a corresponding structure in the eastbound direction. The eastbound and westbound lanes of I-70 are separated through this section with an open wetland area containing West Tenmile Creek. LIZ 7 is located within the Forest Service Vail Pass lynx linkage zone and is surrounded by forest property managed as forested landscape linkage, non-motorized and motorized backcountry recreation, and primitive wilderness.

Several parcels of private land are located within the east end of the zone, within the Copper Mountain Ski Area near the Guller Creek and West Tenmile Creek bridges. According to CDOW DWM Bill Andree, wildlife cross through drainages predominantly at Smith, Stafford, and Wilder gulches, and Guller and Corral creeks. DWM Bill Andree also noted that forest carnivores are frequently seen crossing at Stafford Creek. The forest cover is less dense in this area than that seen on West Vail Pass. In addition to the Vail Pass–Tenmile paved bike path that runs the length of LIZ 7, Forest Service trails exist through Stafford and Wilder gulches, and Guller and Corral creeks.

- **Wetlands:** One of the most important wetland areas with springs/seeps/fens, palustrine, PEM, PSS and PFO wetlands found throughout the Corridor.

- **Major drainages:** Wilder, Smith, and Stafford gulches, and Guller and Corral creeks and five unnamed drainages all run into West Tenmile Creek, which runs parallel to I-70.
- **Culverts and bridges:** One lane bridges span Wilder, Stafford, and Smith gulches, and Guller and West Tenmile creeks on the EB lane, but only Corral Creek is bridged on the westbound lane, thus providing noncontiguous access for wildlife. Two small (3.5' x 3.5') CMPs under the westbound lane may provide access to and from the area between lanes for smaller animals.
- **Barriers:** Median barriers are present fairly consistently along westbound, but infrequently on eastbound lane.
- **Land Ownership/management:** WRNF and private land at Copper Mountain Ski Area.
- **Slopes:** Less than 50 percent within 0.5 mile of I-70 throughout LIZ 7.
- **Dominant vegetation types:** Spruce-fir forests, grass/forb meadows, lodgepole pine forests, aspen forests, riparian forest, and shrubland.
- **Surrounding lands used or zoned as:** Backcountry recreation (non-motorized on north side and motorized on south side), forested landscape linkages, primitive wilderness, ski-based resorts, and utility corridor (WRNF), planned unit development (Summit County).
- **Recreation:** Corral Creek, Wilder Gulch, Stafford Gulch and two other trails connect to Vail Pass-Tenmile Trail, which runs parallel to the LIZ; downhill skiing at Copper Mountain.
- **Wildlife:** Mule deer migration corridor from southwest to northeast across LIZ, elk use Smith and Wilder Gulches, and carnivores use Stafford Creek.
- **AVCs:** Average 0.68/mile/year, about average for the entire Corridor.
- **Special Management Areas:** LIZ 7 is the southern boundary of the Eagles Nest Wilderness Area.

Rationale for Prioritizing

LIZ 7 is used extensively for recreation on numerous trails: Vail Pass-Tenmile Trail, Guller Creek Trail, and Stafford Gulch Trail. Motorized recreation south of the highway and some north of the highway (non-permitted). Copper Mountain ski area located at the southeastern end of zone, with housing units under construction at the far western end of Copper Mountain PUD. Housing in this area is being set back to allow wildlife movement over West Tenmile Creek Bridge. WRNF lands in the western half of the zone are managed as forested landscape linkage.

5.2.8 LIZ 8 – Officer's Gulch/Owl Canyon (milepost 195.5 to milepost 200.9)

This steep canyon area has several water bodies, including Uneva Lake, Officer's Gulch Pond, and Wheeler Flats Ponds. The zone is located within the Forest Service Officer's Gulch lynx linkage area, providing connectivity between Eagle's Nest Wilderness and the Tenmile Range. The area is heavily forested with cover for wildlife growing close to I-70. While the area is encompassed by the WRNF, the land surrounding Uneva Lake and an area east of I-70 are private inholdings, although the owners have indicated to the Forest Service that they do

not plan to develop the land. Several other private mine inholdings exist to the east of I-70 in this area, although they are located on very steep slopes. Forest Service biologists have indicated that most of the ungulate movement in the area is parallel with the highway.

A cement pipe provides drainage under I-70 from Officer's Gulch Pond at milepost 197.9, a 2' CMP passes under the highway at milepost 198.9, and a concrete box culvert exists in the area at milepost 199.6. Forest Service biologists and CDOW DWMs view box culverts as acceptable structures for the area due to mostly carnivore highway crossing activity in the area. The smaller pipes may also provide some opportunity for crossings by smaller animals. An interchange exists at Officer's Gulch and is used as an informal overnight truck stop. An area adjacent to Officer's Gulch Pond is proposed as an overnight camping area by the WRNF. Although the area is currently not for overnight use, Forest Service Biologist Gary Patton indicated overnight use would potentially inhibit carnivore movement. The lands are managed by the WRNF as pristine wilderness, non-motorized backcountry recreation, and scenic byways or travel corridors. The Vail Pass-Tenmile trail/bike path runs through the length of LIZ 8.

- **Wetlands:** To the east of milepost 198, very scattered palustrine and PSS wetlands occur along Tenmile Creek.
- **Major drainages:** Tenmile Creek and Officer's Gulch.
- **Culverts and bridges:** One open span bridge at milepost 197.8 over a county road, a CBC, a cement pipe, and a CMP of 5' x 5' or less from milepost 197.9 to milepost 199.6**.**
- **Barriers:** Few guardrails or fences throughout LIZ 8.
- **Land Ownership/management:** WRNF, private and agricultural (Summit County).
- **Slopes:** Exceed 80 percent on southeast side and more than 50 percent on the rest of the eastern side; west side typically less than 50 percent.
- **Dominant vegetation types:** Lodgepole pine forests, spruce-fir forests, aspen forests, grass/forb meadows.
- **Surrounding lands used or zoned as:** Pristine wilderness, recreation, backcountry recreation (non-motorized) (WRNF); planned unit development and agricultural around Copper Mountain, agricultural closer to Frisco (Summit County).
- **Recreation:** Wheeler Flats Trailhead (near Copper Mountain), Wheeler Lake Spur and Vail Pass-Tenmile trails running parallel to I-70, Officer's Gulch Trailhead at milepost 197.7, and Gore Range Trailhead at milepost 196.0.
- **Wildlife:** Mule deer migration corridor running parallel to LIZ 8, general connectivity zone between high-elevation habitats for wildlife such as bobcats, pine martens, other small carnivores and possibly lynx.
- **AVCs:** Average of 0.24/mile/year, possibly low because animals follow the riparian area rather than trying to cross I-70.
- **Special Management Areas:** LIZ 8is along the southeast boundary of the Eagles Nest Wilderness Area.

Rationale for Prioritizing

There is no residential development in this zone and no development is planned for private lands at Uneva Lake. There is recreational use at Officer's Gulch Pond and North Tenmile Trail and a paved bike trail that extends the length of the zone. Private historic mine inholdings are planned for a swap with WRNF. Topography funnels into a narrow band at Officer's Gulch, making it a natural location for some sort of crossing structure.

5.2.9 LIZ 9a – Laskey Gulch (milepost 207.0 to milepost 209.7)

Located within the Forest Service Loveland Pass lynx linkage area, LIZ 9a provides for north-south lynx movement from the Ptarmigan Peak Wilderness Area and Williams Fork River area to forestlands south of I-70. The majority of private lands are developed in this area, although the Denver Water Board possesses several large undeveloped inholdings in the central portion of the LIZ associated with the Snake River. The area is moderately forested, transitioning to sagebrush closer to the Town of Dillon. Condominiums have been built into the LIZ's western edge to within 0.5 mile of Laskey Gulch. Solid median and guardrail barriers exist through the length of the LIZ. No crossing structures currently exist, but three CMPs of 2', 3', and 5' diameters are present. I-70 was constructed on steep fill slopes through the area.

The viability of the zone as a movement corridor for carnivores is in question due to issues raised at Jones Gulch. Keystone resorts has submitted several proposals for ski area expansion into the Jones Gulch area, the latest in July 2003 for backcountry snowcat skiing at Little Bowl and Erickson Bowl, including a change to the special use permit boundary that Keystone currently holds. The ARNF solicited public comments through July 2003 for the proposal. The Environmental Analysis (EA) of Keystone's snowcat skiing proposal concluded that the operation would have appreciable beneficial cumulative effects on the recreation experience by enabling the resort to offer a wider variety of recreation opportunities. The USFWS submitted a formal letter to the Forest Service in August 2003 requesting that areas east of Jones Gulch be re-designated as forested landscape linkage management instead of ski-based resort management. DWM Tom Kroening noted that resident populations of elk and deer in the area were not obstructed by the golf course south of I-70 and would benefit from a crossing structure at Laskey Gulch to reconnect lands managed by the WRNF as deer and elk winter range north and south of I-70. CDOW has designated the area as a mule deer highway crossing area, due to the greater than six deer killed per year through the 3-mile long zone. The reported AVC is 0.5/mile/year

- **Wetlands:** PSS wetlands and springs/seeps/fens along Straight Creek.
- **Major drainages:** Six unnamed, small drainages enter Straight Creek, which runs parallel to LIZ 9a. Streams are small because the watershed represents the headwaters of Straight Creek.
- **Culverts and bridges:** One open span bridge over two-track at milepost 207, a CMP (5' x 5') with water running through at milepost 208.3 (Laskey Creek), and two smaller, long CMPs under both lanes.
- **Barriers:** Solid shoulder barriers on eastbound and a few on westbound; center median throughout LIZ 9a.
- **Land Ownership/management:** ARNF and private property near Dillon.

- **Slopes:** Scattered slopes above 50 percent on ridges above drainages.
- **Dominant vegetation types:** Lodgepole pine forests, grass/forb meadows, spruce-fir forest, wetlands.
- **Surrounding lands used or zoned as:** Utility corridor, forested landscape linkages, deer and elk winter range, primitive and pristine wilderness (WRNF) in eastern half; agricultural and high density residential (Summit County) on south side from milepost 207 to milepost 207.8.
- **Recreation:** Forest Service road runs parallel to LIZ 9a (uses unknown).
- **Wildlife:** Elk and mule deer highway conflict area, elk severe winter range, mule deer and black bear migration corridor. boreal toad occur along Straight Creek.
- **AVCs:** Average of 0.5/mile/year, concentrated in spring and fall; a re-introduced lynx may have successfully crossed here.
- **Special Management Areas:** Ptarmigan Peak Wilderness Area approximately 0.25 mile to the northwest of LIZ 9a.

Rationale for Prioritizing

LIZ 9a is surrounded by WRNF land; adjacent to condominium developments in Dillon, to the southwest. Jones Gulch, located southeast of Laskey Gulch adjacent to Keystone ski area, south of US 6, is a potential development area but critical for continued wildlife linkage. Development is taking place nearby, including the Keystone area with 300 potential new homes. WRNF currently manages the lands as forested landscape linkage. Denver Water Board lands in the area are potentially for sale, which could add further fragmentation. Summit County may have an interest in acquiring the Denver Water Board lands.

5.2.10 LIZ 9b – Hamilton Gulch to Dead Coon Gulch (milepost 210.7 to milepost 212.6)

Added by recommendation of the Forest Service in June 2003, LIZ 9b is encompassed by the ARNF and lies within the Forest Service Loveland Pass lynx linkage area. The Forest Service noted that numerous elk and deer tracks are seen through the area, and the zone would connect areas north of I-70 managed as forested landscape linkage and pristine wilderness to lands managed for forested landscape linkages south of I-70. The area is densely forested except for the cut-and-fill slopes of I-70.

Several large road cuts and a runaway truck ramp exist north of I-70 in this zone. I-70 was constructed on large fill slopes through this zone and no crossing structures currently exist, although a 4-foot diameter plastic pipe is installed at both Hamilton and Dead Coon gulches, and one 4’ CMP at milepost 211.0. Solid median barriers and offset height between eastbound and westbound directions of I-70 exist through the length of this zone.

Hamilton Gulch reaches I-70 at milepost 211.5, while Dead Coon Gulch reaches I-70 at milepost 212.2. Straight Creek and wetland areas are immediately below I-70 through the entire LIZ. ALIVE Committee members from both the Forest Service and CDOW commented that Hamilton Gulch and Laskey Gulch were both important and that one should not preclude the other in importance.

- **Wetlands:** PSS wetlands and springs/seeps/fens along Straight Creek.

- **Major drainages:** Four unnamed, headwater tributaries enter Straight Creek in LIZ 9b.
- **Culverts and bridges:** Three 4' pipes pass under I-70 in LIZ 9b.
- **Barriers:** Solid shoulder barriers on eastbound and a few on westbound; center median throughout LIZ 9b.
- **Land Ownership/management:** ARNF and private inholdings.
- **Slopes:** Scattered slopes above 50 percent on ridges above drainages.
- **Dominant vegetation types:** Lodgepole pine forests, spruce-fir forest, wetlands.
- **Surrounding lands used or zoned as:** Utility corridor, forested landscape linkages, deer and elk winter range, primitive and pristine wilderness (ARNF).
- **Recreation:** Dispersed, non-motorized recreation.
- **Wildlife:** Elk and mule deer highway conflict area, elk severe winter range, mule deer and black bear migration corridor.
- **AVCs:** Average of 0.5/mile/year, concentrated in spring and fall.
- **Special Management Areas:** Ptarmigan Peak Wilderness Area approximately 0.25 miles to the northwest of LIZ 9b.

Rationale for Prioritizing

There is a utility corridor through the area, the lands to the north and south of Hamilton and Dead Coon gulches are managed for forested landscape linkages and pristine wilderness.

5.2.11 LIZ 10 – Herman Gulch/Bakerville (milepost 216.7 to milepost 220.8)

LIZ 10 was added to the original linkage zones in 2002 because it was considered a lynx crossing zone. LIZ 10 is situated 3 miles east of the EJMT, surrounded by the ARNF. The Forest Service Herman Gulch lynx linkage area lies within this zone, designated as a connection between suitable lynx habitats to the north and south of I-70. Snowshoe hare inhabit the Bethel Avalanche Slide east of Herman Gulch and other avalanche paths in the area, providing forage for lynx and other forest carnivores. A lynx was killed by a vehicle in 2000 on the eastern edge of this LIZ. Forest Service Biologist Gary Patton stated that evidence existed that two female lynx were using the area as home range. CDOT has created retention ponds in the area and boreal toads maintain breeding populations in the ponds.

Nine seasonal homes exist near I-70 north of the underpass at Herman Gulch. This is a heavily used recreation area, as the Continental Divide National Scenic Trail coincides with the Herman Gulch Trail through Herman Gulch and with the Loveland to Bakerville Trail south of I-70. Motorists use the shoulder of I-70 as informal parking on the south side of I-70 near milepost 219. Few median barriers exist through this zone, although shoulder guardrails exist along the majority of its length. A twin span bridge occurs at milepost 218.4. Five CMPs of various diameters cross under I-70 at the following locations: milepost 217.3 (5.5'), milepost 217.9 (2.5'), milepost 219.3 (6'), milepost 219.4 (3'), and milepost 220.1 (2.5'). Large animals can cross at the bridge and smaller animals can use the larger CMPs (5.5'). The surrounding forest lands are managed for

scenery, forested landscape linkages, ski-based resorts (Loveland), and non-motorized backcountry recreation.

- **Wetlands:** PSS wetlands, palustrine ponds, and springs occur along Clear Creek.
- **Major drainages:** Dry, Herman, Watrous, and Kearney gulches enter Clear Creek in LIZ 10.
- **Culverts and bridges:** One twin span bridge crosses a gravel road at the Bakerville exit and five CMPs carry drainage under I-70 to Clear Creek in this zone.
- **Barriers:** Solid shoulder barriers on eastbound and a few on westbound; center median throughout LIZ 10.
- **Land Ownership/management:** ARNF and private inholdings.
- **Slopes:** Scattered slopes above 50 percent on ridges above drainages.
- **Dominant vegetation types:** Lodgepole pine forests, spruce-fir forest.
- **Surrounding lands used or zoned as:** Utility corridor, forested landscape linkages, lynx linkage, deer and elk winter range, primitive and pristine wilderness (ARNF).
- **Recreation:** Dispersed, non-motorized recreation. Intersection of the Continental Divide National Scenic Trail, the Bard Creek Trail and the Bakerville to Loveland Access Trail. Loveland Valley ski area 2 miles west.
- **Wildlife:** Elk and mule deer highway conflict area, elk severe winter range, mule deer and black bear migration corridor. Boreal toads reproduce in local retention ponds.
- **AVCs:** Average of 0.5/mile/year, concentrated in spring and fall.
- **Special Management Areas:** Ptarmigan Peak Wilderness Area approximately 0.25 miles to the northwest of LIZ 10.

Rationale for Prioritizing

Herman Gulch and its accompanying parking area north of I-70 is a heavily used recreation area. People using the Continental Divide National Scenic Trail (CDNST) can connect under the I-70 interchange at milepost 218.4 with the Bakerville-to-Loveland Trail. Kearney Gulch and Watrous Gulch Trails connect with the Bakerville-to-Loveland Trail in the eastern part of the zone. Nine seasonal homes are located north of I-70 underpass. LIZ 10 is surrounded by ARNF land managed for scenery, non-motorized back country recreation, and Loveland ski area development (west of zone). Dry Gulch has the most potential for protection because it is far away from the CDNST, cabins at Herman Gulch, other developed areas around Bakerville, and recreational activity.

5.2.12 LIZ 11 – East of Empire on US 40 (I-70 Exit 232)

LIZ 11 was delineated specifically to address issues with bighorn sheep. Originally, LIZ 11 encompassed the interchange of US 40 and I-70 (milepost 231.2 to milepost 231.8), but sheep pose a greater problem along US 40 west of the interchange. LIZ 11 encompasses an area extending 4.2 miles west of the interchange but east of Berthoud Falls. Sheep inhabiting the mountains north and west of Douglas Mountain are attracted to salts applied to I-70 and US 40 and have been killed at the edge of both roadways. They

generally do not attempt to cross I-70, but do cross US 40 and are frequently hit along an area from west of Empire to the Henderson Mine. The surrounding land has steep, rocky slopes on non-forest property, although the ARNF is north and south of the US 40 Corridor. CDOW DWM Ron Oehlkers stated that CDOW did not support the permanent use of salt licks to attract the sheep away from the area. DWM Oehlkers stated that bighorn sheep would not use an underpass or enclosed structure to cross a roadway. The wetlands near the US 40 and I-70 interchange also support boreal toad populations.

- **Wetlands:** PSS, PFO, palustrine wetlands along Clear Creek and West Fork Clear Creek.
- **Major drainages:** Bard Creek and West Fork Clear Creek. Minor drainages include Miller, Blue, Mad, and Lion creeks.
- **Culverts and bridges:** US 40 bridge over I-70 at milepost 231.4, Clear Creek runs through CBCs that total 201'l x 15'w x 6.5'h under I-70 at milepost 231.3 and a slightly shorter one at milepost 232.3. There are culverts under US 40 for Blue, Mad, Lion, and Miller creeks.
- **Barriers:** Guardrails on shoulders intermittent along I-70 in both directions, and along US 40. Median barrier through the interchange on I-70.
- **Land Ownership/management:** Primarily private surrounded by ARNF.
- **Slopes:** North side of I-70 very steep except around wetlands surrounding Clear Creek, south side also steep at US 40 crossing. Steep slopes used by bighorn sheep on both sides of US 40.
- **Dominant vegetation types:** Mountain shrubland, ponderosa pine forest, Douglas-fir forest, spruce–fir forest.
- **Surrounding lands used or zoned as:** Dispersed recreation, forested flora and fauna, scenery, backcountry recreation (ARNF); agriculture, mining, residential, open space (Clear Creek County and Town of Empire)
- **Recreation:** Little recreation on primarily privately-owned land, dispersed recreation on adjacent ARNF.
- **Wildlife:** Elk calving area approximately 2 miles west of LIZ 11, three mule deer/highway conflict areas, mule deer winter concentration area on US 40 just west of LIZ 11, bighorn sheep winter and summer range, bighorn sheep winter concentration area and lambing areas to the west and south, mountain lion human conflict area (Empire Pass Trail). Boreal toad in wetlands in the interchange area.
- **AVCs:** Average of 0.42/mile/year, primarily bighorn sheep and about one bear per year.
- **Special Management Areas:** None. Numerous mining claims and scattered private lands complicate wildlife management in the area.

Rationale for Prioritizing

LIZ 11 is surrounded by ARNF and managed for scenery.

5.2.13 LIZ 12 – Fall River (milepost 237.2 to milepost 238.2)

The Fall River area is a significant break in the surrounding topography and functions as a movement corridor for mule deer, elk, bighorn sheep, mountain

goat, black bear, and mountain lion. This moderately forested zone is situated entirely on private land with the ARNF approximately 2 miles away to the north and south. Two concrete box culverts, one 4' in height at Georgia Gulch, the other 10' by 10' at Fall River, are present in LIZ 12. An underpass exists at the intersection of Fall River Road and I-70 with an open height of 10 feet. Solid median barriers exist through the length of LIZ 12 and guardrail exists on the south side of I-70 through most of the zone.

Numerous residences exist along Fall River Road and several along US 40. CDOW personnel noted that bear and mountain lion are frequently hit in this area. DWM Ron Oehlkers expressed concern about elk populations becoming habituated and inhabiting the area year-round. Questions were raised in the ALIVE group regarding whether or not habitat connectivity should be improved through this area. CDOW does not desire populations of introduced mountain goats currently inhabiting the Mount Evans area south of I-70 to have the ability to reach areas north of I-70 where they would compete with the native bighorn sheep.

- **Wetlands:** PFO and PSS along Clear Creek and Fall River.
- **Major drainages:** Clear Creek, Fall River, and Trail Creek.
- **Culverts and bridges:** Open span bridge at Fall River Road exit (milepost 237.7), CBCs at Fall River and Georgia Gulch (10' x 10' and 4' x 4', respectively), 3' x 3' CMP at Oro Gulch.
- **Barriers:** Shoulder guardrail solid on eastbound side, center median throughout Zone, shoulder guardrail on westbound side only from Fall River exit to Fall River.
- **Land Ownership/management:** All private.
- **Slopes:** Steep slopes surround LIZ 12 on both sides.
- **Dominant vegetation types:** Ponderosa pine forest, Douglas-fir forest, sagebrush shrubland.
- **Surrounding lands used or zoned as:** Mining, open space, residential and planned unit development (Clear Creek County), on adjacent forest lands is intermix.
- **Recreation:** Scott Lancaster Memorial Bike Path/Bike Way runs parallel, otherwise primarily private so none near by.
- **Wildlife:** Mule deer severe winter range and winter concentration area, elk calving area approximately 3 miles northwest, bighorn sheep winter and summer range, bighorn sheep lambing area.
- **AVCs:** Approximately one mountain lion per year but other wildlife not reported; however, thought to be an important travel corridor and perhaps I-70 is crossed successfully.
- **Special Management Areas:** None.

Rationale for Prioritizing

LIZ 12 is surrounded on all sides by private land, mostly historic mine claims. A significant number of homes are located along Fall River Road; scattered residences along US 6 south of Clear Creek. CDOW has had difficulty in providing possible solutions for problems in this LIZ.

5.2.14 LIZ 13 – Mount Vernon Canyon (milepost 246.5 to milepost 258.1)

CDOW designated several areas in LIZ 13 where six or more roadkills/mile/year of deer and elk occur. Overall, this zone sees more reported roadkill than any other zone through the Corridor. Several Denver Mountain Park and Jefferson County open space properties are situated in or adjacent to the area. No game fencing and very little guardrail and median barriers exist in this zone. No suitable wildlife crossing structures currently exist for larger mammals except for a transportation dirt road underpass at Soda Creek near milepost 249.1. Mountain subdivisions are extensive through this area and elk have habituated to human presence. Groups of five or more elk have been killed in individual accidents in this LIZ. CDOW DWM Tom Howard indicated that fencing in this area would be detrimental and could trap wildlife in the roadway. DWM Howard also indicated that it would be difficult to direct wildlife to any crossing structures in this LIZ.

- **Wetlands:** PEM, PSS, and PFO concentrated in western portion of Zone.
- **Major drainages:** Beaver Brook, Soda Creek, Swede Gulch, Bear Gulch, Cold Spring Gulch, several ditches and one unnamed drainage.
- **Culverts and bridges:** A divided bridge spans Soda Creek Road at milepost 249 and the creek goes through a 4' CMP, Beaver Brook goes through a 5' CMP near the Bergen Park bridge over I-70 at milepost 247.6, four other roads cross over I-70 in this Zone; Bear Gulch goes through a CBC and four unnamed CMPs occur between milepost 253 and milepost 256, all 3.5' x 3.5' or smaller.
- **Barriers:** Even though a high AVC area, very few barriers are used here, primarily shoulder guardrails on the outer curves with more median barriers towards the east end (beginning near milepost 255.5) with fencing occurring only where bison are kept.
- **Land Ownership/management:** Primarily private plus the Town of Genesee.
- **Slopes:** All under 50 percent.
- **Dominant vegetation types:** Forested with ponderosa pine, Douglas-fir, and lodgepole pine, mountain shrubland.
- **Surrounding lands used or zoned as:** Agricultural, resource, commercial, residential and planned unit development (Clear Creek and Jefferson Counties), heaviest residential between milepost 246 and milepost 256.4 on the south side.
- **Recreation:** Denver Mountain Parks (Genesee) between milepost 251 and milepost 254.
- **Wildlife:** several elk and mule deer highway conflict areas, elk migration corridor, elk winter concentration areas to the north, black bear summer concentration and human conflict area approximately 1 mile south.
- **AVCs:** Ranged from 0.70 to 5.20 with an average of 2.37/mile/year, the highest in the I-70 Corridor.
- **Special Management Areas:** None.

Rationale for Prioritizing

LIZ 13 is adjacent to the communities of Genesee, Evergreen, and El Rancho and is all private land except Denver Mountain Parks, which would have to be considered for any improvement ideas. LIZ 13 is developed along most of its length with single homes on large parcels that decrease in number toward the western end near Floyd Hill. The encroachment of development in the area contributes considerable pressure on existing wildlife habitats.

5.3 Priority Ranking of Linkage Interference Zones

The ALIVE Committee ranked all of the LIZs according to their need for wildlife crossings, or the need to improve the permeability of the LIZ. An initial ranking was made in November 2001 of the five highest priority LIZs, as follows:

1. Laskey Gulch
2. East Vail Pass
3. West Vail Pass
4. Officer's Gulch
5. Herman Gulch

One year later, the Committee prioritized all of the 15 LIZs as follows:

- HIGH – East Vail Pass, Laskey/Hamilton Gulches, West Vail Pass, and Herman Gulch
- MEDIUM – Wolcott to Avon, Dowd Junction, Eagle to Wolcott, Eagle Airport to Town of Eagle, and Empire Junction
- LOW – Dotsero, Officer's Gulch/Owl Canyon, Fall River, and Mount Vernon

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6. Publishing the ALIVE Information

Following the work of the ALIVE Committee, the wildlife information and recommendations were made available to the PEIS contractor to incorporate into the Draft PEIS. Much of the information generated by the ALIVE Committee was not published in the PEIS because of space limitations, but much of the information about wildlife movement and habitat connectivity, linkage interference zones, and mitigation recommendations was published in the Draft PEIS. All of the information that was published in the PEIS is presented in Appendix C. In some cases, the mitigation recommendations have been phrased in more general language than that presented by the ALIVE Committee. This was done to reflect a broader level of analysis in the PEIS, which is a Tier 1 document. When more detailed analyses are performed in Tier 2 documents, the more specific language from the ALIVE recommendations will be appropriate.

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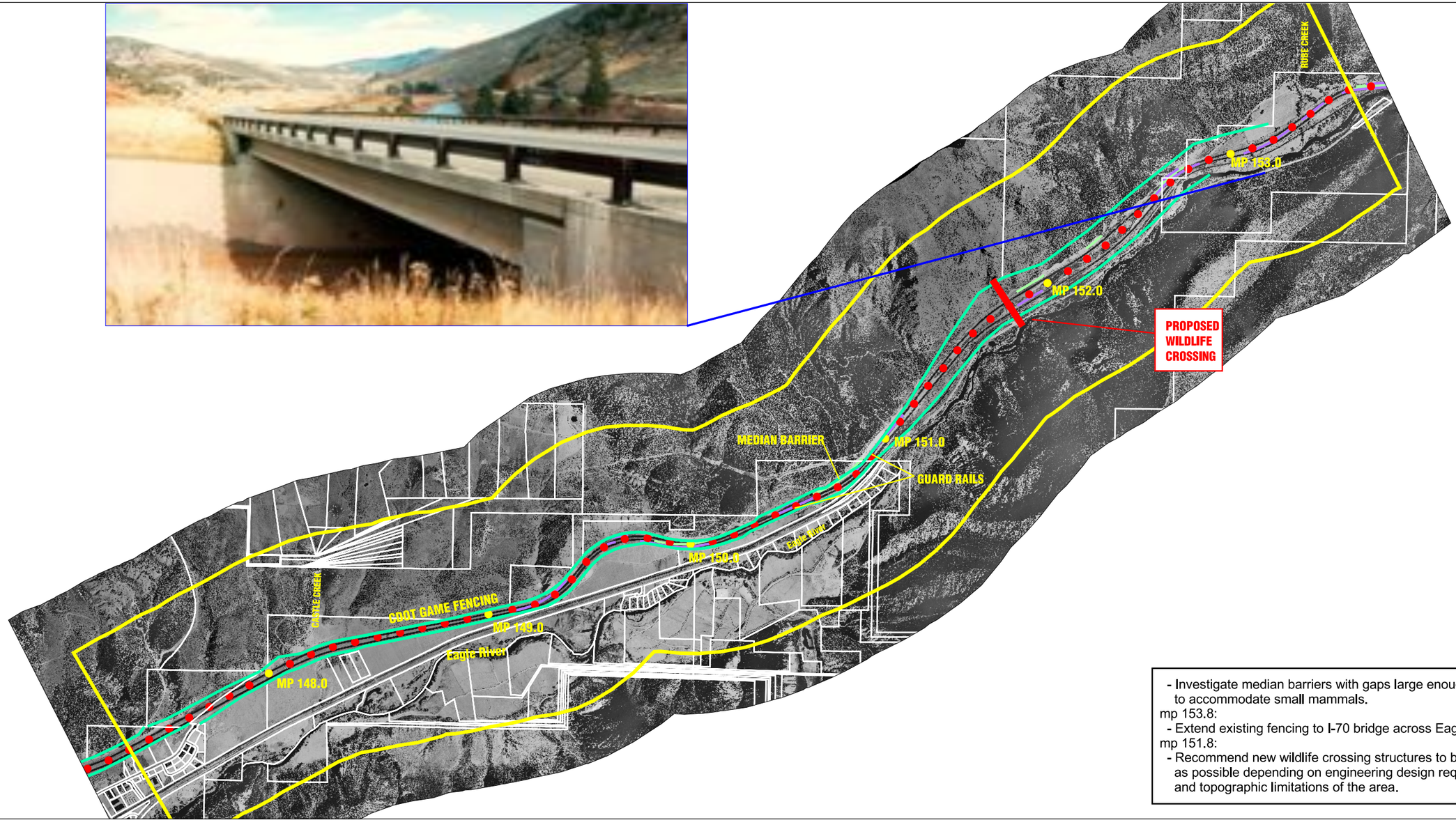
7. Final ALIVE Recommendations for Wildlife Mitigation

Table 3 presents the final recommendations for mitigation measures made by the ALIVE Committee. Whenever a mitigation measure recommends the construction of a crossing structure (excluding wildlife fencing), that structure is illustrated on an accompanying map of the LIZ, as presented on Figures 8 through 18, which follow Table 3.

Table 3. ALIVE Committee Recommended Mitigation Measures by LIZ

Linkage Zone	Proposed Mitigation Description (2003)
1. Dotsero mp 131.4 to mp 134.5	• mp 132.5 to mp 132.8: Repair/replace approximately 300 linear feet of 8-foot game fencing, especially where property owners have cut away fencing for access and where rockfall damage has occurred. Build gates for property owners. • mp 132.5 to mp 132.8: Redesign fence in areas prone to rockfall (approximately 100 feet); use concrete barrier/fence combination.
2. Eagle Airport to Town of Eagle mp 142.0 to mp 145.3	• mp 143.1: Remove fill at bridge west of Cottonwood Creek to increase height to at least 12 feet, making it more suitable for an elk crossing. • mp 142.0 to mp 142.3: Realign approximately 1,500 feet of game fencing in steep areas north of I-70 where rockfall damage occurs, and repair damaged fencing necessary. • mp 145.5: Remove berm from south entrance of passage. • mp 143.8: Investigate potential costs for conservation easement on private land surrounding the Eagle River.
3. Eagle to Wolcott mp 147.3 to mp 153.6	• mp 153.8: Extend existing fencing to I-70 bridge across Eagle River; adding approximately 3,600 feet of new fence on the north and 5,100 feet on the south. • mp 151.8: Add wildlife crossing structure (12' x 24') or as large as possible depending on engineering requirements and topographic limitations of the area (Figure 8). • Investigate costs of conservation easements on adjacent private lands around mp 151.8. • Investigate median barriers with gaps large enough to accommodate small mammals (such as raccoons and skunks). Place barrier gaps every quarter mile.
4. Wolcott to Avon mp 154.5 to mp 166.5	• mp 153.9 to mp 159.0: Add wildlife fencing on south side of I-70 between the Wolcott interchange and where I-70 crosses the Eagle River (approximately 24,700 linear feet of new fencing). Create gaps with berms or one-way gates every 500 feet to enable wildlife to escape from highway side. • mp 155.3 or mp 155.6: Add crossing structure across I-70 and US 6 north and west of Bellyache Ridge, just south of Alkali Creek (Figure 9). • Mp 159.7: Add crossing structure south of Red Canyon Creek and Bear Gulch, south and east of existing road underpass. • Recommend new wildlife crossing structures be as large as possible depending on engineering requirements and topographic limitations of the area. • mp 163 to mp 166.5: Add game fencing on both sides of I-70 (approximately 9,500 linear feet of new fencing). • Investigate conservation easements for each proposed crossing.
5. Dowd Canyon mp 169.5 to mp 172.3	• mp 171.7: Replace 10 foot by 10 foot CBC with 180-foot bridge; included in alternatives being considered under Dowd Canyon Feasibility Study (Figure 10). • mp 170.2 to mp 172.5: Replace existing game fencing with reinforced fence for approximately 5,500 linear feet through rockfall area north of I-70, where current fencing has numerous holes. • mp 170.5: Add 10 foot by 10 foot CBC for carnivores. • CDOT should coordinate with community at West Vail to avoid fence damage caused by plowing snow against fences.
6a and 6b. Upper and Lower West Vail Pass mp 181.7 to mp 188.5	• mp 188.0: Add wildlife overpass (Figure 11). • mp 186.3: Add wildlife underpass structure (arch at least 12 feet by 24 feet). • Recommend new wildlife crossing structures be as large as possible depending on engineering requirements and topographic limitations of the area. • mp 186.3 to mp 188.0: Add CDOT game fencing between proposed structures on both sides of I-70 (approximately 18,000 linear feet total).
7. East Vail Pass mp 190.4 to mp 194.0	• mp 192.5: Add crossing structure to westbound side of I-70 north of Stafford Creek (arch at least 12 feet by 24 feet) (Figure 12). • mp 193.4: Add crossing structure to westbound side of I-70 north of Guller Creek (arch at least 12 feet by 24 feet). • Recommend new wildlife crossing structures be as large as possible depending on engineering requirements and topographic limitations of the area. • Add berms and screening vegetation for approximately 2,300 feet to guide wildlife between existing Wilder Gulch (eastbound) and Corral Creek (westbound) crossings. • Add berms and screening vegetation for approximately 3,400 feet to guide wildlife between existing Smith Gulch (eastbound) and Corral Creek (westbound) crossings. • Provide space between guardrail structures and the road to allow wildlife jumping over barriers to avoid being hit directly by traffic.
8. Officers Gulch/Owl	• mp 198.0: Add 6 foot by 6 foot CBC across from Officers Gulch to allow forest carnivore movement (Figure 13).

Linkage Zone	Proposed Mitigation Description (2003)
Canyon mp 195.5 to mp 200.9	• mp 199.2: Add 6 foot by 6 foot CBC east of Uneva Lake to allow forest carnivore movement. • mp 200.8: Add 6 foot by 6 foot CBC just south of Frisco Exit 201 to allow forest carnivore movement. • Recommend new wildlife crossing structures be as large as possible depending on engineering requirements and topographic limitations of the area. • Investigate amending WRNF plan to exclude overnight use of area surrounding Officers Gulch Pond, planned and secondarily managed as a campground site.
9a. Laskey Gulch mp 207.0 to mp 209.7	• mp 208.3: Investigate underpass crossing structure at least 12 feet by 24 feet to replace the existing 5 foot by 5 foot CMP at Laskey Gulch (Figure 14). • Recommend new wildlife crossing structures be as large as possible depending on engineering requirements and topographic limitations of the area. • Coordinate with local planners to ensure that area zoning accommodates a wildlife structure in this location. • Investigate protecting Jones Gulch along with Laskey Gulch to maintain its integrity as a wildlife corridor. Explore the development potential of the Idabell Mine area and other key area lands. • Continue interagency efforts to ensure that future land planning and zoning efforts improve the viability of the wildlife corridor.
9b. Hamilton Gulch to Dead Coon Gulch mp 210.7 to mp 212.6	• mp 212.2: Investigate underpass or overpass crossing structure at least 12 feet by 24 feet to replace existing the 3.5-foot diameter CMP (Figure 15). • Recommend new wildlife crossing structures be as large as possible depending on engineering requirements and topographic limitations of the area. • Investigate protecting Jones Gulch as a part of Hamilton Gulch crossing to maintain its integrity as a wildlife corridor. Explore the development potential of the Idabell Mine area and other key areas. • Continue interagency efforts to ensure that land planning and zoning efforts improve the viability of the wildlife corridor.
10. Herman Gulch/ Bakerville mp 216.7 to mp 220.8	• mp 217.3: Add underpass structure at least 12 feet by 24 feet with fencing included to replace the current 5-foot CMP at Dry Gulch (Figure 16). • Investigate ARNF Plan amendment to designate Dry Gulch area as lynx linkage corridor.
11. East of Empire on US 40 I-70 Exit 232	• Good place for overpass structure 4.2 miles west of US 40/I-70 interchange, primarily for bighorn sheep crossing (Figure 17). • Investigate using jersey barriers or other barrier structures on both US 40 and I-70 to keep sheep away from road edge.
12. Fall River mp 237.2 to mp 238.2	• Any of the existing CMPs could be replaced with a 12-foot by 24-foot arch or CMP to improve permeability (Figure 18). • Factor improvements into bridge redesign (Fall River Road Interchange Alternative) such as a wider span and leaving adequate space along road and river for wildlife passage.
13. Mount Vernon Canyon mp 246.5 to mp 258.1	• This area is recognized as a problem area and additional mitigation measures will continue to be evaluated. • Fencing throughout the length of the zone may be the only solution, but CDOW has stated that fencing could be detrimental to the wildlife in the area by trapping them on the road and has suggested that game fencing through the zone not be considered as a mitigation measure for the area. • Investigate costs of adding intelligent signs to warn motorists about wildlife movement only during applicable seasons.



- Investigate median barriers with gaps large enough to accommodate small mammals.

mp 153.8:

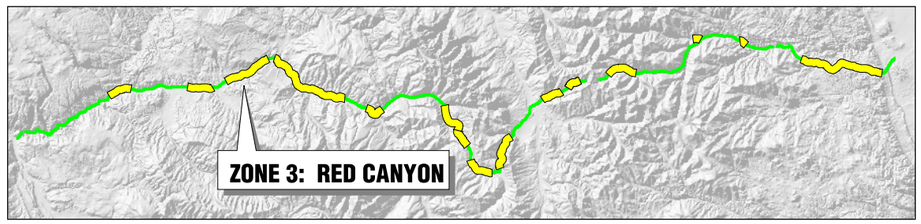
- Extend existing fencing to I-70 bridge across Eagle River.

mp 151.8:

- Recommend new wildlife crossing structures to be as large as possible depending on engineering design requirements and topographic limitations of the area.

General Features

- I-70 Mile Posts
- Existing CDOT Game Fencing
- I-70 Shoulder Barriers
- I-70 Median Barriers



N
W E
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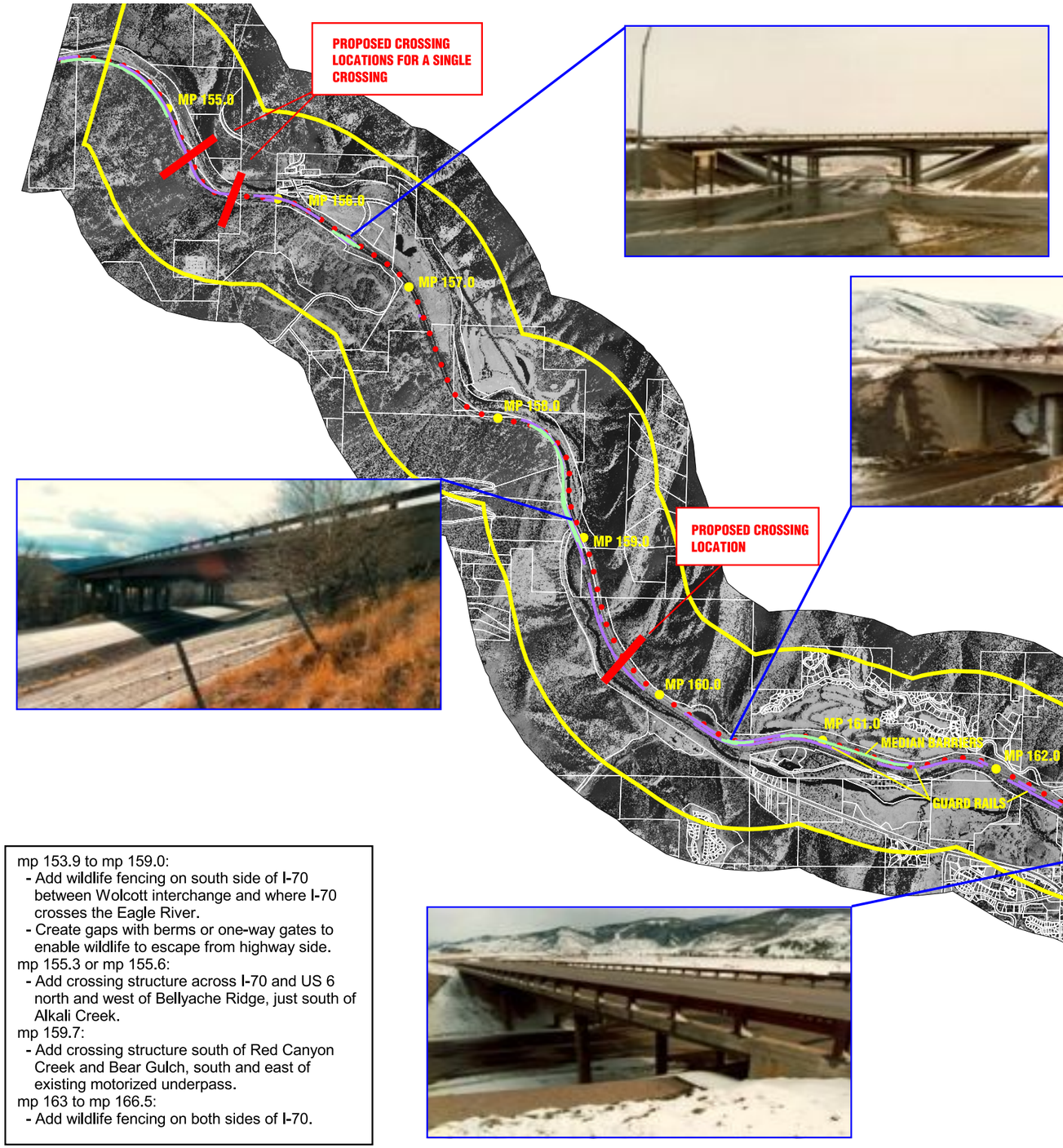
1000 0 1000 Feet

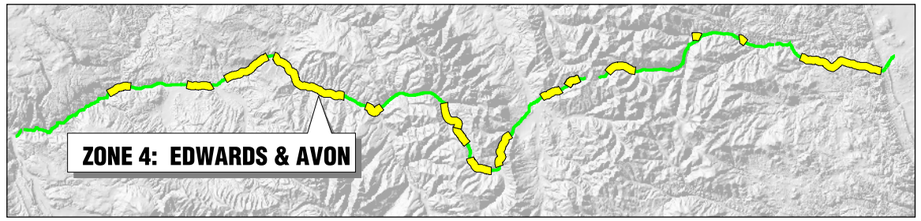
SCALE - 1:18,000 or 1" = 1,500'

I-70 Mountain Corridor PEIS

Wildlife Linkage Interference Zone 3:
Eagle to Wolcott

Figure 8





General Features

- I-70 Mile Posts
- I-70 Shoulder Barriers
- I-70 Median Barriers

3000 0 3000 Feet

SCALE - 1:45,000 or 1" = 3,750'

mp 153.9 to mp 159.0:
- Add wildlife fencing on south side of I-70 between Wolcott interchange and where I-70 crosses the Eagle River.
- Create gaps with berms or one-way gates to enable wildlife to escape from highway side.

mp 155.3 or mp 155.6:
- Add crossing structure across I-70 and US 6 north and west of Bellyache Ridge, just south of Alkali Creek.

mp 159.7:
- Add crossing structure south of Red Canyon Creek and Bear Gulch, south and east of existing motorized underpass.

mp 163 to mp 166.5:
- Add wildlife fencing on both sides of I-70.

I-70 Mountain Corridor PEIS

Wildlife Linkage Interference Zone 4:
Wolcott & Avon

Figure 9

ZONE 5: DOWD CANYON

Rafting "Take Out" Location

MP 170.0

SHOULDER BARRIERS

WHISKEY CREEK CDOW LEASE

MEDIAN BARRIERS

PROPOSED CBC UNDERPASS

CDOT GAME FENCING

MP 171.0

VAIL DEER UNDERPASS PROPERTIES (CDOW)

Dowd Junction Wildlife Underpass CBC WB & EB Length: 101.000 Height: 10.000

PROPOSED TO REPLACE CBC WITH BRIDGE

MP 172.0

Dowds Junction Bridge EB & WB Length: 114.000 Height: 32.000

Rafting "Put In" Location

N W E S

500 0 500 Feet

SCALE - 1:12,000 or 1" = 1,000'

General Features

- Bridges, Culverts & Drainages
- I-70 Mile Posts
- I-70 Shoulder Barriers
- I-70 Median Barriers
- Existing CDOT Game Fencing

- Replace existing wildlife crossing structures to be as large as possible depending on engineering design requirements and topographic limitations of the area.

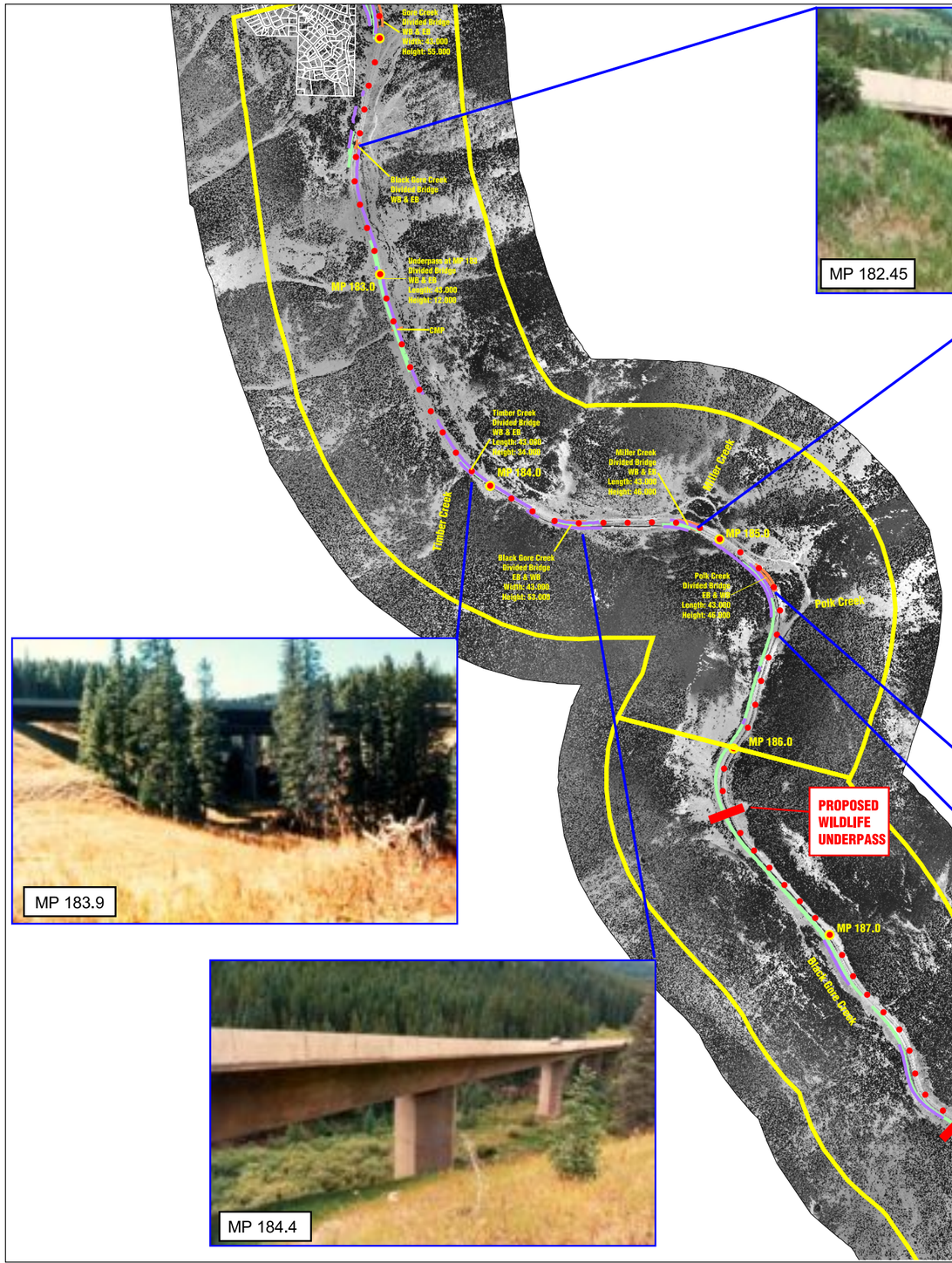
mp 170.2 to mp 172.5:

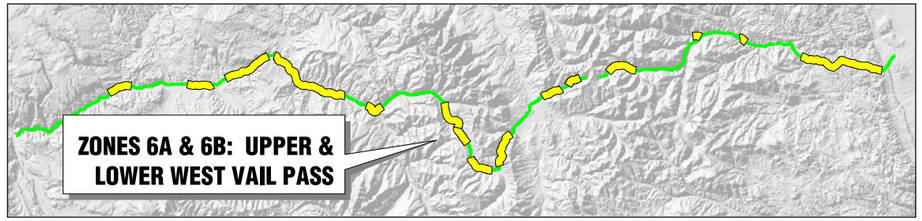
- Replace existing wildlife fencing with reinforced fence through rockfall area north of I-70, where current fencing has numerous holes.

I-70 Mountain Corridor PEIS

Wildlife Linkage Interference Zone 5:
Dowd Canyon Area

Figure 10





LIZ 6B Upper West Vail Pass
Area of Highest elevation
but no appropriate wildlife
crossing. 3.0 miles

2000 0 2000 Feet

SCALE - 1:36,000 or 1" = 3,000'

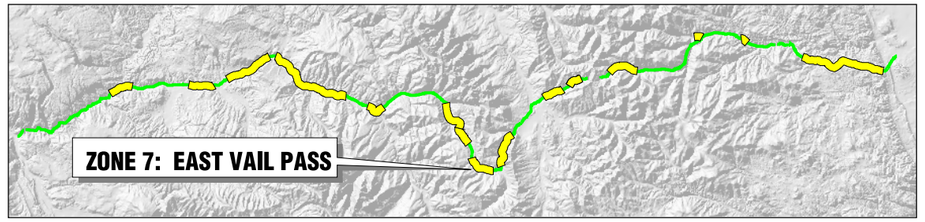
General Features

- Bridges, Culverts & Drainages
- I-70 Mile Posts
- I-70 Shoulder Barriers
- I-70 Median Barriers
- Existing CDOT Game Fencing

I-70 Mountain Corridor PEIS

Wildlife Interference Zones 6A & 6B:
Upper & Lower West Vail Pass

Figure 11



General Features

- Bridges, Culverts & Drainages
- I-70 Mile Posts
- I-70 Shoulder Barriers
- I-70 Median Barriers

- Add berms and screening vegetation to guidewildlife between existing Wilder Gulch (eastbound) and Corral Creek (westbound) crossings.
- Add berms and screening vegetation to guide wildlife between existing Smith Gulch (eastbound) and Corral Creek (westbound) crossings.
- Provide space between guardrail structures and the road to allow wildlife jumping over barriers to avoid jumping directly into traffic.

mp 192.5:
- Add crossing structure to westbound side of I-70 north of Stafford Creek.

mp 193.4:
- Add crossing structure to westbound side of I-70 north of Guller Creek.

West Tenmile Creek
Bridge
EB Only
Length: 43.000
Height: 37.000

Wilder Gulch
Bridge
EB Only
Length: 43.000
Height: 20.000

Corral Creek
Bridge
WB Only
Length: 41.000
Height: 44.000

MP 191.0

Corral Creek

West Tenmile Creek

PROPOSED WB
UNDERPASSES

Smith Gulch
Bridge
EB Only
Length: 43.000
Height: 35.000

MP 192.0

CMP

Stafford Creek
Bridge
EB Only
Length: 44.000
Height: 35.000

Stafford Creek

CMP

MP 193.0

Guller Creek
Bridge
EB Only
Length: 43.000
Height: 37.000

Guller Creek

MP 194.0

West Tenmile Creek
Bridge
EB Only
Length: 43.000
Height: 37.000

1000 0 1000 Feet

SCALE - 1:18,000 or 1" = 1,500'

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I-70 Mountain Corridor PEIS

Wildlife Interference Zone 7:
East Vail Pass

Figure 12

I-70 Mountain Corridor PEIS

Wildlife Interference Zone 8:
Officers Gulch / Owl Canyon

Figure 13

MP 200.8 = Proposed crossing for carnivores

MP 200.0

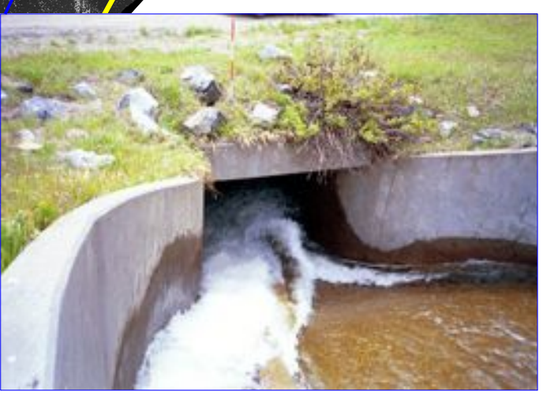
CBC

UNEVA LAKE

MP 199.0

2 CMP's

PROPOSED CBC UNDERPASS



MP 198.0

Cement Pipe

Tenmile Creek

MP 197.0

MP 196.0

Tenmile Creek

mp 198.0, mp 199.2, and mp 200.8:
- Recommend new wildlife crossing structures to be as large as possible depending on engineering design requirements and topographic limitations

General Features

- Bridges, Culverts & Drainages
- I-70 Mile Posts
- I-70 Shoulder Barriers
- I-70 Median Barriers

N
W E
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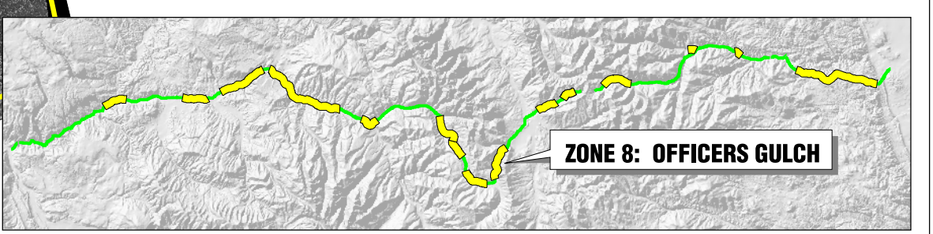
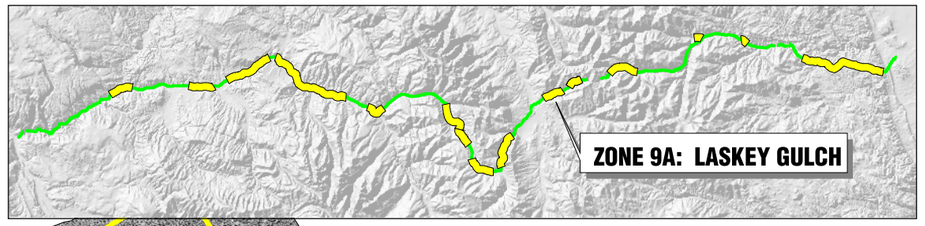
1000 0 1000 Feet

SCALE - 1:18,000 or 1" = 1,500'





General Features

- Bridges, Culverts & Drainages
- I-70 Mile Posts
- I-70 Shoulder Barriers
- I-70 Median Barriers

PROPOSED LARGER UNDERPASS TO REPLACE EXISTING

Unnamed 2' CMP WB & EB

MP 209.0

Laskey Gulch 10x8' EB & WB Length: 369.800 Height: 6.000

MP 208.0

Unnamed 2' CMP WB & EB

MP 207.0

N W E S

1000 0 1000 Feet

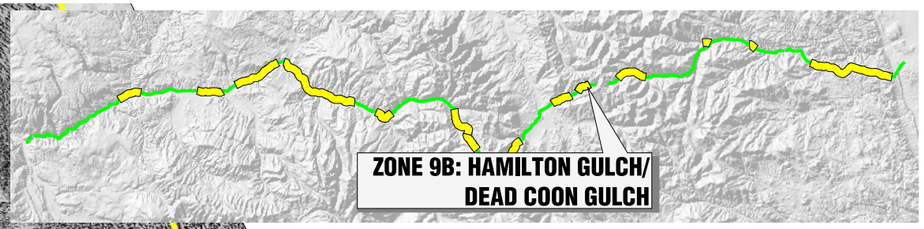
SCALE - 1:18,000 or 1" = 1,500'

mp 208.3:
- Recommend new wildlife crossing structures to be as large as possible depending on engineering design requirements and topographic limitations of the area.

I-70 Mountain Corridor PEIS

Wildlife Interference Zone 9a:
Laskey Gulch

Figure 14



HAMILTON GULCH

DEAD COON GULCH

PROPOSED LARGER
CROSSING THAN EXISTING

Unnamed
Plastic Pipe
Width: 3.500

ROAD CUT

MEDIAN BARRIERS

Runaway Truck Ramp

MP 212.0

STRAIGHT CREEK

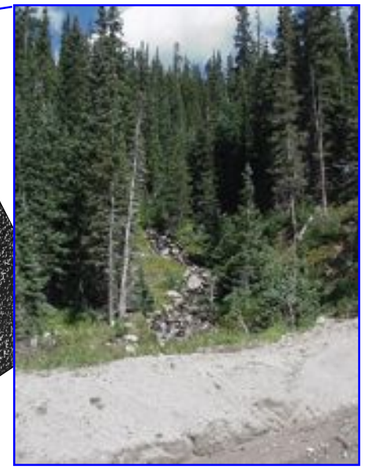
Hamilton Gulch
Plastic Pipe
Width: 4.000'

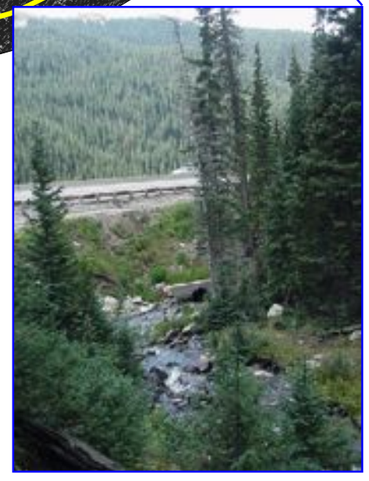
ROAD CUT

GUARD RAILS

MP 211.0

Unnamed
CMP
Width: 4.000





N
W E
S

500 0 500 Feet

SCALE - 1:10,500 or 1" = 875'

General Features

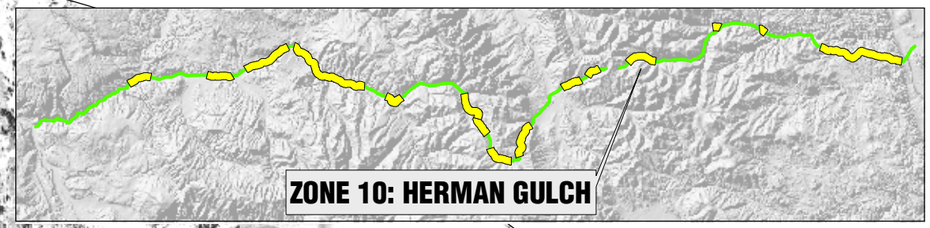
- Bridges, Culverts & Drainages
- I-70 Mile Posts
- I-70 Shoulder Barriers
- I-70 Median Barriers

mp 212.2:
- Recommend new wildlife crossing structures to be as large as possible depending on engineering design requirements and topographic limitations of the area.

I-70 Mountain Corridor PEIS

Linkage Interference Zone 9b:
Hamilton Gulch / Dead Coon Gulch

Figure 15



PROPOSED REPLACEMENT UNDERPASS LARGER THAN EXISTING

MP 218.0

CMP
Width: 2.500

Herman Gulch
CMP
Width: 5.000

MP 219.0

Watrous Gulch
CMP
Width: 6.000
Length: 195.000

CMP
Width: 3.000
Length: 240.000

MP 220.0

CMP
Width: 2.500

Dry Gulch
CMP
EB & WB
Width: 5.500
Length: 162.000

MP 217.0

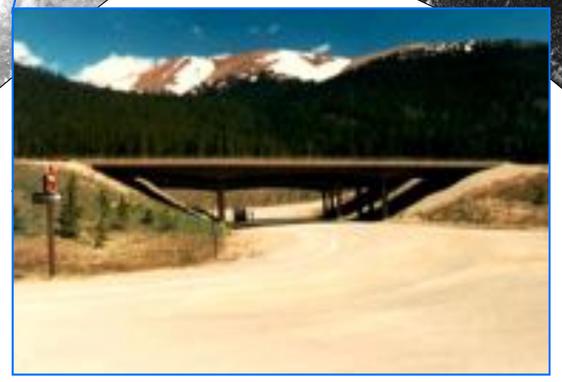
N
W E
S

1,000 0 1,000
Feet

SCALE - 1:19,800 or 1" = 1,650'

General Features

- I-70 Shoulder Barriers
- I-70 Median Barriers
- Bridges, Culverts & Drainages
- I-70 Mile Posts

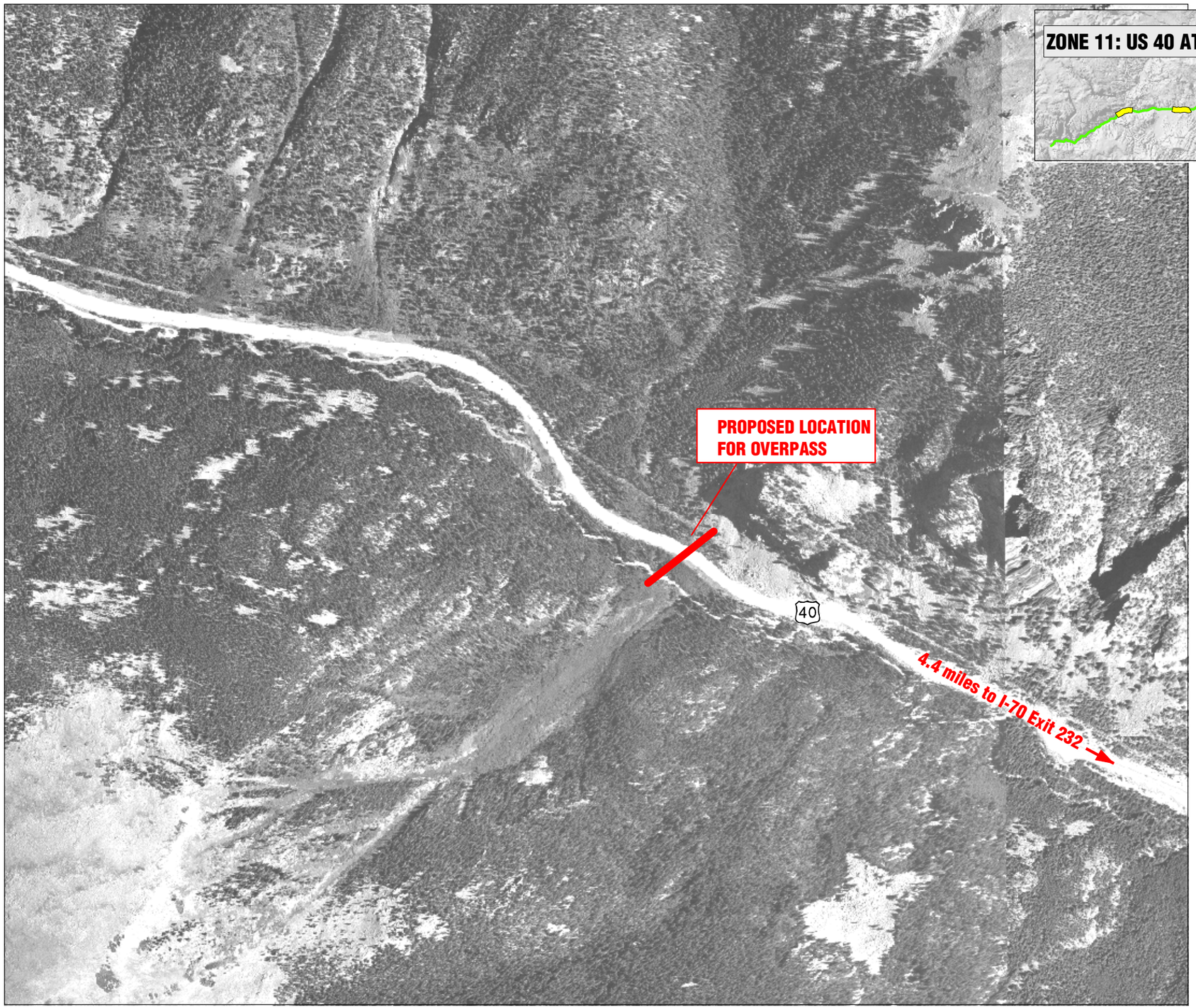


mp 217.3:
- Design corridor to allow free movement of wildlife under I-70 within this zone.

I-70 Mountain Corridor PEIS

Wildlife Interference Zone 10:
Herman Gulch

Figure 16

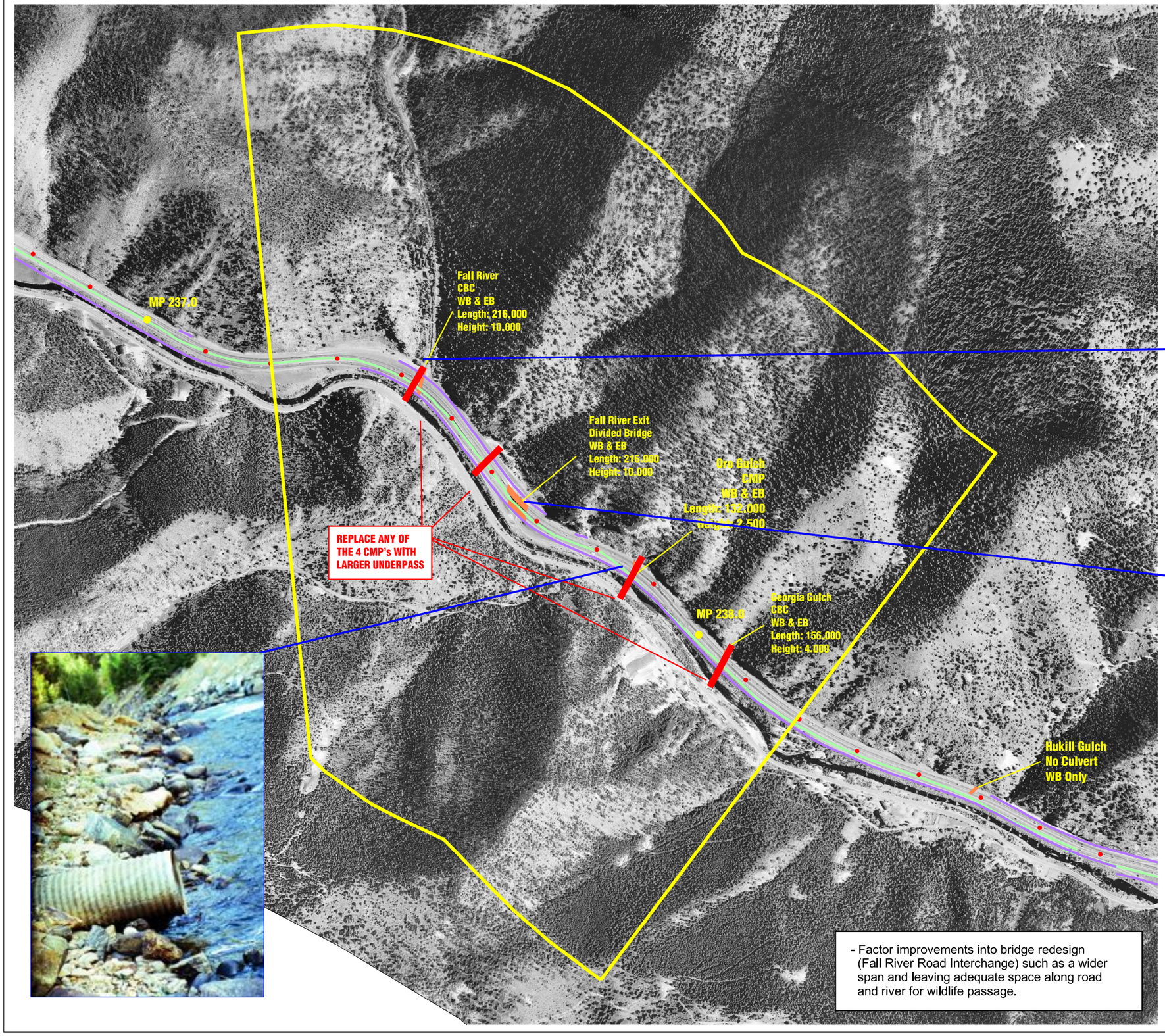


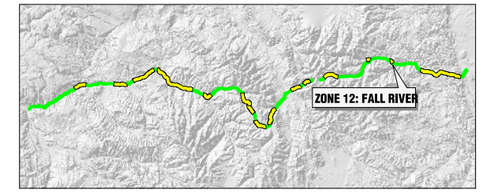
SCALE - 1:9,000 or 1" = 750'

I-70 Mountain Corridor PEIS

Wildlife Interference Zone 11:
US 40 at Empire

Figure 17





General Features

- I-70 Mile Posts
- Existing CDOT Game Fencing

- Factor improvements into bridge redesign (Fall River Road Interchange) such as a wider span and leaving adequate space along road and river for wildlife passage.

N
W E
S

600 0 600 Feet

SCALE - 1:9,600 or 1" = 800'

I-70 Mountain Corridor PEIS

Linkage Interference Zone 12:
Fall River

Figure 18

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Appendix A
ALIVE Memorandum of Understanding

DRAFT

ALIVE
Memorandum of Understanding
among the
Colorado Department of Transportation
Federal Highway Administration
US Fish and Wildlife Service
The USDA Forest Service
US Bureau of Land Management
Colorado Department of Natural Resources, Division of Wildlife

This Memorandum of Understanding (MOU) is made and entered into this ___day of _____, 2006, between the Colorado Department of Transportation (CDOT), the Federal Highway Administration (FHWA), the US Fish and Wildlife Service (USFWS), the USDA Forest Service (USFS), the US Bureau of Land Management (BLM), and the Colorado Department of Natural Resources, Colorado Division of Wildlife (CDOW), hereinafter referred to as "Parties" or "Agencies."

The Parties to this agreement are public entities with responsibilities pertaining to the I-70 Mountain Corridor (I-70 Corridor) Tier 1 Programmatic Environmental Impact Statement (PEIS) and Tier 2 (site-specific, project-level) National Environmental Policy Act (NEPA) documents.

The PEIS recognizes that the existing I-70 Corridor and the proposed future improvements pass through several life zones and ecosystems that support numerous aquatic and terrestrial wildlife species. While all Parties to this MOU recognize that the I-70 transportation system provides important benefits to Colorado citizens, the local communities, and economic interests on a statewide level, they also acknowledge that the I-70 Corridor fragments or isolates existing habitats, interferes with free movement of animals within their habitat, and reduces remaining quality wildlife habitat by making such habitat less accessible to many native species. In addition, high-traffic volumes form a difficult-to-penetrate barrier to movement, often resulting in animal-vehicle collisions and serious levels of mortality for some rare or low-density species. Therefore, over time, the benefits derived from a transportation system can come at a cost to other resources, including interference with the ability of wildlife to use the landscape in a manner that maintains population effectiveness.

The Parties to this agreement desire to improve conditions for wildlife in this Corridor. The **ALIVE Committee** ("**A L**andscape Level **I**nventory of **V**alued **E**cosystem Components"), consisting of wildlife specialists from each Agency, as developed a landscape-based ecosystem approach for consideration of wildlife needs and conservation measures, and has identified measures to improve existing aquatic and terrestrial ecosystem connectivity across the I-70 Corridor between Denver and Glenwood Springs.

Using best available information, the ALIVE Committee identified 13 high-priority locations where evidence suggests that the highway's barrier effect impedes important wildlife migration or movement routes or zones of dispersal. The PEIS and this MOU refer to these locations as linkage interference zones (LIZs). The 13 LIZs are described on Table 1 and shown on Figure 1, both appended to and made a part of this MOU. The ALIVE program provides a starting point for, and ensures Agencies' participation in development of, subsequent Tier 2 site-specific analyses and implementation of long-term impact mitigation measures within the context of a Corridor-long, landscape-based ecosystem approach to Corridor impacts on wildlife needs and conservation measures. It is understood by all parties to this MOU that, because the I-70 Mountain Corridor project is anticipated to span many years, the descriptions of the LIZs, species affected, and recommended mitigation strategies in Table 1 are subject to change through time. All parties to this MOU agree to coordinate to update this Table, if necessary, during each applicable Tier 2 process and in those respective NEPA documents.

I. Purpose and Intent of the MOU

With this MOU, the Parties identify their interdependence in identifying, designing, and managing landscape elements to ensure effective populations of species identified by the ALIVE Committee. The Parties herewith establish a program of cooperation for the purpose of early and full implementation of corrective actions to solve permeability problems in identified LIZs, and to streamline the section 7 consultation process under the Endangered

Species Act for the I-70 Corridor Tier 2 projects. Time and resources will be better invested in proactive programs that involve a corridor-wide, coordinated program of species and habitat conservation and provide the maximum benefit to wildlife.

It is the intent of the Parties to increase the permeability of the I-70 Corridor to terrestrial and aquatic species, including but not limited to deer, elk, the boreal toad, fish (for example, greenback cutthroat trout), and forest carnivores (for example, Canada lynx). This includes development of management strategies that will result in the long-term protection and restoration of wildlife linkage areas that intersect the I-70 Corridor, improve habitat connectivity, and preserve essential ecosystem components.

The Parties recognize that:

1. This process goes beyond the ordinary regulatory or statutory requirements of its participants. While CDOT and FHWA have an obligation under the Endangered Species Act (ESA) section 7(a)(1) "to utilize their authorities in furtherance of the purposes of the Act by carrying out programs for the conservation of species listed pursuant to the Act," neither CDOT nor FHWA has a mission to sustain wildlife populations. They cooperate with and rely on resource and regulatory agencies to further the conservation of wildlife and the protection of endangered species.
2. Regulatory and resource agencies, and other stakeholders with an interest in wildlife habitat connectivity and conservation along the I-70 Corridor, have limited resources to address the barrier effects of the I-70 Corridor and to pursue key conservation objectives and principles for game animals and threatened, endangered, or otherwise sensitive aquatic and terrestrial species. By working together, these agencies can make the most effective and efficient use of limited resources.
3. Traditional project-by-project evaluation and treatment of regulatory requirements for, and mitigation of, impacts on wildlife have limited effectiveness in a corridor the extent of I-70.
4. Constructing wildlife passages at the earliest possible opportunity, particularly in locations where ordinary regulatory processes do not require mitigation or conservation measures for wildlife, will require the financial support of the Parties and other stakeholders, as well as an active pursuit of other elements essential to the function of wildlife passages. Financial support can include but is not limited to direct funding, in-kind contribution of labor or equipment, etc.
5. Resources otherwise devoted to the regulatory consultation and documentation process would be better spent by combining and streamlining the processes for multiple projects over an extended timeframe and the furtherance of a coordinated program to address habitat fragmentation and wildlife viability for the entire length of the Corridor, i.e. at the landscape, ecosystem level.
6. Existing planning and funding mechanisms for transportation projects can create limitations to the programmatic approaches envisioned by this MOU. Full implementation of a successful ALIVE outcome will require the participation by all Parties and other stakeholders in the commitment of resources beyond those meant for transportation mitigation.

With this MOU, the Parties propose to develop mechanisms that focus resources on results. The Parties will work together to identify programs or actions for implementing the MOU as opportunities, funding, or proposed transportation improvement projects warrant. The Parties seek to collaborate in identifying the means for funding and constructing wildlife passages as soon as possible, to use all available means to protect and maintain the viability of these passages, and to identify regulatory review processes to accelerate project permitting.

Other stakeholders not party to this MOU also hold keys to full implementation of the ALIVE recommendations. Specifically, local governments, land managers, and private landowners with jurisdiction over or ownership of lands affected by the Corridor are instrumental in developing growth policies and defining conservation easements, land holdings, and other mechanisms which are needed to ensure the long-term viability of wildlife passages and other best management practice (BMP) investments. In addition, financial participation by these other stakeholders, as well as other interested parties, will be necessary to fully implement the recommendations of ALIVE.

Construction of effective wildlife passages will require the cooperation of transportation, resource, and regulatory agencies and those other stakeholders with jurisdiction or ownership affected by the Corridor, whether or not they

are Parties to this MOU. All Parties to this agreement understand that CDOT cannot commit public funding to construction of wildlife passages unless the Parties and other affected stakeholders with jurisdiction or ownership are in agreement to commit their respective resources, regulation and management policies, and practices to ensuring functional key wildlife passages in respective LIZs. Recognizing that, all Parties to this agreement commit to ensuring functional key wildlife passages and linkage areas along the length of the Corridor not only through full analysis of a reasonable range of alternatives in the PEIS and subsequent project-specific NEPA analyses, and their own management, regulation, design, construction, maintenance, and monitoring, but also through collectively and actively seeking agreement and cooperation among those who are not Parties to this agreement but who have pertinent jurisdiction or ownership or are interested parties in the respective LIZs.

II. Cooperation

A. All Parties, within their statutory and regulatory authority, agree to work together toward the long-term protection and restoration of wildlife habitat or habitat linkages that intersect the I-70 Corridor. All Parties to this MOU understand that any action that would curtail or prohibit restoration of the functionality of a movement corridor identified by the ALIVE Committee could result in a reconsideration of the feasibility of a wildlife passage associated with this Corridor. Based on this understanding, all Parties agree to reasonably cooperate in the implementation of this MOU. Such cooperation shall include:

1. Supporting the concepts identified in this MOU and working to actively implement this MOU as authorized under applicable laws, regulations, and policies.

2. Providing transportation and wildlife expertise, data, and technical support to the ALIVE Committee for planning and project review that will mitigate impacts on, or provide betterments for, wildlife, and increase and improve wildlife habitat connectivity across the I-70 Corridor.

3. Considering the ALIVE Committee's recommendations when the opportunity to construct a specific wildlife passage arises; with the expectation that additional analyses are needed prior to any investment in wildlife passages or BMPs. Analysis will include evaluations of the effectiveness of previously-installed structures, including their location and design, as well as the compatibility of associated land use with the intended function of the structure.

4. Identifying programs or actions that result in the long-term protection, restoration, or enhancement of wildlife habitat or habitat connectivity intersected by the I-70 Corridor. Paramount to this need is the management of enough land adjacent to each passage so that a reasonable person can conclude that the intended permeability function of each passage will be sustained as growth and other land uses inevitably occur.

5. Establishing more efficient processes of regulatory review and permitting, thereby helping to reduce the cost and delay of subsequent individual Tier 2 construction projects in the I-70 Corridor.

6. Working with the ALIVE Committee, local governments, and other stakeholders as appropriate to:

   a. pursue potential partnerships and funding mechanisms;

   b. identify and promote opportunities and resources to construct wildlife passages in the most effective locations based on the best available information on wildlife use of passages over or under highways and determined by supporting land use, and

   c. sustain partnerships for the long-term protection and restoration of habitat in important habitat conservation and linkage areas.

7. All Parties to this MOU agree:

   a. that passages in LIZs (see map, Figure 1) where construction of I-70 occurs as a result of the PEIS Decision and subsequent Tier 2 decisions will be built before or during such construction, providing all Parties and other stakeholders with jurisdiction or ownership in those respective LIZs are cooperatively committed to and are coordinating to ensure functional LIZs and passages. In coordination with the ALIVE Committee, Tier 2 NEPA and

ESA section 7 analyses will identify the specific location and appropriate structure(s) for passages within each LIZ, based on best available information on wildlife species of concern, habitat connectivity, effectiveness of wildlife passages, and type and adjacent land use plans. Included in this effort are the development of other BMPs such as a fencing plan intended to direct or inhibit wildlife movement, as required, and an identification of the necessary funding to build and maintain the BMPs including wildlife passages and the corridor easements;

b. that, when funding options are identified through successful efforts of one or more of the Parties or stakeholders, or other independent initiatives, wildlife passages in identified LIZs that will not undergo construction as a result of the PEIS and subsequent Tier 2 decisions will be constructed with consideration of priorities developed by the ALIVE Committee;

c. All Parties to this MOU agree to partner in an effort to understand and satisfy the wildlife and habitat needs associated with each passage within the context of a Corridor-long, landscape-level ecosystem approach to wildlife needs and conservation measures. The design and location of each passage within each of the LIZs is necessarily site-specific, but all Parties agree to locating, designing, constructing, and maintaining each passage within the Corridor-long context.

B. Such cooperation by FHWA and CDOT shall include:

1. Leading the primary effort to initiate the ALIVE program, thereby helping to achieve the environmental goals of the PEIS and subsequent Tier 2 decisions, which extend beyond the requirements of CDOT and FHWA.

2. The design criteria of all alternatives considered in full in the PEIS will not preclude incorporation and construction of viable wildlife passages for the species of concern in that LIZ, as identified by the ALIVE Committee.

3. Pursuing options for identifying, and if necessary funding, an administrative position for a maximum of two (2) years. The function of the administrator would be to explore, identify, and pursue funding sources and mechanisms to construct wildlife passages, especially for those passages to be pursued beyond CDOT's legal responsibility. In the best interest of the ALIVE program, determining the need for an administrative position will be revisited regularly by the Parties and funding sought to maintain the position as determined necessary by the Parties.

C. Such cooperation by the USFS and the BLM shall include:

1. Considering the recommendations of the ALIVE program in the review of Tier 2 NEPA documents and the granting of any land actions or other use permits germane to movement corridors, approving biological reports and participating in section 7 consultation under the ESA so that transportation projects and associated conservation measures can proceed in a timely manner.

2. Encouraging the cooperation and support of land lease holders and other entities with legal interest on public lands to ensure the realization of the objectives of the MOU, which could include their active participation in achieving the goals of the ALIVE program.

3. Exercising their mandates to protect wildlife species and their habitat. Accordingly, the USFS and the BLM, by means of ordinary and established Planning and subsequent NEPA processes, will consider lands in proximity to I-70 for their habitat and wildlife movement attributes. They will treat installed wildlife passages consistent with their intended purpose of connecting functional wildlife movement corridors, and strive to maintain associated wildlife movement corridors.

4. Informing the CDOT Environmental Programs Branch, Transportation Regions 1 and 3 by letter of all requested land actions, special use permits, USFS and BLM plan amendments, or other pertinent actions, that could affect an identified habitat linkage and conflict with a planned wildlife passage area.

5. As opportunities arise, seeking to consolidate lands along the Corridor to maintain or improve habitat connectivity adjacent to the I-70 Corridor.

D. Such cooperation by the USFWS shall include:

Participating in and facilitating the development of regulatory streamlining instruments that accelerate the section 7(a)(2) consultation process under the Endangered Species Act as it may apply to transportation projects and their associated conservation measures, and any related right-of-way actions from the USFS or the BLM to FHWA and CDOT. A separate Programmatic Agreement will be pursued among FHWA, CDOT, and USFWS for this purpose.

E. Such cooperation by CDOW shall include:

Providing in-kind support through cooperation and consultation with other Parties, jurisdictions, and landowners to facilitate a Corridor-long perspective and understanding of wildlife needs and conservation measures; providing wildlife data and management expertise; and monitoring the effectiveness of wildlife passages and LIZ management.

III. Nonfunding or Obligating Document

This MOU is neither a fiscal nor a fund-obligating document. Any endeavor involving reimbursement or contribution of funds among the Parties of this MOU will be handled in accordance with applicable laws, regulations, and procedures. Such endeavors will be outlined in separate agreements that shall be made in writing by representatives of the Parties and shall be independently authorized by appropriate statutory authority. This MOU does not establish authority for noncompetitive award of any contract or other agreement. Any contract or agreement for services must fully comply with all applicable requirements for competition.

IV. Effective Date

This MOU is effective as of the date of the signatures shown below and will expire upon the full implementation of the Selected Alternative in the Record of Decision for the I-70 Mountain Corridor PEIS.

Full implementation of this MOU may take place over a long time span. To deal with changing conditions, the Parties will meet within 60 days after the MOU is signed and annually thereafter, unless all Parties agree to another schedule, to review changes, consider unforeseen developments, and make decisions regarding the priorities, placement, and design of wildlife passages considered in this MOU.

V. Modification

To be effective, all Parties must agree in writing to any modifications to this MOU.

VI. Termination

Parties may terminate their participation in this MOU with a 30-day notice to the other Parties. Termination by any one party will terminate the entire MOU and eliminate any remaining requirements for any of the Parties. Termination of this MOU does not relieve CDOT and FHWA of obligations identified in the PEIS/ROD, section 7 consultation, or other permit requirements.

VII. Availability of Funds

Implementation of this MOU by the federal agencies is subject to the requirements of the Anti-Deficiency Act (31 USC 1341) and the availability of appropriate funds. Nothing in this MOU will be construed by the Parties to require the obligation, appropriation, or expenditure of any money from the US Treasury.

VIII. Dispute Resolution

All Parties agree to work cooperatively to avoid and resolve conflicts. The Parties agree to explore issues thoroughly before escalating disputes. Resolution mechanisms to ensure that adequate communication has occurred, such as mediation and facilitation, may be used at any level to help expedite resolution. If disagreements emerge which cannot be resolved at any level, the dispute will be escalated through management as appropriate.

IX. Retention of All Authorities

Nothing in this MOU is intended to limit or diminish the legal obligations, responsibilities, and management authority of the Parties.

X. Signatures

COLORADO DEPARTMENT OF TRANSPORTATION

By: _____
Thomas E. Norton, Executive Director

COLORADO DIVISION, FEDERAL HIGHWAY ADMINISTRATION

By:_____
David Nicol, P.E., Division Administrator

US FISH AND WILDLIFE SERVICE, ECOLOGICAL SERVICES

By:_____
Susan Linner, Colorado Field Supervisor

USDA FOREST SERVICE

By:_____
Jacqueline L. Parks, Acting Forest Supervisor,
Arapaho and Roosevelt National Forests and Pawnee National Grassland

US BUREAU OF LAND MANAGEMENT

By:_____
Jamie Connell, Field Manager, Glenwood Springs Resource Area

COLORADO DEPARTMENT OF NATURAL RESOURCES, COLORADO DIVISION OF WILDLIFE

By: _____
Russell George, Executive Director, Colorado Dept. of Natural Resources
OR
Bruce McCloskey, Director, Division of Wildlife

Attachments to ALIVE MOU

Table 1. Linkage Interference Zones and Recommended Mitigation

Life Zones	Linkage Interference Zones	Animal-Vehicle Collisions	Proposed Mitigation
Western Slope Foothills Glenwood Springs to Avon (mp 116 to mp 170)	**Zone 1: Dotsero (mp 131.4 to mp 134.5)** Setting: • Predominantly sagebrush with little tree cover. • The Nature Conservancy (TNC) recently purchased a conservation easement on the Bair Ranch property near this zone, which will enhance and preserve wildlife movement opportunities in this area. Wildlife Movement: • Known movement corridor for deer and elk. • Area fairly heavily used for crossing. • Most deer and elk in this zone cross from mp 133 west to the mouth of the Glenwood Canyon, avoiding the nearby lakes south of I-70 where several developments are under construction. • Mule deer severe winter range and winter concentration areas on both sides of I-70. • Elk winter range north of I-70. • Located adjacent to the BLM Glenwood Canyon lynx linkage that provides movement between Flattops Wilderness and Red Tables in WRNF. • CDOW indicates that as few as 30 percent of the roadkills in this area are ever reported. Existing Structures and Fencing: The existing transportation underpasses in this area are not being used as wildlife crossings and are not suitable for wildlife.	1.4 per mile per year	• mp 132.5 to mp 132.8: Repair/replace wildlife fencing, as appropriate. • mp 132.5 to mp 132.8: Redesign fence in areas prone to rockfall (approximately 100 feet); use concrete barrier/fence combination.
	Zone 2: Eagle County Airport to Town of Eagle (mp 142.0 to mp 145.3) Setting: • Open piñon-juniper woodland near I-70. • Riparian forest and shrub habitats. • Adjacent to the Eagle River. • Rapid development through the 1990s occurred in this area around Eagle County Airport. Planned developments in this area include, Frost Creek, and Diamond S Ranch developments south of I-70. Wildlife Movement: • CDOW describes this section of I-70 as a highway crossing area for big game. • Provides for movement to and from deer and elk severe winter range, winter concentration areas, and fawning/calving habitat to the north and south of I-70. • Mule deer severe winter range areas on north and south of I-70. • Elk severe winter range on north of I-70 on BLM lands. • Lands managed by the WRNF as elk habitat are located to the south of the zone. Existing Structures and Fencing: Game fencing exists through the entire length of zone on both sides of I-70, for approximately 35,850 total linear feet.	0.39 per mile per year	• mp 143.1: Remove fill at bridge west of Cottonwood Creek to increase height, making it more suitable for an elk crossing. • mp 142.0 to mp 142.3: Realign wildlife fencing in steep areas north of I-70 where rockfall damage occurs, and repair damaged fencing as necessary. • mp 145.5: Remove berm from south entrance of passage. • mp 143.8: Investigate potential costs for conservation easement on private land surrounding the Eagle River.
	Zone 3: Eagle to Wolcott (mp 147.3 to mp 153.4) Setting: • The eastern portion of the zone is moderately forested, while the western portion closer to the town of Eagle is sparsely forested. • Zone extends through Red Canyon. • Steep slopes on both sides of highway for most of its length. • Large areas of BLM lands are located to the north and south with mixed private lands in between. • Recreation uses near the zone include numerous BLM trails. Wildlife Movement: • Elk severe winter range southwest of I-70. • Mule deer severe winter range, winter concentration to the south of I-70. • Forest carnivores including bear and mountain lion frequent the area. • Providing for lynx movement across shrub-steppe habitats from Flattops Wilderness in the east to Castle Peak in the west, the BLM has designated this zone as a lynx linkage area. Existing Structures and Fencing: Solid 8-foot fencing exists on both sides of I-70 through the entire zone. No suitable wildlife crossing structures are currently located through this area.	0.39 per mile per year	• mp 153.8: Extend existing fencing to I-70 bridge across Eagle River. • mp 151.8: Recommend new wildlife crossing structures to be as large as possible depending on engineering design requirements and topographic limitations of the area. • Investigate median barriers with gaps large enough to accommodate small mammals (for example, raccoons and skunks). Place barriers every 0.25 mile. • Investigate costs of conservation easement around mp 151.8.

Table 1. Linkage Interference Zones and Recommended Mitigation (Continued)

Life Zones	Linkage Interference Zones	Animal-Vehicle Collisions	Proposed Mitigation
Western Slope Foothills – Continued Glenwood Springs to Avon (mp 116 to mp 170)	**Zone 4: Wolcott to Avon (mp 154.5 to mp 166.5)** Setting: • Sparsely forested. • Rapid development around Avon and Edwards occurred through the 1990s. • Significant development is still occurring through the eastern half of the zone, including 250 housing units, soccer fields, a school, and a church south of mp 163. • Red Sky Ranch, a large development of 35-acre lots southwest of the zone, is being subdivided into 15-acre lots. • The BLM recently completed a 1,400-acre land swap to private interests near the zone in exchange for lands outside Grand Junction. Wildlife Movement: • Heavily traveled by carnivores, including black bear and mountain lion (Bellyache Ridge); designated by CDOW as a human conflict area for both species. • CDOW considers most of the area a highway conflict zone for deer and elk. • Elk and mule deer severe winter range and winter concentration both sides of I-70. The area south of I-70 through the eastern portion of this zone contains elk severe winter range and calving areas. • Federal lands to the north are managed by the WRNF for deer and elk winter range, while the Holy Cross Wilderness is located to the south. • Rapid development, combined with habitats historically occupied by deer, elk, and forest carnivores has resulted in wildlife conflicts in this zone. • The zone is located at the western edge of the Castle Peak BLM lynx linkage. BLM has designated the area between mp 154.0 and 160.0 as lynx habitat linkage. Existing Structures and Fencing: This linkage interference zone currently has no CDOT wildlife fencing.	1.2 per mile per year	• mp 153.9 to mp 159.0: Add wildlife fencing on south side of I-70 between Wolcott interchange and where I-70 crosses the Eagle River. Create gaps with berms or one-way gates to enable wildlife to escape from highway side. • Recommend new wildlife crossing structures to be as large as possible depending on engineering design requirements and topographic limitations of the area. • mp 155.3 or mp 155.6: Add crossing structure across I-70 and US 6 north and west of Bellyache Ridge, just south of Alkali Creek. • mp 159.7: Add crossing structure south of Red Canyon Creek and Bear Gulch, south and east of existing motorized underpass. • mp 163 to mp 166.5: Add wildlife fencing on both sides of I-70. • Investigate conservation easements for each proposed crossing.
Western Slope Montane Avon to East Vail (mp 170 to mp 182)	**Zone 5: Dowd Canyon (mp 169.5 to mp 172.3)** Setting: • The area has little forest cover adjacent to I-70. • Steep slopes on the north side are a significant rockfall hazard. • The WRNF surrounds the zone to the north and south, while pockets of residential development are located to the east and west. • Federal lands and good habitat are located north and south. • Wildlife fencing has been damaged. Wildlife Movement: • This is a western Vail north–south connection for wildlife movement. • Elk winter range/severe winter range is located south of the zone. • Important elk and mule deer migration corridor. • Camera studies performed by CDOW have shown the area to be used by elk, deer, and mountain lion. • Bear and lion conflict areas. • Designated as a lynx linkage area by USFS. Existing Structures and Fencing: This linkage interference zone has median and guardrail barriers along most of I-70. A concrete box culvert and several land leases by CDOW are located in this zone for wildlife movement. The existing crossing structure is long and only 10 feet in height, inhibiting the movement of large elk. Most of I-70 in this zone includes CDOT wildlife fencing on both sides, which is often damaged by rockfall on the north and winter snowplowing activities from residences to the south. A paved bike path with restricted winter usage is located near the existing crossing structure in addition to several trails and a river rafting “put in” location. Eagle County plans to expand the paved bike path to the west.	0.59 per mile per year	• Recommend new wildlife crossing structures to be as large as possible depending on engineering design requirements and topographic limitations of the area. • mp 170.2 to mp 172.5: Replace existing wildlife fencing with reinforced fence through rockfall area north of I-70, where current fencing has numerous holes. • CDOT should coordinate with community at West Vail to avoid damage caused by plowing snow against fences.

Table 1. Linkage Interference Zones and Recommended Mitigation (Continued)

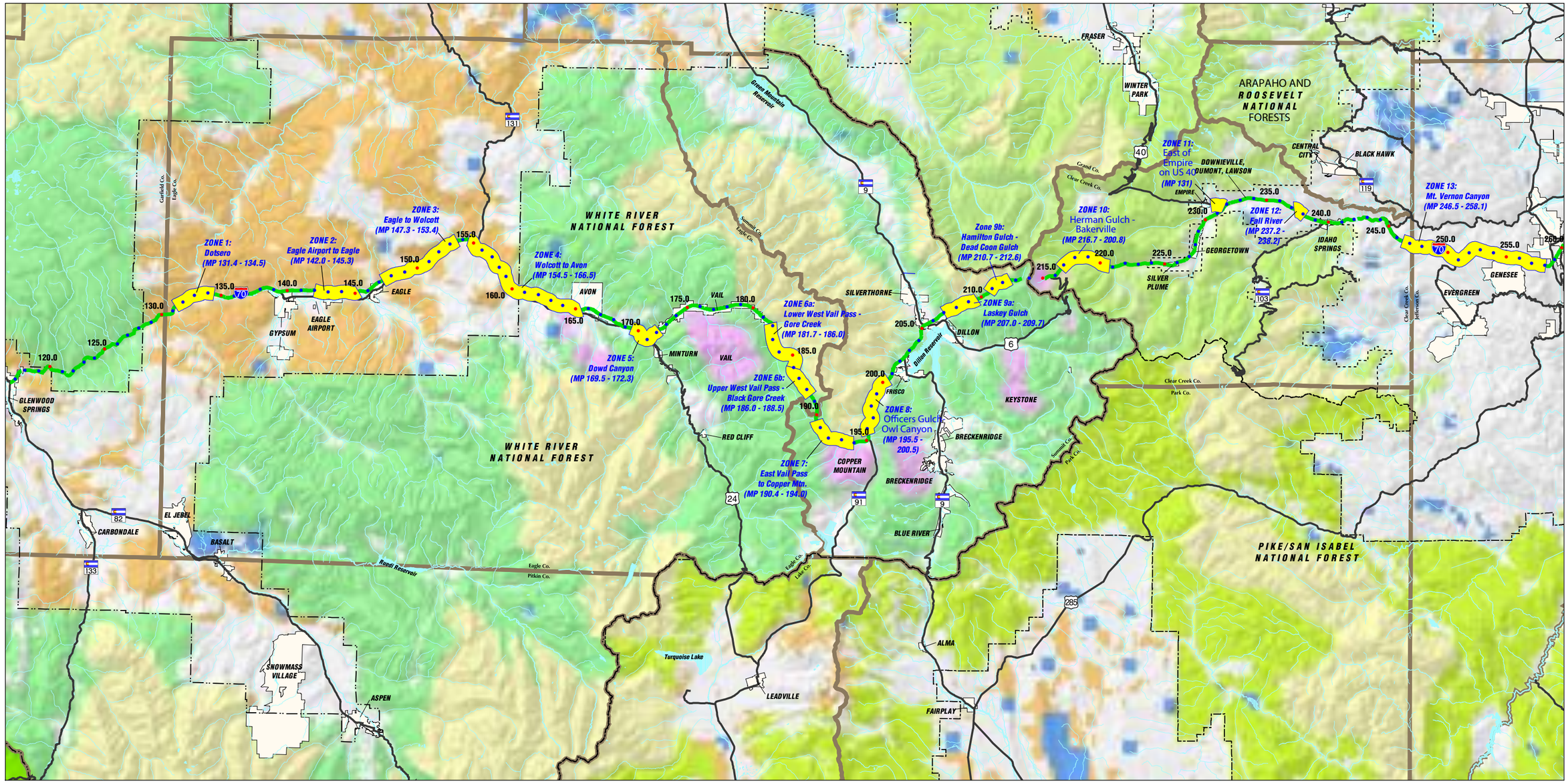
Life Zones	Linkage Interference Zones	Animal-Vehicle Collisions	Proposed Mitigation
Subalpine East Vail to US 40 (mp 182 to mp 233)	**Zone 6a and 6b: Upper and Lower West Vail Pass (mp 181.7–188.5)** Setting: • Coniferous forest grows to the edge of both sides of the highway through most of the zone. • Bridges are highly effective as wildlife crossings to connect forest lands from mp 182.5–185.3. • Eagles Nest Wilderness Area is located directly north of I-70 through most of the zone. • The land on the southwest side of lower west Vail Pass is forest property managed as forested landscape linkage, intended to be maintained for a connection between Eagles Nest Wilderness Area to the east and the Holy Cross Wilderness Area to the southwest. • The forest lands at the top of upper west Vail Pass are managed for year-round motorized backcountry recreation to the west and for nonmotorized backcountry recreation to the east. Wildlife Movement: • Surrounded by the WRNF, this zone is used heavily by wildlife and has a low amount of roadkill. • Designated as a lynx linkage area by the USFS; based on habitat of the area, lynx usage is highly probable. (Note: Two lynx were killed within a short distance of each other in vehicle collisions on upper west Vail Pass, one in 1999 and one in 2004, both near mile marker 187.) • Bighorn sheep range north. • Bear and lion conflict area. Existing Structures and Fencing: Six open-span bridges are located contiguously in the eastbound and westbound direction of I-70 through lower west Vail Pass, although there are no existing crossing structures through upper west Vail Pass. Animals in the area are found to readily jump over median barriers but showed reluctance to cross in areas with guardrail structures (Barnum 2002). The offset lanes of the interstate and associated jersey barriers are significant movement barriers to wildlife in portions of this LIZ.	0.03 per mile per year	• mp 188.0 and mp 186.3: Recommend new wildlife crossing structures to be as large as possible depending on engineering design requirements and topographic limitations of the area. • mp 188.0 to mp 186.3: Add CDOT wildlife fencing between proposed structures on both sides of I-70.
	Zone 7: East Vail Pass to Copper Mountain (mp 190.4 to mp 194.0) Setting: • Most of zone is forested, although not as densely as west Vail Pass. • Significant open areas exist. • The eastbound and westbound lanes of I-70 are separated through this section with an open wetland area containing West Tenmile Creek. • The zone is surrounded by ski areas, forest property managed as forested landscape linkage, nonmotorized backcountry recreation, and primitive wilderness. • Several parcels of private land are located within the east end of the zone, just west of Copper Mountain near the Guller Creek and West Tenmile Creek bridges. • In addition to the Tenmile-Vail Pass National Recreation Trail that runs the length of the zone, USFS trails are located through Stafford Gulch, Wilder Gulch, Corral Creek, and Guller Creek. Wildlife Movement: • This zone is located within the USFS Vail Pass lynx linkage zone. • CDOW indicates that wildlife cross through drainages predominantly at Smith Gulch and Guller, Stafford, Wilder, and Corral creeks. • CDOW also noted that forest carnivores are frequently seen crossing at Stafford Creek. The forest cover is less dense in this area than that seen on west Vail Pass. Existing Structures and Fencing: Five existing open-span bridge structures occur in the eastbound direction through this zone. Only one structure exists in the westbound direction, and it is not directly adjacent to a corresponding structure in the eastbound direction.	0.68 per mile per year	• Recommend new wildlife crossing structures to be as large as possible depending on engineering design requirements and topographic limitations of the area. • mp 192.5: Add crossing structure to westbound side of I-70 north of Stafford Creek. • mp 193.4: Add crossing structure to westbound side of I-70 north of Guller Creek. • Add berms and screening vegetation to guide wildlife between existing Wilder Gulch (eastbound) and Corral Creek (westbound) crossings. • Add berms and screening vegetation to guide wildlife between existing Smith Gulch (eastbound) and Corral Creek (westbound) crossings. • Provide space between guardrail structures and the road to allow wildlife jumping over barriers to avoid jumping directly into traffic.
	Zone 8: Officers Gulch/Owl Canyon (mp 195.5 to mp 200.5) Setting: • Area dominated by extreme slopes on all sides; canyon opens up to Wheeler Flats area near Copper Mountain (south) and Frisco (north). • Borders Eagles Nest Wilderness Area (west) and WRNF lands managed for nonmotorized backcountry recreation and scenic byways, which is conducive to wildlife habitat. • This steep canyon area has several water bodies, including Uneva Lake, Officers Gulch Pond, and Wheeler Flats Ponds. • The area is heavily forested with tree cover for wildlife use close to I-70. • While the area is encompassed by the WRNF, the land surrounding Uneva Lake to the east of I-70 is a forest inholding, although the owners have indicated to the USFS that they do not plan to develop the land. Several other private mine inholdings are located to the east of I-70 in this area, although they are located on very steep slopes. • The lands are managed by the WRNF as pristine wilderness, nonmotorized backcountry recreation, and scenic byways or travel corridors. The Tenmile-Vail Pass National Recreation Trail runs through the length of this linkage interference zone. Wildlife Movement: • Connection between habitats in the Gore Mountain Range and Tenmile Mountain Range, especially for carnivores. • CDOW considers mp 200.8 a black bear movement corridor. • Mule deer migration corridor runs parallel. • Located within the USFS Officers Gulch lynx linkage area, providing movement between Eagles Nest Wilderness Area and the Tenmile Mountain Range. • USFS biologists have indicated that most of the ungulate movement in the area is lateral with the highway. Existing Structures and Fencing: A single box culvert is located at mp 199.6. Box culverts are viewed as acceptable structures for the area by USFS and CDOW for most carnivore highway crossing activity in the area. An interchange at Officers Gulch is used as an informal overnight truck pullover. WRNF manages an area adjacent to Officers Gulch Pond that is proposed as an overnight camping area, although the area is currently not for overnight use and USFS indicated overnight use would potentially inhibit carnivore movement.	0.24 per mile per year	• mp 198.0, mp 199.2, and mp 200.8: Recommend new wildlife crossing structures to be as large as possible depending on engineering design requirements and topographic limitations of the area. • Investigate amending WRNF plan to exclude overnight use of area surrounding Officers Gulch Pond, planned and secondarily managed as a campground site.

Table 1. Linkage Interference Zones and Recommended Mitigation (Continued)

Life Zones	Linkage Interference Zones	Animal-Vehicle Collisions	Proposed Mitigation
Subalpine – Continued East Vail to US 40 (mp 182 to mp 233)	**Zone 9a: Laskey Gulch (mp 207.0 to mp 209.7)** Setting: • The area is moderately forested, transitioning to sagebrush closer to the town of Dillon. • Located between Dillon and a steep pass leading to the EJMT and constructed on steep cut-and-fill slopes of I-70. • In Dillon, condominiums have been built along the western edge of the linkage interference zone on the south side of I-70 within 0.5 miles of Laskey Gulch. Sound walls are currently being constructed adjacent to the condominiums. Due to the vertical height of these walls, they would be considered a movement barrier to most species of terrestrial wildlife. • Solid median and guardrail barriers are located through the length of the linkage interference zone, and no crossing structures currently exist. • This zone is within the WRNF and is managed as forested landscape linkage. • Most private lands are developed in this area, although the Denver Water Board possesses several large undeveloped inholdings in the central portion of the zone. Wildlife Movement: • Laskey Gulch is an important connection for deer, elk, and bear. • Elk severe winter range habitat north and south of I-70. • Elk and mule deer highway conflict areas. • Mule deer and bear migration corridors. • Potential lynx crossing. Located within the USFS Loveland Pass lynx linkage area, this zone provides for north-south lynx movement from the Ptarmigan Peak Wilderness Area and Williams Fork River area to forest lands south of I-70. Existing Structures and Fencing: CDOW noted that resident populations of elk and deer in the area were not obstructed by the golf course south of I-70 and would benefit from a crossing structure at Laskey Gulch to reconnect lands managed by the WRNF as deer and elk winter range north and south of I-70.	0.50 per mile per year (total zone 9)	• mp 208.3: Recommend new wildlife crossing structures to be as large as possible depending on engineering design requirements and topographic limitations of the area. • Coordinate with local planners to ensure that area zoning accommodates a wildlife structure in this location. • Continue interagency efforts to ensure that future land planning and zoning efforts improve the viability of the wildlife corridor.
	Zone 9b: Hamilton Gulch/Dead Coon Gulch (mp 210.7 to mp 212.6) Setting: • With the exception of cut-and-fill slopes of I-70, this area is densely forested. • This zone includes 3- to 5-foot concrete center barrier structure throughout its length, and approximately 2,300 feet of guardrail. • Straight Creek follows the length of the zone along I-70. • Several large road cuts and a runaway truck ramp are located north of I-70 in this zone. • Straight Creek and wetland areas are located below I-70 through the zone to the south. Hamilton Gulch reaches I-70 at mp 211.5, while Dead Coon Gulch lays further to the east at mp 212.2. Members of the ALIVE committee from both the USFS and CDOW commented that they felt that Hamilton Gulch and Laskey Gulch were both important and that they should both be considered equally. Wildlife Movement: • High usage by deer and elk along Hamilton Gulch and near Dead Coon Gulch to the east. • Located within the USFS Loveland Pass lynx linkage area and managed as forested landscape linkage. • The USFS noted that numerous elk and deer tracks are seen through the area and the zone would connect areas north of I-70 managed as forested landscape linkage and pristine wilderness to lands managed for forested landscape linkages south of I-70. Existing Structures and Fencing: I-70 was constructed on large fill slopes through this zone and no crossing structures currently exist, although two 4-foot plastic pipes and one corrugated metal pipe are located in the zone. Solid median barriers and an offset height between eastbound and westbound directions of I-70 are located through the length of this zone.	As above	• mp 212.2: Recommend new wildlife crossing structures to be as large as possible depending on engineering design requirements and topographic limitations of the area.
	Zone 10: Herman Gulch/Bakerville (mp 216.7 to mp 220.8) Setting: • Herman Gulch is located 3 miles east of EJMT, surrounded by the ARNF. • The forest lands are managed for scenery, ski-based areas (Loveland), and nonmotorized backcountry recreation. • Six residential structures are located near I-70 north of the underpass at Herman Gulch. • The Continental Divide National Scenic Trail traverses through this area along the Herman Gulch trail to the north of I-70 and along the Loveland to Bakerville trail to the south of I-70. Wildlife Movement: • Considered important lynx habitat. Herman Gulch lynx linkage area is located within this zone, designated as a connection between suitable lynx habitats to the north and south of I-70. If quality habitat north of I-70 were combined with that south of the highway, a more viable lynx range would be possible, especially if connectivity across the Corridor improved. • ARNF has designated the area a lynx linkage zone. • Boreal toad breeding area. • Snowshoe hare inhabit the Mount Bethel Avalanche Path east of Herman Gulch and other avalanche paths in the area, providing forage for lynx and other forest carnivores. • USFS and CDOW indicated that evidence existed that two female lynx were using the area as home range. A lynx was killed on I-70 by a vehicle in the area of Herman Gulch in 2000. Another female (pregnant with 2 fetuses) was killed near eastbound mp 217 on 5/19/2005. Existing Structures and Fencing: Motorists use the shoulder of I-70 as informal parking on the south side of I-70 near mp 219. Few median barriers are located through this zone, although guardrails are located through most of its length.	Data Unavailable	• mp 217.3: Design corridor to allow free movement of wildlife under I-70 within this zone. • Continue interagency efforts to ensure that future land planning and zoning efforts improve the viability of the wildlife corridor.

Table 1. Linkage Interference Zones and Recommended Mitigation (Continued)

Life Zones	Linkage Interference Zones	Animal-Vehicle Collisions	Proposed Mitigation
Eastern Slope Montane Silver Plume to Mount Vernon Canyon (mp 233 to mp 255)	**Zone 11: East of Empire on US 40 (off I-70 – approximately mp 232.0)** Setting: • North-facing slope heavily forested; south face primarily bare exposed rock cliffs. • ARNF is located just to the east of this zone. Wildlife Movement: • Steep slopes used by bighorn sheep on both sides of US 40. This zone was delineated specifically to address issues with bighorn sheep, which approach the edge of the highway to lick salt and are sometimes hit by vehicles at the edge of the I-70 and US 40 interchange. Bighorn sheep generally do not attempt to cross I-70 (except near the Henderson Mine west of this zone) but do cross US 40 and are frequently hit west of Empire. • Mule deer winter concentration north; mule deer highway conflict area. • Mountain lion conflict area. Existing Structures and Fencing: CDOW stated that bighorn sheep would not use an underpass or enclosed structure to cross a roadway.	0.42 per mile per year	• Good place for overpass structure 4.2 miles west of US 40/I-70 interchange, primarily for bighorn sheep crossing. • Investigate using jersey barriers or other barrier structures on both US 40 and I-70 to keep sheep away from road edge.
	Zone 12: Fall River (mp 237.2 to mp 238.2) Setting: • Primarily forested, though not densely. No wildlife fencing. Relatively gentle slopes throughout zone. • Located entirely on private land with the ARNF approximately 2 miles away to the north and south. • Numerous residences are located along Fall River Road and several along US 40. Wildlife Movement: • The Fall River area provides a significant break in the surrounding topography and functions as a movement corridor for mule deer, elk, bighorn sheep, mountain goat, black bear, and mountain lion. • CDOW noted that carnivores are frequently hit in this area, and there are concerns about elk populations becoming habituated and inhabiting the area year-round. • Bighorn sheep, elk, bear, and mountain lion frequent the area and are hit occasionally. • Resident elk living close to populated areas are a concern in this area. Elk calving 0.25 miles north. • Mule deer severe winter and winter concentration north. • The ALIVE Committee identified this zone , however, CDOW has concerns regarding the introduced mountain goats currently inhabiting the Mount Evans area south of I-70 having the ability to reach areas north of I-70 and compete with native bighorn sheep. Existing Structures and Fencing: Two concrete box culverts, one 4 feet in height at Georgia Gulch, the other 10 feet in height at Fall River, currently exist in this linkage interference zone. An underpass is located at the intersection of US 40 and I-70. Solid median barriers are located through the length of the linkage interference zone and a guardrail is located on the south side of I-70 through most of the zone.	Reported numbers too low for average	• Recommend new wildlife crossing structures to be as large as possible depending on engineering design requirements and topographic limitations of the area. • Factor improvements into bridge redesign (Fall River Road Interchange) such as a wider span and leaving adequate space along road and river for wildlife passage.
	Zone 13: Mount Vernon Canyon (mp 246.5 to mp 258.1) Setting: • Several Denver Mountain Park and Jefferson County open space properties are situated in or adjacent to this zone. • Mountain subdivisions have been extensively built through this area. • The 2,340-acre Denver Mountain Park (Genesee) extends north and south of I-70 between mp 251 and 254 and approximately 20 percent is fenced for bison rangeland adjacent to I-70. The park includes open forests and grasslands. Wildlife Movement: • Overall, this zone sees more reported roadkill than any other zone through the Corridor. • Several deer and elk highway conflict areas mapped by CDOW. • Bear summer and human conflict areas south of I-70. • Due to extensive subdivisions, elk in zone have habituated to human presence. • Resident elk are frequently hit by vehicles; groups of five or more elk have been killed in individual accidents in this linkage interference zone. Existing Structures and Fencing: CDOW indicated that fencing in this area would be detrimental and could trap wildlife in the roadway. CDOW also indicated that it would be difficult to direct wildlife to crossing structures in this zone. No wildlife fencing and very little guardrail and median barriers exist in this zone. No suitable wildlife crossing structures currently exist for larger mammals, except for a transportation dirt road underpass at Soda Creek near mp 249.	2.37 per mile per year	• Recognized as a problem area; mitigation measures currently being evaluated. • Fencing throughout the length of the zone may be the only solution. However, CDOW has stated that fencing could be detrimental to the wildlife in the area and has suggested that wildlife fencing through the zone not be considered as a mitigation measure for the area. • Investigate costs of adding intelligent signs to warn motorists about wildlife movement.



General Features

- I-70 Mileposts
- I-70
- State & Federal Highways
- White River NF
- Arapaho and Roosevelt NF
- Pike / San Isabel NF
- Rivers & Streams
- Lakes & Water Bodies
- County Boundaries
- Cities & Towns

Jurisdiction

- Arapaho and Roosevelt NF
- White River NF
- Bureau of Land Management
- Pike/San Isabel NF
- NF Wilderness

Wildlife Linkage Interference Zones

- State of Colorado
- Ski Areas
- Private Lands
- Wildlife Linkage Interference Zones

N W E S

4 0 4 Miles

SCALE - 1:471,000 or 1" = 39,250'

I-70 Mountain Corridor PEIS

Wildlife Linkage Interference Zones

Figure 1

Appendix B
Summary of ALIVE Meeting Minutes

SUMMARY OF ALIVE MEETING MINUTES

Date	Participants	Discussions/Conclusions
Feb 9, 2001	Cecilia Joy-CDOT, Gene Byrne, Tom Kroening-DOW, Bill Andree-DOW, G. Wallace-BLM, Gary Patton-FWS, V. Hackett-BLM, Timothy Carey-COE, Dave Weber-DOW, S. Ballenski-FS, Edrie Vinson-FHWA, Marie Venner-CDOT, Brian Pinkerton-CDOT, Tim Tetherow-JFSA, Sonja Chavez-Summit Co, Kris Miering-CDOT, Ronald Speral-FHWA, Roland Wostl-CDOT, Jill Schlaefer-CDOT, Tammie Smith-CDOT, Jerry Powell-CDOT, Becky Vickers-CDOT, Brad Crowder-EPA, Rick Thompson-JFSA, Evan Kirby-JFSA	The initial meeting started with a presentation by Ms. Joy to convey the purpose of the ALIVE Committee; to examine any locations that would support an early-action wildlife enhancement or mitigation project; and to prioritize locations where additional information was needed for wildlife conservation measures. JFSA presented current GIS information that had been mapped. Discussion followed of separate- or early-action projects. Identified priorities for ALIVE: review mapping data, consider CNHP state and global rankings, and discuss geographic area of study. Discussed "credit issues": what measures could offset incidental "takes"; what are conditions for RPMs; and can there be lynx mitigation now while they are still getting established. Discussed level of involvement for ALIVE participants.
Mar 15, 2001	Cecilia Joy, Robert Henke-SAIC, Roland Wostl, Edrie Vinson, Bill Andree, Dave Weber, Rick Thompson-JFSA, Marie Venner, Jonathon Bartch-CDR Assoc, Tom Fresques-BLM, Fred Wahl-FS, Lee Carlson-FWS, Kurt Broderdorp-FWS, Tom Howard-DOW, Jerry Powell, Ron Speral, Becky Vickers, Tammie	Robert Henke introduced as facilitator. A general question-answer session to define the issues that ALIVE will and won't address. Members identified specific sites as critical for specific species. Reviewed spreadsheet of early actions. Decided that minor early projects that required no environmental analysis or up to an EA level could be conducted prior to the PEIS. Much discussion of resource credits for future impacts but not for repairing past mistakes or maintenance. Concluded that future work will be analyzed with I-70 as the baseline. Credits should work biologically as well as geographically. Funding sources were discussed (state, FHWA, FWS for Section 7). Concluded that any wildlife crossing design should be for all species and not just target species. Started discussing connectivity. Agencies were asked to prioritize a set of ranking categories for construction projects (impacts, species, cost, Section 7, feasibility, build-ability, connectivity, etc), along with a request for agency lists of all known areas of wildlife concern in the Corridor. Identified key species to analyze as representative of larger species groups. Decided to address all regulated species, then discuss habitats to include many other non-regulated species. Decided that overlay mapping would be used to screen the alternatives first and then analyze the impacts. Decided to perform one level of analysis over the entire 140-mile Corridor,

	Smith, Jim Lance-CDOT	then a higher level of analysis for specific areas identified by the agencies. Much discussion over a screening process using high, medium and low levels of wildlife conflict. Asked all agencies to screen for their high, medium and low priorities for special projects for the next meeting. Bob Henke will ask JFSA to make first attempt at defining critical wildlife areas and bring them to next meeting.
Apr 19, 2001	Robert Henke, Cecelia Joy, Brian Pinkerton, Lee Carlson, Ron Speral, Kurt Broderdorp, Tammie Smith, Bill Andree, Jerry Powell, Edrie Vinson, Becky Vickers, Fred Wahl, Ron Oehlkers-CDOW, Rick Thompson, Tom Fresques, Janet George-CDOW	Ms. Joy presented a list of 9 separate actions (SA) related to I-70 but not to the PEIS. New maps were presented with the SAs located as well as potential wildlife crossing areas. CDOT/ FHWA changed policy to only list SAs if they are "doable" ahead of the PEIS. Mr. Pinkerton clarified CDOT funding for SAs. Separate actions would fall into general groups of 1. fencing, 2. studies, 3. new boreal toad habitat, 4. noxious weed control, 5. protective buying, and 6. wetland mitigation/enhancement. Major wildlife crossings would no longer fit into SAs that could be completed prior to the PEIS ROD. Such SAs would be carried into the PEIS as mitigation measures. The Barry property near Empire has a verbal agreement for purchase under the protective buying category. A fence and gap maintenance plan will be prepared. Parcels available for protective buying will be identified. Consensus was that Summit Co. should be focus for protective buying. New studies identified focused on lynx tracking, boreal toad habitat, bighorn sheep crossing, and noxious weed presence. Unanimous consensus that lynx was the top priority. Handouts discussed for a PEIS proposed level of analysis and a proposed technical approach for Level 2 screening. Group discussed the need for a programmatic Biological Assessment. L. Carlson said a BA would require a proposed alternative and that consultation should be sufficient at the Tier 1 level so that ESA issues for Tier 2 projects would be covered. E. Vinson suggested consideration of a Programmatic Memorandum of Agreement (MOA).
May 23, 2001	Robert Henke, Bill Andree, Kurt Broderdorp, Ron Oelhkers, Rick Thompson, Fred Wahl, Dave Weber, Tom Kroening, Kirk Oldham-CDOW, Sue Bonifield-SAIC, Tim Tetherow, Roland Wostl, Cecelia Joy, Marie Venner, Jill Schlaefer	R. Henke summarized the evolution of the ALIVE goals and purpose from the opportunities for early funding and identification of potential wildlife crossings in the first meeting to the FHWA/CDOT decision not to pursue early wildlife crossings. Purposes shifted from identification of wildlife crossings to more diverse SAs such as lynx studies, fencing issues, noxious weeds, and protective land buying. The ALIVE group was perceived to provide expertise to the PEIS. Eventual impact analyses would include linkage studies and it is up to ALIVE to help define guidelines for these steps in the PEIS process. Some of the ALIVE goals are to pinpoint areas of concern, linkage, and focus ahead of and independent of future construction. A presentation of 20-year long range funding and annual funding by Ms. Joy, who said any study proposal set forth by ALIVE would have to compete for FY 2003 money. A preliminary schedule for the PEIS and funding was presented. Bill Andree presented a fencing proposal highlighting 5 areas west of Dowd Junction. Rick Thompson identified 5 parcels in Summit Co. A proposal for a two-year lynx mitigation pathway monitoring was presented. The ALIVE Committee questioned their level of confidence in participating in the lynx study. Environmental goals will be directly tied to the ROD in 2004, requiring the ALIVE Committee to make early decisions on what are the T&E issues and the potential effects of alternatives in the PEIS. The existing wildlife crossing survey compiled by SAIC was presented on a spreadsheet along database details and a slide show of wildlife crossing photos.
Aug 15, 2001	Robert Henke, Roland Wostl, Edrie Vinson, Bill Andree, Dave Weber, Cecelia Joy, Rick Thompson, Marie Venner,	A new draft of ALIVE Purpose and Need statement was circulated for comment. Earlier, the ALIVE focus was on identification of potential wildlife crossings for Special Action funding. When those funds were delayed, the Committee focused on identifying alternative conservation measures, as identified in previous meetings. Responses included a draft lynx study plan, a protective land-buying plan (the Barry property was purchased), boreal toad habitat improvement, emphasis on CDOT's noxious weed program, and a fencing plan. CDOT considered donating 40 acres of bighorn sheep

	Jonathon Bartch, Tom Fresques, Fred Wahl, Lee Carlson, Kurt Broderdorp, Tom Howard, Ron Speral, Becky Vickers, Jim Lance-CDOT, Tammie Smith, Brian Pinkerton, Jerry Powell, Janet George, Evan Kirby, Kai Kraut-FHWA, Janet Moser-FS, Ron Oehlkers, Jill Schlaefer, Eric Odell-DOW, Gary Spinuzzi-CDOT, Pam Stephenson-FHWA, David Ortez-FHWA, Debra Barringer-JFSA	habitat to the CDOW for credit against future impacts along I-70. Initially, ALIVE used professional judgment of its members to prioritize the locations of wildlife crossings along I-70. Primary candidates were Laskey, Herman, and Officer's gulches, and east and west Vail Pass. The strategy was changed to look at available data and scientific models to model habitat linkage zones as a way of locating and prioritizing crossing locations. A Corridor Conservation Plan interagency approach to habitat linkage would identify landscape linkages along the corridor that includes important connections for wildlife. Local jurisdictions would be urged to develop their own corridor conservation plans to conserve important parcels using matching funds from programs such as Lotto/GOCO and Smart Growth grants. CDOT is developing lynx habitat linkage modeling with a professor at CSU that combines habitat use information with a functional model. Also, CDOT is developing an impedance model to calculate the barrier effect of highways to wildlife based on traffic volumes, highway width, etc. The FS also is developing lynx habitat linkage models based on core areas, areas with low populations and low densities of roads. Interest in a MOA persists, and FHWA and FWS distributed an unsigned version of an existing sample for comment by the Committee. Considerable discussion followed by DOW District Wildlife Managers using maps and presenting data on wildlife movements. Preliminary mapping of wildlife movement and habitat linkages had been completed and the site-specific information was added to the maps. Information was provided for road kills, sightings, lynx, elk, bear, deer, bighorn sheep, mountain goat, and mountain lion. Additional information was presented for Summit and Eagle counties. The Committee requested that agencies write letters of support to CDOT executive management to encourage funding of the lynx study.
Oct 1, 2001	Robert Henke, Cecelia Joy, Tim Tetherow, Roland Wostl	A prior teleconference among the participants (Sep 20, 2001) discussed the ALIVE Committee goals and relevance to the PEIS. In that teleconference, it was agreed that ALIVE does relate to and support the PEIS. Discussion at this meeting focused on restating the goals of the ALIVE Committee as follows: 1) identify and map wildlife linkage zones and proposed structure locations (including size and type) along the Corridor. R. Wostl would develop a forest carnivore map using modeling from D. Theobold at CSU. 2) Provide advice, insight and review regarding wildlife and T&E species for various aspects of the PEIS. 3) Critique preliminary transportation alternatives with respect to potential advantages and disadvantages to wildlife. 4) Support development of a Corridor Conservation Plan. The lynx study was discussed and R. Wostl stated that CDOT would not fund it, but that two other funding options exist: one is to approach CDOW for funding, and the other is to develop a plan whereby Colorado Ski Country, CDOW, Forest Service and CDOT share the costs of the study (as amended to address transportation questions). Discussion turned to barrier design options and the need for coordination between ALIVE and design engineers for highway and other alternatives. It was agreed a barrier map would be developed. The barrier map was to address structural barriers including Fixed Guideway Transit barriers, steep slopes, wildlife crossing zones, AVC data, existing fencing, and existing and proposed community development.
Nov 27, 2001	Robert Henke, Bill Andree, Kurt Broderdorp, Lee Carlson, Bill Clark-CDOW, Mindy Clark-CDOW, Joe Doerr, Tom Fresques, Joan Friedlander-FS, Tom Howard, Cecelia Joy, Tom	Discussion started with the letter of agreement between the FHWA, CDOT and USFWS that outlines the goals of ALIVE and the procedures for working together on the ALIVE Committee. Other agencies were invited to participate in the letter of agreement. Mr. Tetherow presented a tentative schedule for the PEIS process. Ms. Vinson stated that wildlife crossings should be determined now, not after (transportation) alignments are identified. CDOT and their consultants will provide the Biological Assessment for T&E species, but they are counting on the ALIVE group for expert review and comment on that document and various PEIS chapters indirectly. There is no expectation that the ALIVE Committee will produce any specific document. Discussion then addressed the importance of coordination between USFWS and the White River

	Kroening, Scott Ludwig-new I-70 project coordinator for FS, Kris Miering, Janet Moser, Nancy Warren-replacing Fred Wahl for FS, Tim Tetherow, Edrie Vinson, Ron Oehlkers, Kurt Oldham, Brian Pinkerton, Jerry Powell, Jill Schlaefer, Tammie Smith, Rick Thompson, Marie Venner, Fred Wahl, Dave Weber, Roland Wostl, Ron Speral, Gary Spinuzzi	National Forest (WRNF) Plan and how the plan may affect the PEIS. The WRNF Plan should be available in March 2002, and the Arapaho-Roosevelt (ARNF) Plan is finished and available. Committee members were hopeful that the species lists from these plans could be available now; it would be easier to meet the PEIS schedule. Mr. Broderdorp hoped to have the Biological Opinion for the WRNF Plan by February 2002. Mr. Tetherow restated that early input on lynx habitat is needed for the draft PEIS. ALIVE Focus Reports Report on identification and priority of key wildlife linkage areas to date. Using best professional judgment from all meetings to date, the 5 highest priority wildlife crossings were 1) Laskey Gulch (highest), 2) east of Vail Pass, 3) west of Vail Pass, 4) Officers Gulch, and 5) Herman Gulch. An inventory of structures is partially complete: bridges, culverts, manmade barriers have been mapped, but steep slopes need to be mapped. Wildlife barrier maps for each wildlife linkage zone will be prepared. Deer and elk linkage areas need to be defined. The CDOT GIS model needs to be completed. Overlay analyses will be needed to refine the linkage zones. Collectively, the group concluded that, with the exception of lynx, there was sufficient existing data to identify key linkage areas for the PEIS. Report on CDOT Forest Carnivore Habitat Linkage Model. It was stated that there are two winter seasons for data collection to complete this model. The proposed lynx study was not funded. In its place, Ms. Shenk proposed a tiered study to formulate a preliminary description of lynx habitat as it relates to highways. The approach is to use GIS data inventory, more detailed GIS analyses, additional data collection from telemetry efforts, and new data collection from snow tracking efforts along the Corridor. Report on Corridor Conservation Plan. Coordination efforts are on going with local governments and agencies to conserve land outside the I-70 Corridor but within the wildlife linkage zones. Mr. Wostl distributed an executive summary for a draft of the plan. The Committee solicited written support from the agencies to help gain credence with funding efforts. Next Ms. Shenk of DOW displayed and discussed research efforts on the lynx reintroduction in Colorado. A question and answer period followed. She also discussed other aspects of the lynx research and the group discussed the next steps in the proposed lynx research in the Corridor.
Feb 20, 2002	Robert Henke-SAIC	Draft Technical Memorandum, I-70 Big Game Wildlife Linkage Zones. This document identified 12 linkage zones for big game along the I-70 Corridor. The preliminary analysis was based on CDOW Wildlife Resource Information System (WRIS) data, animal-vehicle collision (AVC) data, and best professional judgment of CDOW District Wildlife Managers (DWM). Other data put on maps included aerial photography, corridor data, road template information, possible barriers to wildlife, and geometric concepts for wildlife crossing design. The document was prepared in two steps: first, all the wildlife data were mapped and overlaid on the Corridor. Second, the maps were provided to the DWMs for their professional comments and revisions. The DWMs involved included Bill Andree for Eagle County, Tom Howard for Jefferson County and some of Clear Creek County, Tom Kroening for Summit County, and Ron Oehlkers for most of Clear Creek County. Step 1 identified nine linkage zones. Review by the DWMs changed some boundaries and created some new zones, bringing the total to 12. Further refinement will result from site-specific comparisons and the Forest carnivore linkage model (in preparation).
Mar 6, 2002	Combination ALIVE and SWEEP Workshop	Discussion began on the identification of the 12 wildlife linkage zones. Ms. Barnum gave an overview of the CDOT Statewide Habitat Linkage Model. The model analyzes GIS maps with software that sorts, prioritizes and ranks individual

	Bill Andree, Debra Barringer, Sarah Barnum, Tom Boyce, Kurt Broderdorp, Lee Carlson, Joan Carlson, Peter Cornish, Mike Crouse, Tony Devito, Joe Doerr, Gary Frey, Robert Henke, Andrew Holton, Gary Johnson, Robt.L. Jones, Cecelia Joy, Evan Kirby, Bill McKee, Alison Michael, Kris Miering, Eric O'Dell, Brian Pinkerton, Jerry Powell, Bob Quinlan, Ed Rapp, Robert Ray, Glenn Rodriguez, Jill Schlaefer, Tammie Smith, Gary Spinuzzi, Tim Tetherow, Rick Thompson, Edrie Vinson, Nancy Warren, Dave Weber, John Woodling, Roland Wostl,	pixels of each habitat type according to the ease that an animal can travel through that habitat type. Each animal type is assumed to have a dispersion budget for travel. The model is a Least Cost Path Analysis. It is hoped the model can be tested against the linkage zones in the PEIS process. Mr. Tetherow showed examples of GIS county land use mapping that will be overlain with wildlife and road data when integrating wildlife impacts and mitigations in the PEIS. The SWEEP Committee members discussed water resources and fisheries analysis. SWEEP has inventoried the Clear Creek County area resources for potential impacts to Clear Creek: waste water input, siltation, traction sand and sedimentation, mineralization, mining contaminations, and others. High value streams were identified throughout the Corridor west of the EJMT as Gold Medal Streams: Blue River, Gore Creek, and the Eagle River. Two handouts were distributed concerning the sediment control action plans (SCAP) underway by CDOT. Today's main problem is sedimentation from traction sand used during the winter. SWEEP is concentrating on Clear Creek because of the complexity of problems in that drainage. However, under the Clean Water Act rules for TMDL, under NEPA guidelines, and under Section 404 rules, water resources along the entire Corridor will receive similar levels of analyses. Alternatives Under Consideration. Discussion turned to what kinds of preliminary alternatives are being considered and how some of those alternatives would be constructed in certain locations. There was extensive round-robin discussion of the scope and extent of each alternative in context with modes of transportation, the typical template cross-sections, and associated features along the Corridor. Discussion touched on Eagle Airport, fixed guideway systems, Herman Gulch, additional bores for EJMT, transit elements, Dowd Junction, Vail, Copper Mountain, Frisco-Dillon-Silverthorne, and I-70 east of EJMT and Floyd Hill. Approach for Assessing Impacts. Discussion then turned to the kinds of impacts that could result from the alternatives just discussed. The goal of discussion was to address constraints that may apply to the Corridor options as they relate to water and wildlife issues. Mr. Tetherow said he is seeking responses that indicate important elements or flaws that the designers need to address/incorporate into their plans. He then distributed a handout that highlighted issues and the corresponding assessment method for each of the following: water quality and hydrology, wetlands, aquatic resources, wildlife, T&E and sensitive species including terrestrial, aquatic and plants. Extensive discussion then covered potential impacts and the proposed assessment criteria and methodologies. Fixed Guideway Transit (FGT) experienced significant additional discussion. From the meeting notes, both the ALIVE and SWEEP Committees prepared summary tables of issues and concerns (23) matched with resolutions for each issue/concern.
Jul 30, 2002	Roland Wostl, Nancy Warren, Cecelia Joy, Bill Andree, Jerry Powell, Sonja Chavez	Meeting specifically to address the MOA and related coordination. There was a general feeling among the ALIVE Committee that they didn't accomplish what they wanted to. The purpose of this MOA is to: 1). Outline what the group can agree upon in terms of conservation strategies and BMPs for I-70 section by section, and 2). Attempt to put the vision of the ALIVE Committee into the MOA, and 3). Identify priorities for I-70 based on limited resources so that CDOT can incorporate BMPs/conservation strategies where they are really needed with a relatively high level of assurance, and 4). Develop conservation strategies that are in line with the Biological Opinion (BO) and which do not preclude the FWS from any future decisions made at the Biological Opinion stage, and 5). Document conservation strategies so that the public can get a sense of what the agencies are thinking in the draft PEIS, and

		6). The MOA would serve as an independent document to support conservation strategies for listed species, species of concern, and others. The group intends that the MOA will not be signed at this stage and will serve as an independent document in draft form to help development of the BO. It is also intended the MOA will be included as a draft document in the PEIS. To avoid the appearance of prejudice by the FWS, the MOA will be signed only after a draft BO has been issued. The MOA also will include provisions for aquatic and amphibian species. Comments emphasized the need for the FS to coordinate with CDOT so there are not any actions in the Corridor that may be in conflict with the Forest Management Plan. The FS also should coordinate with CDOT about the Forest review of the Biological Assessment. The group agreed that the MOA should be completed by the end of the year so that it can be included in the draft PEIS. Signatories are expected to be CDOW, FS, FWS, BLM, and maybe the Corps of Engineers.
Aug 27, 2002	Roland Wostl, Cecelia Joy, Evan Kirby, Edrie Vinson, Scott Ludwig, Allison Michael-FWS, Lee Carlson, Jerry Powell, Ann Skinner-CDOT	Meeting specifically to address the MOA. The first item of discussion was the Forest Resource Management Plan as it treats Jones Gulch. The Plan designates the eastern edge of the gulch area as Forested Landscape Linkage. The majority of Jones Gulch has been designated as ski-based resort area. The group felt more should be done to preserve private in-holdings. Ms. Joy asked if the FS could work with Summit County to see if there is interest in acquiring the 60-acre Idabell Mine site. Would the FS approach Summit County to see if the county would apply for a GOCO grant to acquire the mine site. The group considers Jones Gulch closely associated with Laskey Gulch for wildlife movement. If CDOT is going to invest in Laskey Gulch, then Jones Gulch also needs to be a priority to have continuous forested linkage. Mr. Kirby presented the I-70 Wildlife Linkage Interference Zone maps segment by segment that were categorized as potential improvement areas, potential fencing improvement areas, and potential local coordination areas. The group needs to prioritize areas for site-specific mitigation. Agency specialists need to review these maps, verify the information, identify BMPs, and identify the problems and appropriate solutions in each zone. Items suggested for addition to the maps include creeks, wildlife fencing, federal lands, road kill information, and the Bakerville area as a lynx crossing. It was decided to keep aquatic issues separate. There were questions about deer and elk movements in the Fall River Road area and east to Genesee. Consideration could be given to making the Floyd Hill area impermeable to deer because of chronic wasting disease. Big horn sheep should be included for now to see where it appears on the priority list, as the west side of Empire is the area with the most sheep AVCs.
Sep 30, 2002	Cecelia Joy, Edrie Vinson, Evan Kirby, Alison Michael, Jerry Powell, Scott Ludwig, Bill Andree, Terry Edelmon – USFS, Yates Opperman – CDOT, Ann Skinner, Lee Carlson, Roland Wostl	MOA Group Meeting. Ms. Joy contacted the Corps which did not want to participate at the present time. Todd Robertson of Summit County wanted to join the group. BLM wants to be a signatory to the MOA, but currently is interested only in updates from the group. The quantity and quality of lynx data were discussed. LIZ 1 – Dotsero. Discussion included road kills and their locations, deer and elk crossing areas and fencing and holes in the fence, animal crossings at the Colorado/Eagle river confluence are being affected by development, and the Bair Ranch may be purchased by the Nature Conservancy. There is interest in getting Eagle County to join the group. Recommendations were for fence repairs on the north, identification of private access issues, and redesigning length of fences. LIZ 2 – Airport to Eagle. Discussion included a rockslide area that is affecting fencing, any land acquisition only possible on the south side, south of SH 6 is very developed and there is severe winter range there, there is some potential to expand the crossing area at MP 143, the crossing at MP 144.5 is still functional but impeded with a berm, and a possible

		conservation easement for Cottonwood Creek. Recommendations were for fence realignment, expand the crossing at MP 143, create a buffer zone for crossing at MP 144.5 and redesignate Cottonwood Creek from high value to low value and seek a conservation easement for Cottonwood Creek. LIZ 3 – Eagle to Wolcott. Discussion included crossings at MP 152 and 153 being well fenced and effective, but area between MP 151 and 153 is too steep for crossing, mountain lions cross on east side of fence, and there have been moose and bear AVCs in this area. Recommendations were to move fence to MP 153.8 to reduce AVCs, make the bridge at MP 153 more wildlife friendly, and urge CDOT to leave openings in the median barriers for smaller animals. LIZ 4 – Wolcott to Avon. Discussion included the extensive development that is planned, that lynx, lion, bear and bobcat use the area and many cross via the underpass at MP 159.5 that is a high priority crossing. Elk feed in the median there and many have been killed. There is a need for a crossing under I-70 and over SH 6 and the railroad, as it is a popular carnivore crossing. BLM administers the land on both sides of the Corridor at MP 159.5 and both sides are private land at MP 160. The underpass at MP 165 is adjacent to steep topography that is not conducive to crossings and has high deer road kill. Recommendations included add fencing on the south side and ask the FS to notify all agencies prior to any land trades.
Oct 28, 2002	Cecelia Joy, Tom Fresques, Bill Andree, Scott Sands – FHWA, Scott Ludwig, Gary Patton – USFS, Roland Wostl, Edrie Vinson, Evan Kirby, Allison Michael, Jerry Powell, Lee Carlson, Terry Edelmon. Paul Semmer – USFS, Ann Skinner	MOA Group meeting. The MOA is to be a program level, not project level MOA. The purpose is to identify issues and protect solutions, and to agree in advance to mitigation for the whole Corridor. Timing for the MOA was discussed but tabled for zone-by-zone review. The FS discussed concerns about the timing of conservation easements and other land preservation techniques. Once the parcels next to the highway become unavailable, any actions to preserve wildlife corridors will be moot. The FS gave an update on the proposed exchange between FS and Vail near MP 165.2 west of Avon. Most of the land should have a conservation easement and 10% would be for employee housing. LIZ 5 – Dowds Canyon. Discussion included that the Vail deer underpass is too small to be effective, there is a 180-foot span bridge in this area but it too, is little used by deer, bear and lions. A box culvert at MP 170 would be good since bear and lion cross there and lynx are possibly crossing at 170.7. Carnivores like to cross at MP 170.2 to 171. MP 171.8 is a good spot for deer underpass. In the summer, there is a lot of mountain biking and rafting in this area. Game fencing in this area has a lot of holes in it. Recommendations included a better underpass at MP 170.5, a crossing at Dowd Junction, and fence repair or replacement from MP 171.2 to 172.5. Between LIZ 5 and LIZ 6. Elk, bighorn sheep and deer are having AVCs east of the Vail golf course to the East Vail exit. Game fencing is needed. LIZ 6 – West Vail Pass. There are already good crossings here, maybe fencing from MP 183 to 185.3 to guide animals to crossings. Many skiers and hunters park on I-70 and cut the fence for access. Perhaps stiles would help. This is also a SCAP area as Black Creek is on the TMDL list. A knee wall is being recommended by SCAP and this has an overall negative effect on deer and elk. From MP 186 to the top of the pass, there is a need for one or two crossings. The area has high lynx probability. MP 188 is a good spot for an underpass or overpass. The slope here is from north to south. Maybe a stepped-wall would work here instead of a fence. What is needed is a segmental wall to allow small mammals, reptiles and amphibians to cross. LIZ 7 – East Vail Pass. Eastbound has more barriers than westbound. Underpasses are offset by up to 0.6 mile and there is nothing to guide animals to the underpasses. There is a culvert north of MP 193 that could be a site for a crossing, but

		fencing may be the only realistic alternative here. Need to put the bike path below the highway and the animal crossings over the highway. Copper Mountain ski area ends at Guller Creek and the potential for additional housing there is high. Wilder Gulch is a natural crossing. There is lots of animal movement at Smith Gulch, MP 192, and more movement at Wilder and Smith Gulch than at Stafford Gulch. MP 193.4 is a good location for a crossing. Animals are reluctant to use box culverts, as they prefer crossings big and open. LIZ 8 – Officers Gulch. This area connects the Gore Range and 10-Mile Range and there are lynx crossing in this area. The interchange at 197.8 currently sees a lot of day use, but no other kind. Uneva Lake is privately owned and is expected to stay that way. It might be possible to close the interchange but that is unlikely because it is near a water facility close to Denver. A lot of the animal movement is lateral, so perhaps a crossing farther west would work. There are multiple small culverts between MP 198 and 199.4 that might be used by bobcats and small carnivores, but wing walls would be needed to improve usage. There is heavy animal movement at MP 202 west of the interchange by the trailhead. LIZ 9 – Laskey Gulch (with Jones and Hamilton gulches). The threat to Jones Gulch from development is not considered high, as the Idabell property is restricted for use only as a dude ranch with two residences. Laskey Gulch is one of the best passages into the Williams Fork from the south. The area between Laskey Gulch and the EJMT is too steep for any action. LIZ 9.5 – Herman Gulch/Bakerville. The Herman Gulch trailhead sees lots of day use recreation. There are 7 residences at Herman Gulch. Lynx have been known to cross in this area and one was killed by a car. It is recommended to create a crossing for the lynx near MP 218 so both sides of the highway can function as home range. There is also a water quality issue in this location for Clear Creek that will have to be addressed with any mitigation measure proposed. There is also boreal toad habitat close by I-70 and the toad is an MIS species on the ARNF. Water quality issues may also affect the toad and studies are underway. LIZ 10 – Empire Junction. The big issue here is bighorn sheep. They cross US 40 northwest of Empire near the Henderson Mine. There is potential boreal toad habitat in the area as well. A wider highway template may keep sheep from grazing too near the travel lanes. Jersey barriers might keep sheep away and use of lithium chloride near the travel lanes may distress sheep enough to keep them away. LIZ 11 – Fall River. Discussion asked questions such as "do we want animals to cross here or keep it impermeable?" There are bighorn sheep and mountain goats in this area. Sheep won't use box culverts. Bear and mountain lion occasionally have AVCs here. For urban elk, there is good winter range but the area is very built up. LIZ 12 – Mount Vernon Canyon. The fixed guideway alternatives would be in the median here and the highway would not be rebuilt in this area. Many elk have AVCs here and signage and fencing are needed for safety in this area. It is expected that mitigation measures will be looked at on a region-wide basis. There is potential to do mitigation up front for 20 year's worth of projects.
Nov 20, 2002	Cecelia Joy, Sarah Barnum-CDOT, Evan Kirby, Roland Wostl, Bill Andree, Gary Patton, Kirk Oldham - CDOW, Beth Chase-CDOT, Ann Skinner, Tom	MOA Group Meeting. Discussion started about LIZs that were not completed in the previous meeting. LIZ 10 – Empire Junction between Empire and Berthoud Falls. Bighorn sheep will not enter enclosed spaces or use tunnels. There is an ideal location for an overpass due to topography. Use fencing on the north side and maybe use Jersey barriers to keep them off the highway. This is more a problem for US 40 than for I-70. LIZ 6 – West Vail Pass at MP-182.5 to 188.5. Ms. Barnum discussed her research on animal crossings on Vail Pass. The underpasses on the west end of the pass area work well and are used by a variety of species. Elk cross at grade where there

	Fresques, Jerry Powell, Allison Michael, Debra Barringer, Terry Edelmon, Scott Ludwig	are no shoulder barriers and they jump the center median barriers. In winter, it is used by coyotes, fox, weasels, and snowshoe hares that are all willing to jump barriers. Animals are reluctant to jump a shoulder barrier to get onto the highway. Plowed snow banks are an aid to crossing barriers. If some animals use a path, then other animals will use the path. The determinants for where animals cross include no barrier or a diffuse barrier, preferred habitat, drainages, and a variable distance to forest edge. Road kill is low on the west side of Vail Pass. The topography from MP 188 to the top of the Pass supports an overpass, as there is too great a distance between crossings. Crossings are needed every few miles because elk will not be pushed more than a half-mile. There is a natural drainage at 188.7. An overpass may be needed if barriers built for SCAP cannot be crossed. LIZ 7 – East Vail Pass to Copper Mtn. MP 190.4 to MP 194. The underpasses in this area are offset between EB and WB and animals spend time in the median. Animals cross three times more frequently on the east side than the west side of Vail Pass. Crossings increase nearer to Copper Mtn. Copper, like most ski resorts, is an attraction for coyotes. Animals are crossing at Guller, Stafford, and Smith gulches, and Wilder and Corral creeks. Larger animals including lions are crossing at Stafford Creek. She recommended fence or Jersey barriers between Stafford and Guller gulches and linking Wilder Gulch to Corral Creek to direct animals to Corral Creek. LIZ 12 – Mount Vernon Canyon MP 246.5 to 258.1. This is state's top road kill area, as there is a lot of urban wildlife. There is a lot of mountain parkland that could be linked for migration routes. Mr. Howard stated that fencing might be more detrimental than helpful in this zone, as it could keep deer and elk on the highway and prevent their escape. Due to the many exit ramps and frontage roads in the area, effective fencing would be difficult, if not impossible, to build and maintain. For crossing structures to be effective here, there would need to be many structures within a half-mile of each other, and there is no certainty that animals would use them. The entire LIZ has equal priority and several structures should be built. LIZ 11 – Fall River MP 237.2 to 238.2. Mitigation measures for this area have not been developed. Ron Oehlkers needs to be consulted. LIZ 9 – Laskey Gulch MP 207 to 209.7. This is a critical wildlife migration connector. There are steep slopes on both sides and the highway is built on fill. Options for the gulch include an open span bridge and a CBC. Tunneling under the highway would require special techniques because of the fill. LIZ 9.5 – Herman Gulch MP 218 to 221. Priority here is lynx, and need to avoid the Colorado Trail to reduce human/wildlife conflicts. Need to consider a berm system here like Wyoming's, i.e., a 5-foot berm with steep sides to allow animals to jump off the highway but not onto the highway. The berms could be used in conjunction with fencing on the south side and concrete fencing on the north side. Fences and berms need gaps for small animals, such as porcupines. Boreal toads do not get killed in the road but sand/salt/mag chloride maybe a problem for them. There is a drainage pipe for toads here. There is evidence that two female lynx tried to use this area as home range. This could be effective home range is there was two-way flow across the highway, not just one-way needed for dispersal. 10' by 10' culverts seem to be too small, even for coyotes and fox. Some discussion on recreation and wildlife uses in same area. LIZ 4 – Wolcott to Avon MP 154.4 to 166.5. This zone is at risk from development pressures. A land exchange of 400 acres from FS to Eagle Valley Land Trust is happening in the area. Three Committee members volunteered to visit with the Town of Avon. Development of this area would be better for wildlife if it occurred near Metcalf. Regular and special

		deer fencing is needed on both sides of the highway. There is lynx habitat between MP 154 and 160 that includes the Wolcott exit. Wildlife crossings are proposed at Bellyache Ridge between MP 153 and 156, and near MP 165 at Avon. Road kills are very common here. This information needs to be presented to Eagle County as a development issue. LIZ 3 – Red Canyon to Eagle MP 147.3 to 153.6. A conservation easement should be explored here. The FS does not endorse easements because they are unenforceable. Then the Committee voted on a prioritization of the LIZs: HIGH = LIZ 7-East Vail Pass, LIZ 9-Laskey Gulch, LIZ 6-West Vail Pass, LIZ 9.5-Hermann Gulch. MEDIUM = LIZ 4-Wolcott to Avon, LIZ 5-Dowd Canyon, LIZ 3-Eagle to Wolcott, LIZ 2-Eagle Airport, LIZ 10-Empire Junction. LOW = LIZ 1-Dotsero, LIZ 8-Owl Canyon, LIZ 11-Fall River, LIZ 12-Mount Vernon. A Wildlife Mitigation table was attached for review.
Jan 14, 2003	Jerry Powell, Edrie Vinson, Roland Wostl, Evan Kirby, Loren Hettinger – JFSA, Alison Michael, Beth Chase, Gary Spinuzzi, Tom Howard, Scott Ludwig, Tom Fresques, Terry Edelmon, Cecelia Joy, Ann Skinner	Ms. Joy opened the meeting, identifying objectives to include: finalizing the matrix for the LIZs to identify proactive steps to preserve as many future options for crossing structures and mitigation as possible, and looking at the MOA. Jerry Powell offered a counterpoint to statements in the minutes of the previous meeting for LIZ 9.5 that there is considerable data that recreational activity impacts on wildlife are mostly negative and that it is desirable to avoid this interaction. Discussion turned to the matrix of LIZs with proposed mitigation compiled by JFSA. LIZ 6 – West Vail Pass. Ranking the West Vail Pass as high priority was questioned because the area is one of the most permeable areas on the Corridor. There is still need for connectivity high on the pass. LIZ 12 – Mt. Vernon Canyon. The matrix recommends fencing to keep animals off the road. Tom Howard believes that fencing may make the AVC situation worse. More fencing could impede wildlife crossings but not stop it. The area is already heavily punctured by bridges and county roads. Animals can get trapped between fences on the highway resulting in greater AVCs and safety issues. Discussion turned to identifying how large and what orientation is needed for the area next to a crossing structure to make the structure effective. It was decided that any LIZ with lynx linkage was of statewide significance. All others supported a minimum of regional significant habitat. Assignments were made to Committee members to evaluate the size of areas needed to protect and ensure effectiveness of a crossing structure and any conflicts that prevent effective use of a structure. Discussion turned to the reasonableness of changing Forest management plans or county zoning on the possibility that CDOT may construct a crossing at an unknown time in the future. CDOT is seeking cooperation from entities that control land or land uses so that there is a likelihood that a crossing structure will succeed when it is built and to protect mitigation options for the future. CDOT's position is that CDOT has no control over lands outside the ROW and is dependent on advance or concurrent cooperation with other entities in order for these plans to succeed. There was much discussion through the rest of the meeting on whose role it should be to identify and protect the swaths of movement corridors (BLM, FS, DOT and DOW, cooperation from counties, etc.). LIZ 3 – Eagle to Wolcott. Castle Peak linkage at MP 153. This LIZ connects BLM and FS lands and is interspersed with private lands zoned as "resource", which is a flexible zoning. One option is to establish a process with the county to zone lands so they are compatible with a crossing structure. LIZ 4 – Wolcott to Avon, MP 155 to 165. This LIZ is closely connected with LIZ 3. The Vassar land exchange would affect this LIZ and development there could compromise the effectiveness of a crossing here. There are conditions on the land exchange that development will not be placed near the Metcalf property. Consider a possible structure at MP 155.3 on BLM linkage zone and the area near MP 159.7 at Red Canyon.

		LIZ 5 – Dowd's Canyon. Plans have considered a bridge at MP 171.7 where ownership includes CDOT ROW, private and FS. This is an intermix area with high human use, a bike path, and deer and elk winter range. An issue arose concerning the great variability in wildlife behavior. Conditions good for deer and elk might not be suitable for lynx. Different species have greatly different ranges of movement. An option was suggested that there could be seasonal restrictions on recreational activities in the intermix zones during deer and elk migration periods. CDOT was successful in protecting movement corridors cooperatively on the south Highway 85 corridor. That success involved identifying the private owners, identifying where animals were crossing, designing the road to match the placement of culverts with those of the railroad, buying certain pieces of property, and cooperating with owners, counties, and others. LIZ 6-West Vail Pass. There is the possibility of a wildlife overpass here on the upper area. A concern was raised that an overpass for wildlife might also facilitate the movement of snowmobiles. The Forest Plan authorizes motorized backcountry recreation in winter on the south side of I-70. The north side is managed as wilderness, which does not allow motorized access. LIZ 7 – East Vail Pass. This LIZ is fairly permeable and is an elk crossing area. Copper Mountain desiring to expand into Guller Gulch area may conflict with a crossing there. LIZ 8 – Officer's Gulch MP195.5 to 200.9; LIZ 9 – Laskey gulch MP 207 to 209.7; LIZ 9.5 – Herman Gulch/Bakerville MP 218 to 221. These LIZs were discussed together, as they are a major regional linkage for lynx. At Officer's Gulch, topography forces animal movement to a narrow strip of land that includes FS, private, and Summit County ownership. LIZ 10 – Empire Junction on US 40 MP 227.8 to 229.1. The issue here is to keep bighorn sheep off SH 40 and facilitate their movement. There is only one suitable location because of topography. A crossing structure would have to be an overpass because of sheep behavior. LIZ 11 – Fall River MP 237.2 to 238.2. This area, along with LIZ 12 is a crossing area for lion and bear. Adjacent land use is residential and mixed mining and residential.
Mar 6, 2003	Kirk Oldham, Shannon Schwab-CDOW, Tom Kroenig, Alison Michael, Lee Carlson, Bill Andree, Dian Jacoby-CDOT, Jerry Powell, Gary Spinuzzi, Gary Patton, Scott Ludwig, Tom Fresques, Terry Edelmon, Loren Hettinger, Evan Kirby, Beth Chase, Roland Wostl, Edrie Vinson, Cecelia Joy	Meeting started with Ms. Joy discussing possible footprints for the Corridor along with a supporting handout depicting the footprints and possible lane configuration types. Mr. Hettinger discussed comparison of alternatives based on the LIZ matrix. Discussion followed of the alternatives and rankings. There was some confusion about the differences in priority of the zones in the alternatives discussion compared with the zones in the LIZ discussions. Important to the discussions was the result that the group decided to use ranges of effects rather than absolute values. Afterwards, the group decided to split the West Vail Pass LIZ into 2 LIZs. LIZ 6 would cover the lower Vail Pass area that is more permeable and less in need of improvements. LIZ 6.5 would cover upper Vail Pass from approximately MP 186 to 188, which is less permeable and needs more improvements to allow for wildlife movement. There was considerable discussion of the matrices presented, but that discussion is omitted here because the matrices and alternatives were all completely revised (some several times) prior to publishing the Draft PEIS in December 2004. Discussion then turned to the MOA. The objective is a cooperative agreement designed to make the I-70 Corridor as permeable as possible to wildlife. The objective is a prioritized set of conservation actions through a programmatic agreement with USFWS, BLM, FS, DOW and CDOT. An objective is a common interest in being able to implement in advance of projects and to document this so it is included in the PEIS. An objective is a common intent to work cooperatively to protect wildlife corridors in order to have a complete set of alternatives in the ROD. The MOA is to serve

		as a basis for political support, and to address other impacts to numerous sensitive species as well as direct and indirect impacts from the highway. An additional objective is to identify the various agencies' roles in order to define and coordinate methods of implementation. The MOA can address other issues in addition to permeability, such as water quality, the SWEEP program, amphibians and fish. An objective of the MOA is to identify resource/impact topics where CDOT could fund research (e.g., deicers) and then ensure that the findings of the research would be implemented.

Appendix C
Information from the ALIVE Committee as Published in the PEIS

Appendix C. Information from the ALIVE Committee Published in the Draft PEIS

3.2.2.4 Wildlife Species in the Corridor

Foothills Zone

Typical mammals that inhabit the Foothills Zone include mule deer, mountain lion, bobcat, mountain (Nuttall's) cottontail, deer mouse, rock squirrel, Colorado chipmunk, and long-tailed weasel. Characteristic birds include chipping sparrow, dark-eyed junco, dusky flycatcher, green-tailed towhee, golden eagle, mourning dove, plain titmouse, and piñon jay. This is the most important zone in the Corridor for reptile habitat, providing habitat for collared lizard, eastern fence lizard, tree lizard, bull snake, and prairie rattlesnake. See Appendix F, Biological Resources and Wetlands Documentation, for a more complete list of common wildlife species associated with the above vegetation types.

Montane Zone

Mammals that typically occur throughout the Montane Zone include elk, mule deer, mountain lion, bobcat, coyote, beaver, porcupine, striped skunk, and black bear (see Appendix F). Some of the more common small mammals of this zone are mice, squirrels, shrews, bats, chipmunks, mountain cottontails, weasels, and woodrats. Typical avian species include hawks and owls, as well as the mountain bluebird, mountain chickadee, ruby-crowned kinglet, Steller's jay, pygmy nuthatch, and red crossbill (Appendix F). The latter two bird species are considered indicator species of mature ponderosa pine forest (Kingery 1998).

Subalpine Zone

Wildlife species primarily associated with the Subalpine Zone along the Corridor include elk, black bear, American marten, porcupine, yellow-bellied marmot, snowshoe hare, pine squirrel (chickaree), and many smaller mammals (Appendix F, Biological Resources and Wetlands Documentation). Birds typical of this higher mountain region include the broad-tailed hummingbird, Clark's nutcracker, gray jay, house wren, mountain chickadee, pine grosbeak, pine siskin, hermit thrush, Townsend's solitaire, western tanager, yellow-rumped warbler, and red-breasted nuthatch, which is considered an indicator species of mature spruce-fir forest.

Alpine Zone

The Alpine Zone is typified by bighorn sheep, mountain goat, pika, short- and long-tailed weasels, chipmunk, yellow-bellied marmot, shrews, voles, and a number of bird species including American pipit, brown-capped rosy finch, Clark's nutcracker, and white-crowned sparrow (see Appendix F for a more complete list of species).

3.2.2.5 Wildlife Issues in the Corridor

The primary issue affecting wildlife in the Corridor is the interference of I-70 with wildlife movement and animal-vehicle collisions (AVCs). Barriers to wildlife movement include structural, operational, and behavioral impediments to wildlife trying to cross I-70.

Barrier Effect

I-70, human population centers, increasing development, and human intrusion act as barriers to wildlife that historically crossed the Corridor in their migration or daily movements to access key habitats that supply forage or prey, cover, and water and provide breeding and rearing young requirement; and to repopulate additional areas. Transportation corridors and the communities that have developed have been a prominent cause of habitat fragmentation in the mountains of Colorado in general (WRNF 2002). Mountain valleys that contain important habitats and serve as wildlife migration and movement pathways are often subject to development. No quantitative data exist regarding how a road's design regulates its barrier effect. However, it is logical to assume barrier effects increase for all species with increased road width and the addition of retaining walls, fences, raised medians, guard rails, and significant increases in volume and/or speed of traffic.

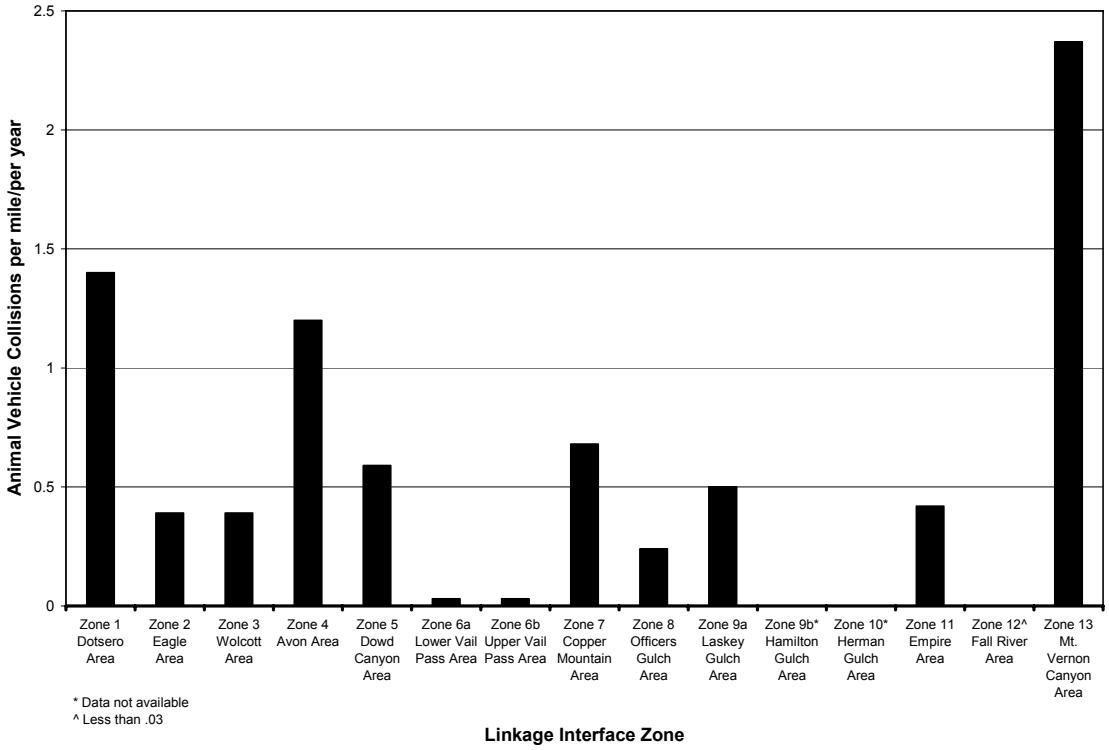
Animal-Vehicle Collisions

Documentation of mortality by AVCs from daily operations of highways covers a wide range of species, including mammals, birds, amphibians, and invertebrates (Trombulak and Frissell 2000). AVCs usually indicate a location where animal species are trying but having difficulty crossing the roadway.

Not all AVCs are reported or known, and it is estimated that only 16 to 50 percent of all AVCs are actually reported in the US (Romin and Bissonette 1996, Messner et. al. 2000). Data that are available for AVCs within Corridor linkage interference zones are important in identifying problem areas along I-70 (Chart 3.2-1) AVCs along the Corridor were compiled for the period 1988 to 1998 (Barnum 2002). Over this 10-year period, a total of 923 AVCs were reported. The average number of AVCs per mile per year was 0.63, but ranged from 0.0 to 5.2, with a standard deviation of plus or minus 0.79. Thus, road areas with 0 to about 1.4 AVCs per year per mile can be considered "normal." Road areas with 1.4 or greater AVCs per year per mile should be noted as problem areas.

Additionally, information on the species involved is inconsistent throughout the Corridor because currently State Patrol does not record the species involved when reporting AVCs. However, Colorado Division of Wildlife (CDOW) records indicate that in Colorado, mule deer, elk, and bighorn sheep account for most reported AVCs. Because these three species have different habitat affinities, they are not distributed evenly throughout the study Corridor, and their contribution to AVCs probably varies by location.

Chart 3.3-1. Animal-Vehicle Collisions in the Corridor



Linkage Interference Zones

Linkage interference zones are locations along the Corridor where the evidence suggests that the existing highway's barrier effect impedes traditional wildlife movement through certain corridors. These corridors include migration routes, as well as pathways used by a species to access required parts of its habitat on a more frequent basis. In all instances, these movement pathways connect two important components of a species' habitat needed to complete lifecycles. Evidence used to identify probable linkage interference zones included AVC data, knowledge of historic movement patterns, and observations by agency personnel, primarily of mule deer, elk, bighorn sheep and, when data were available, carnivores. The locations and characteristics of each linkage interference zone are detailed in Table 3.2-1. Figure 3.2-2 illustrates the linkage interference zones in relation to the alternatives, life zones, and key wildlife areas. In the Resource Maps section, Map 3.2-8 illustrates wildlife linkage interference zones Corridor-wide, and Maps 3.2-9 through 3.2-22 illustrate individual linkage interference zones.

Agency Coordination: A Landscape Level Inventory of Valued Ecosystem Components (ALIVE)

CDOT and FHWA enlisted four other state and federal agencies—CDOW, Bureau of Land Management (BLM), US Forest Service (USFS), and US Fish and Wildlife Service (USFWS)—to participate in a program to address the barrier effect issues of the Corridor. These agencies are responsible for the protection and management of wildlife habitats and TES species. Through the combined experience and expertise of these agencies, approaches were developed during 2002 and 2003 for mitigating transportation-related impacts on wildlife movement in the Corridor. This approach is named "A Landscape Level Inventory of Valued Ecosystem Components" (ALIVE).

Through the ALIVE committee, a wide range of ecological data were collected and evaluated, including assessments of high-value conservation sites and impaired landscape components that helped to target effective landscape level mitigation strategies. All data used were gathered in spatial formats through the use of GIS-based analytical tools. This approach supports a long-term strategy for identifying direct, secondary, and cumulative effects of project alternatives.

The focus of the ALIVE committee is:

- Designation of key wildlife habitat including Canada lynx habitat (see Map 3.3-1).
- Identification and characterization of linkage interference zones (see Maps 3.2-8 through 3.2-22).
- Analysis of specific conflict areas for wildlife roadway crossing within the linkage interference zones
- Recommendations for mitigating conflicts through wildlife crossings and other techniques including fencing and land conservation strategies. The resulting mitigation for wildlife crossings is common to both key wildlife habitats and lynx habitats. Lynx are further discussed in section 3.3, Threatened, Endangered, and Other Special Status Animal and Plant Species.

3.2.2.6 Important Communities, Habitats and Wildlife Species

Key Wildlife Habitat

CDOW identifies severe winter ranges, winter concentration areas, and lambing and calving areas for large game animals.

Of the forested habitats within the Corridor, aspen and ponderosa pine forests usually support more wildlife species than spruce-fir or lodgepole pine forests, which generally contain a simpler understory (DeByle and Winokur 1985, USFS 2002). A mixture of aspen and conifers may increase animal species diversity above what either provides in pure stands (Scott and Crouch 1988). Riparian forest and shrublands, however, are much more species rich than upland forest habitats, primarily because of the high number of bird species (USFS 2002). Affiliations of animal species with these habitats of the Corridor are tabulated in Appendix F, Biological Resources and Wetlands Documentation. Terrain features also are key to habitat value and an important factor in defining key wildlife habitat, such as bighorn sheep lambing areas, and elk and mule deer winter concentration areas.

The Wildlife Resources Information System (WRIS) mapping developed by CNHP was used to identify key habitat for mule deer, elk, and bighorn sheep along the Corridor. The designation of key habitats was coordinated with CDOW biologists and includes the following:

- Elk severe winter range, winter concentrations, and calving areas (see Map 3.2-3)
- Mule deer severe winter range and winter concentrations (see Map 3.2-4)
- Bighorn sheep summer range, winter range, winter concentrations, and lambing areas (see Map 3.2-5)

Mule deer fawning areas are scattered in various habitats and are not mapped as discrete areas.

The Migratory Bird Treaty Act of 1918 (MBTA, 16 USC 760c-760g), as amended, implements protection of migratory birds and provides that it is unlawful to take any migratory bird, part, nest, egg, or product. As such, all of the native avian species of the Corridor and their active nests are protected and have potential to be affected by the alternatives that expand the highway footprint/right-of-way. Vegetation types (riparian and aspen forests) of the Corridor with the highest potential to be used for nest sites were used to measure the extent that songbirds could be affected by the alternatives.

The Bald and Golden Eagle Act of 1940 gives additional protection for eagle species and their nests.

Management Indicator Species

Management indicator species are selected by each national forest "because their population changes are believed to indicate the effects of management activities" (36 CFR 291.19(a)(1)). In addition to individual species, USFS also considers some plant communities as management indicators. In general, management indicator species are selected to meet one of the following criteria: (1) they are ecological indicators; (2) they are species commonly hunted or of economic significance; or (3) they are threatened or endangered species. Appendix F includes a list of WRNF and ARNF management indicator species anticipated to occur within the Corridor and provides a biological evaluation that includes management indicator species and TES species.

Management indicator species relevant to the Corridor were selected from Forest Plan lists and include the following:

- For ARNF, mule deer, bighorn sheep, warbling vireo, Wilson's warbler, and boreal toad
- For WRNF, MacGillivray's warbler and snowshoe hare
- For ARNF and WRNF, brook, brown, rainbow, greenback cutthroat, Colorado River cutthroat trout, elk, and pygmy nuthatch

These species are selected because their management indicator communities (MICs) or habitats are most likely to be influenced and/or because the movement of individuals across I-70 is of concern. The management indicator species not selected are least likely to be influenced by this project and/or because similar habitat/highway crossing concerns are represented by other management indicator species. Forest Plan management indicator species that are also threatened, endangered, or special status species but not selected as Project management indicator species are evaluated only as threatened, endangered or special status species in section 3.3, Threatened, Endangered, and Other Special Status Animal and Plant Species, if influence due to the project alternatives is likely a concern.

All threatened, endangered, proposed, sensitive species, and management indicator species for the ARNF and the WRNF and for Clear Creek, Summit, Eagle, and Garfield counties were considered in the evaluation and were identified as being within the project area or potentially affected by the project alternatives. Any species, ecosystem, or MIC not listed or discussed below was determined not to occur within the project area, would not be influenced by project activities, and/or was not selected as project management indicator species and, therefore, will not be discussed further for USFS lands.

3.2.3.4 Direct Wildlife Impacts

The primary issue affecting wildlife in the Corridor is the interference of I-70 with wildlife movement and animal-vehicle collisions (AVCs). This section describes the barrier effects associated with I-70 and project alternatives. Table 3.2-1, under the column heading Linkage Interference Zones, presents a discussion of wildlife linkage interference zones and proposed mitigation recommended by the ALIVE committee.

Section 3.2.3.5, Indirect Wildlife Impacts, presents impacts that would be associated with noise from increased traffic volumes, and operation and maintenance of project alternatives (road effect zone), as well as the impacts from induced growth associated with project alternatives.

Barrier Effects

Barriers to wildlife movement include structural, operational, and behavioral impediments to wildlife trying to cross I-70. The potential for increased structural barrier effects was analyzed for each alternative based on horizontal (additional lanes) and vertical (walls, barriers, fencing) components that would present varying degrees of barriers to wildlife movement, depending on the alternative. The following sections describe the physical barriers associated with alternatives, the influence of existing and planned development patterns, and the related barrier effects on alternatives.

No quantitative data exist regarding how a road's design results in a barrier effect. However, it is reasonable to assume that barrier effects would increase for all species with increased width and the addition of retaining walls, fences, raised medians, guardrails, and increases in volume and/or speed of traffic.

Table3.2-1. Linkage Interference Zones and Recommended Mitigation

Life Zones	Linkage Interference Zones	Animal-Vehicle Collisions	Proposed Mitigation
Western Slope Foothills Glenwood Springs to Avon (mp 116–170)	**Zone 1: Dotsero (mp 131.4–134.5)** Setting: • Predominantly sagebrush with little tree cover. • The Nature Conservancy (TNC) recently purchased the Bair Ranch property near this zone, which will enhance and preserve wildlife movement opportunities in this area. Wildlife Movement: • Known movement corridor for deer and elk. • Area fairly heavily used for crossing. • Most deer and elk in this zone cross from mp 133 west to the mouth of the Glenwood Canyon, avoiding the nearby lakes south of I-70 where several developments are planned. • Mule deer severe winter range and winter concentration areas on both sides of I-70. • Elk winter range north of I-70. • Located adjacent to the BLM Glenwood Canyon lynx linkage that provides movement between Flattops Wilderness and Red Tables in WRNF. • CDOW indicates that as few as 30 percent of the roadkills in this area are ever reported. Existing Structures and Fencing: The existing transportation underpasses in this area are not being used as wildlife crossings and are not suitable for wildlife.	1.4 per mile per year	• mp 132.5–132.8: Repair/replace wildlife fencing, as appropriate. • mp 132.5–132.8: Redesign fence in areas prone to rockfall (approximately 100 feet); use concrete barrier/fence combination.
	Zone 2: Eagle County Airport to Town of Eagle (mp 142.0–145.3) Setting: • Open piñon-juniper woodland near I-70. • Riparian forest and shrub habitats. • Adjacent to the Eagle River. • Rapid development through the 1990s occurred in this area around Eagle County Airport. Planned developments in this area include Adam's Rib, Frost Creek, and Diamond S Ranch developments south of I-70. Wildlife Movement: • Provides for movement to and from deer and elk severe winter range, winter concentration areas, and fawning/calving habitat to the north and south of I-70. • Mule deer severe winter range areas on north and south of I-70. • Elk severe winter range on north of I-70 on BLM lands. • Lands managed by the WRNF as elk habitat are located to the south of the zone. Existing Structures and Fencing: CDOW describes this section of I-70 as a highway crossing area for big game.	0.39 per mile per year	• mp 143.1: Remove fill at bridge west of Cottonwood Creek to increase height, making it more suitable for an elk crossing. • mp 142.0–142.3: Realign wildlife fencing in steep areas north of I-70 where rockfall damage occurs, and repair damaged fencing as necessary. • mp 145.5: Remove berm from south entrance of passage. • mp 143.8: Investigate potential costs for conservation easement on private land surrounding the Eagle River.
	Zone 3: Eagle to Wolcott (mp 147.3–153.4) Setting: • The eastern portion of the zone is moderately forested, while the western portion closer to the town of Eagle is sparsely forested. • Zone extends through Red Canyon. • Steep slopes on both sides of highway for most of its length. • Large areas of BLM lands are located to the north and south with mixed private lands in between. • Recreation uses near the zone include numerous BLM trails. Wildlife Movement: • Elk severe winter range southwest of I-70. • Mule deer severe winter range, winter concentration to the south of I-70. • Forest carnivores including bear and mountain lion frequent the area. • Providing for lynx movement across shrub-steppe habitats from Flattops Wilderness in the east to Castle Peak in the west, the BLM has designated this zone as a lynx linkage area. Existing Structures and Fencing: Solid 8-foot fencing exists on both sides of I-70 through the entire zone. No suitable wildlife crossing structures are currently located through this area.	0.39 per mile per year	• mp 153.8: Extend existing fencing to I-70 bridge across Eagle River. • mp 151.8: Recommend new wildlife crossing structures to be as large as possible depending on engineering design requirements and topographic limitations of the area. • Investigate median barriers with gaps large enough to accommodate small mammals (for example, raccoons and skunks). Place barriers every 0.25 mile. • Investigate costs of conservation easement around mp 151.8.

Life Zones	Linkage Interference Zones	Animal-Vehicle Collisions	Proposed Mitigation
Western Slope Foothills – Continued Glenwood Springs to Avon (mp 116–170)	**Zone 4: Wolcott to Avon (mp 154.5–166.5)** Setting: • Sparsely forested. • Rapid development around Avon and Edwards occurred through the 1990s. • Significant development is still occurring through the eastern half of the zone, including 250 housing units, soccer fields, a school, and a church south of mp 163. • The WRNF recently exchanged a 400-acre parcel of land north of mp 165 that will be developed into 300 employee-housing units on 40 acres of the property for Vail Ski Area with the remaining acreage to remain as conservation easement. • Red Sky Ranch, a large development of 35-acre lots southwest of the zone, is being subdivided into 15-acre lots. • The BLM recently completed a 1,400-acre land swap to private interests near the zone in exchange for lands outside Grand Junction. Wildlife Movement: • Heavily traveled by carnivores, including black bear and mountain lion (Bellyache Ridge); designated by CDOW as a human conflict area for both species. • CDOW considers most of the area a highway conflict zone for deer and elk. • Elk and mule deer severe winter range and winter concentration both sides of I-70. The area south of I-70 through the eastern portion of this zone contains elk severe winter range and calving areas. • Federal lands to the north are managed by the WRNF for deer and elk winter range, while the Holy Cross Wilderness is located to the south. • Rapid development, combined with habitats historically occupied by deer, elk, and forest carnivores has resulted in wildlife conflicts in this zone. • The zone is located at the western edge of the Castle Peak BLM lynx linkage. BLM has designated the area between mp 154.0 and 160.0 as lynx habitat linkage. Existing Structures and Fencing: This linkage interference zone currently has no CDOT wildlife fencing.	1.2 per mile per year	• mp 153.9–mp 159.0: Add wildlife fencing on south side of I-70 between Wolcott interchange and where I-70 crosses the Eagle River. Create gaps with berms or one-way gates to enable wildlife to escape from highway side. • Recommend new wildlife crossing structures to be as large as possible depending on engineering design requirements and topographic limitations of the area. • mp 155.3 or 155.6: Add crossing structure across I-70 and US 6 north and west of Bellyache Ridge, just south of Alkali Creek. • mp 159.7: Add crossing structure south of Red Canyon Creek and Bear Gulch, south and east of existing motorized underpass. • mp 163–166.5: Add wildlife fencing on both sides of I-70. • Investigate conservation easements for each proposed crossing.
Western Slope Montane Avon to East Vail (mp 170–182)	**Zone 5: Dowd Canyon (mp 169.5–172.3)** Setting: • The area has little forest cover adjacent to I-70. • Steep slopes on the north side are a significant rockfall hazard. • The WRNF surrounds the zone to the north and south, while pockets of residential development are located to the east and west. • Federal lands and good habitat are located north and south. • Wildlife fencing has been damaged. Wildlife Movement: • This is a western Vail north–south connection for wildlife movement. • Elk winter range/severe winter range is located south of the zone. • Important elk and mule deer migration corridor. • Camera studies performed by CDOW have shown the area to be used by elk, deer, and mountain lion. • Bear and lion conflict areas. • Designated as a lynx linkage area by USFS. Existing Structures and Fencing: This linkage interference zone has median and guardrail barriers along most of I-70. A concrete box culvert and several land leases by CDOW are located in this zone for wildlife movement. The existing crossing structure is long and only 10 feet in height, inhibiting the movement of large elk. Most of I-70 in this zone includes CDOT wildlife fencing on both sides, which is often damaged by rockfall on the north and winter snowplowing activities from residences to the south. A paved bike path with restricted winter usage is located near the existing crossing structure in addition to several trails and a river rafting “put in” location. Eagle County plans to expand the paved bike path to the west.	0.59 per mile per year	• Recommend new wildlife crossing structures to be as large as possible depending on engineering design requirements and topographic limitations of the area. • mp 170.2–172.5: Replace existing wildlife fencing with reinforced fence through rockfall area north of I-70, where current fencing has numerous holes. • CDOT should coordinate with community at West Vail to avoid damage caused by plowing snow against fences.

Life Zones	Linkage Interference Zones	Animal-Vehicle Collisions	Proposed Mitigation
Subalpine East Vail to US 40 (mp 182–233)	**Zone 6a and 6b: Upper and Lower West Vail Pass (mp 181.7–188.5)** Setting: • Coniferous forest grows to the edge of both sides of the highway through most of the zone. • Bridges are highly effective as wildlife crossings to connect forest lands from mp 182.5–185.3. • Eagles Nest Wilderness Area is located directly north of I-70 through most of the zone. • The land on the southwest side of lower west Vail Pass is forest property managed as forested landscape linkage, intended to be maintained for a connection between Eagles Nest Wilderness Area to the east and the Holy Cross Wilderness Area to the southwest. • The forest lands at the top of upper west Vail Pass are managed for year-round motorized backcountry recreation to the west and for nonmotorized backcountry recreation to the east. Wildlife Movement: • Surrounded by the WRNF, this zone is used heavily by wildlife and has a low amount of roadkill. • Designated as a lynx linkage area by the USFS; based on habitat of the area, lynx usage is highly probable. (Note: A lynx was killed in a vehicle collision on upper west Vail Pass in 1999.) • Bighorn sheep range north. • Bear and lion conflict area. Existing Structures and Fencing: Six open-span bridges are located contiguously in the eastbound and westbound direction of I-70 through lower west Vail Pass, although there are no existing crossing structures through upper west Vail Pass. Animals in the area are found to readily jump over median barriers but showed reluctance to cross in areas with guardrail structures (Barnum 2002).	0.03 per mile per year	• mp 188.0 and mp 186.3: Recommend new wildlife crossing structures to be as large as possible depending on engineering design requirements and topographic limitations of the area. • mp 188.0–186.3: Add CDOT wildlife fencing between proposed structures on both sides of I-70.
	Zone 7: East Vail Pass to Copper Mountain (mp 190.4–194.0) Setting: • Most of zone is forested, although not as densely as west Vail Pass. • Significant open areas exist. • The eastbound and westbound lanes of I-70 are separated through this section with an open wetland area containing West Tenmile Creek. • The zone is surrounded by forest property managed as forested landscape linkage, nonmotorized backcountry recreation, and primitive wilderness. • Several parcels of private land are located within the east end of the zone, just east of Copper Mountain near the Guller Creek and West Tenmile Creek bridges. • In addition to the Tenmile-Vail Pass National Recreation Trail that runs the length of the zone, USFS trails are located through Stafford Gulch, Wilder Gulch, Corral Creek, and Guller Creek. Wildlife Movement: • This zone is located within the USFS Vail Pass lynx linkage zone. • CDOW indicates that wildlife cross through drainages predominantly at Smith Gulch and Guller, Stafford, Wilder, and Corral creeks. • CDOW also noted that forest carnivores are frequently seen crossing at Stafford Creek. The forest cover is less dense in this area than that seen on west Vail Pass. Existing Structures and Fencing: Five existing open-span bridge structures occur in the eastbound direction through this zone. Only one structure exists in the westbound direction, and it is not directly adjacent to a corresponding structure in the eastbound direction.	0.68 per mile per year	• Recommend new wildlife crossing structures to be as large as possible depending on engineering design requirements and topographic limitations of the area. • mp 192.5: Add crossing structure to westbound side of I-70 north of Stafford Creek. • mp 193.4: Add crossing structure to westbound side of I-70 north of Guller Creek. • Add berms and screening vegetation to guide wildlife between existing Wilder Gulch (eastbound) and Corral Creek (westbound) crossings. • Add berms and screening vegetation to guide wildlife between existing Smith Gulch (eastbound) and Corral Creek (westbound) crossings. • Provide space between guardrail structures and the road to allow wildlife jumping over barriers to avoid jumping directly into traffic.
	Zone 8: Officers Gulch/Owl Canyon (mp 195.5–200.5) Setting: • Area dominated by extreme slopes on all sides; canyon opens up to Wheeler Flats area near Copper Mountain (south) and Frisco (north). • Borders Eagles Nest Wilderness Area (west) and WRNF lands managed for nonmotorized backcountry recreation and scenic byways, which is conducive to wildlife habitat. • This steep canyon area has several water bodies, including Uneva Lake, Officers Gulch Pond, and Wheeler Flats Ponds. • The area is heavily forested with tree cover for wildlife use close to I-70. • While the area is encompassed by the WRNF, the land surrounding Uneva Lake to the east of I-70 is a forest inholding, although the owners have indicated to the USFS that they do not plan to develop the land. Several other private mine inholdings are located to the east of I-70 in this area, although they are located on very steep slopes. • The lands are managed by the WRNF as pristine wilderness, nonmotorized backcountry recreation, and scenic byways or travel corridors. The Tenmile-Vail Pass National Recreation Trail runs through the length of this linkage interference zone. Wildlife Movement: • Connection between habitats in the Gore Mountain Range and Tenmile Mountain Range, especially for carnivores. • CDOW considers mp 200.8 a black bear movement corridor. • Mule deer migration corridor runs parallel. • Located within the USFS Officers Gulch lynx linkage area, providing movement between Eagles Nest Wilderness Area and the Tenmile Mountain Range. • USFS biologists have indicated that most of the ungulate movement in the area is lateral with the highway. Existing Structures and Fencing: A single box culvert is located at mp 199.6. Box culverts are viewed as acceptable structures for the area by USFS and CDOW for most carnivore highway crossing activity in the area. An interchange at Officers Gulch is used as an informal overnight truck pullover. WRNF manages an area adjacent to Officers Gulch Pond that is proposed as an overnight camping area, although the area is currently not for overnight use and USFS indicated overnight use would potentially inhibit carnivore movement.	0.24 per mile per year	• mp 198.0, mp 199.2, and mp 200.8: Recommend new wildlife crossing structures to be as large as possible depending on engineering design requirements and topographic limitations of the area. • Investigate amending WRNF plan to exclude overnight use of area surrounding Officers Gulch Pond, planned and secondarily managed as a campground site.

Life Zones	Linkage Interference Zones	Animal-Vehicle Collisions	Proposed Mitigation
Subalpine - Continued East Vail to US 40 (mp 182–233)	**Zone 9a: Laskey Gulch (mp 207.0–209.7)** Setting: • The area is moderately forested, transitioning to sagebrush closer to the town of Dillon. • Located between Dillon and a steep pass leading to the EJMT and constructed on steep cut-and-fill slopes of I-70. • In Dillon, condominiums have been built along the western edge of the linkage interference zone on the south side of I-70 within 0.5 miles of Laskey Gulch. Sound walls are currently being constructed adjacent to the condominiums. • Solid median and guardrail barriers are located through the length of the linkage interference zone, and no crossing structures currently exist. • This zone is within the WRNF and is managed as forested landscape linkage. • Most private lands are developed in this area, although the Denver Water Board possesses several large undeveloped inholdings in the central portion of the zone. Wildlife Movement: • Laskey Gulch is an important connection for deer, elk, and bear. • Elk severe winter range habitat north and south of I-70. • Elk and mule deer highway conflict areas. • Mule deer and bear migration corridors. • Potential lynx crossing. Located within the USFS Loveland Pass lynx linkage area, this zone provides for north-south lynx movement from the Ptarmigan Peak Wilderness Area and Williams Fork River area to forest lands south of I-70. Existing Structures and Fencing: CDOW noted that resident populations of elk and deer in the area were not obstructed by the golf course south of I-70 and would benefit from a crossing structure at Laskey Gulch to reconnect lands managed by the WRNF as deer and elk winter range north and south of I-70.	0.50 per mile per year (total zone 9)	• mp 208.3: Recommend new wildlife crossing structures to be as large as possible depending on engineering design requirements and topographic limitations of the area. • Coordinate with local planners to ensure that area zoning accommodates a wildlife structure in this location. • Continue interagency efforts to ensure that future land planning and zoning efforts improve the viability of the wildlife corridor.
	Zone 9b: Hamilton Gulch/Dead Coon Gulch (mp 210.7–212.6) Setting: • With the exception of cut-and-fill slopes of I-70, this area is densely forested. • This zone includes 3- to 5-foot concrete center barrier structure throughout its length, and approximately 2,300 feet of guardrail. • Straight Creek follows the length of the zone along I-70. • Several large road cuts and a runaway truck ramp are located north of I-70 in this zone. • Straight Creek and wetland areas are located below I-70 through the zone to the south. Hamilton Gulch reaches I-70 at mp 211.5, while Dead Coon Gulch lays further to the east at mp 212.2. Members of the ALIVE committee from both the USFS and CDOW commented that they felt that Hamilton Gulch and Laskey Gulch were both important and that they should both be considered equally. Wildlife Movement: • High usage by deer and elk along Hamilton Gulch and near Dead Coon Gulch to the east. • Located within the USFS Loveland Pass lynx linkage area and managed as forested landscape linkage. • The USFS noted that numerous elk and deer tracks are seen through the area and the zone would connect areas north of I-70 managed as forested landscape linkage and pristine wilderness to lands managed for forested landscape linkages south of I-70. Existing Structures and Fencing: I-70 was constructed on large fill slopes through this zone and no crossing structures currently exist, although two 4-foot plastic pipes and one corrugated metal pipe are located in the zone. Solid median barriers and an offset height between eastbound and westbound directions of I-70 are located through the length of this zone.	As above	• mp 212.2: Recommend new wildlife crossing structures to be as large as possible depending on engineering design requirements and topographic limitations of the area.
	Zone 10: Herman Gulch/Bakerville (mp 216.7–220.8) Setting: • Herman Gulch is located 3 miles east of EJMT, surrounded by the ARNF. • The forest lands are managed for scenery, ski-based areas (Loveland), and nonmotorized backcountry recreation. • Six residential structures are located near I-70 north of the underpass at Herman Gulch. • The Continental Divide National Scenic Trail traverses through this area along the Herman Gulch trail to the north of I-70 and along the Loveland to Bakerville trail to the south of I-70. Wildlife Movement: • Considered important lynx habitat. Herman Gulch lynx linkage area is located within this zone, designated as a connection between suitable lynx habitats to the north and south of I-70. If quality habitat north of I-70 were combined with that south of the highway, a more viable lynx range would be possible, especially if connectivity across the Corridor improved. • ARNF has designated the area a lynx linkage zone. • Boreal toad breeding area. • Snowshoe hare inhabit the Mount Bethel Avalanche Path east of Herman Gulch and other avalanche paths in the area, providing forage for lynx and other forest carnivores. • USFS and CDOW indicated that evidence existed that two female lynx were using the area as home range. A lynx was killed on I-70 by a vehicle in the area of Herman Gulch in 2000. Existing Structures and Fencing: Motorists use the shoulder of I-70 as informal parking on the south side of I-70 near mp 219. Few median barriers are located through this zone, although guardrails are located through most of its length.	Data Unavailable	• mp 217.3: Design corridor to allow free movement of wildlife under I-70 within this zone.

Life Zones	Linkage Interference Zones	Animal-Vehicle Collisions	Proposed Mitigation
Eastern Slope Montane Silver Plume to Mount Vernon Canyon (mp 233–255)	**Zone 11: East of Empire on US 40 (off I-70 - approximately mp 232.0)** Setting: • North-facing slope heavily forested; south face primarily bare exposed rock cliffs. • ARNF is located just to the east of this zone. Wildlife Movement: • Steep slopes used by bighorn sheep on both sides of US 40. This zone was delineated specifically to address issues with bighorn sheep, which approach the edge of the highway to lick salt and are sometimes hit by vehicles at the edge of the I-70 and US 40 interchange. Bighorn sheep generally do not attempt to cross I-70 (except near the Henderson Mine west of this zone) but do cross US 40 and are frequently hit west of Empire. • Mule deer winter concentration north; mule deer highway conflict area. • Mountain lion conflict area. Existing Structures and Fencing: CDOW stated that bighorn sheep would not use an underpass or enclosed structure to cross a roadway.	0.42 per mile per year	• Good place for overpass structure 4.2 miles west of US 40/I-70 interchange, primarily for bighorn sheep crossing. • Investigate using jersey barriers or other barrier structures on both US 40 and I-70 to keep sheep away from road edge.
	Zone 12: Fall River (mp 237.2–238.2) Setting: • Primarily forested, though not densely. No wildlife fencing. Relatively gentle slopes throughout zone. • Located entirely on private land with the ARNF approximately 2 miles away to the north and south. • Numerous residences are located along Fall River Road and several along US 40. Wildlife Movement: • The Fall River area provides a significant break in the surrounding topography and functions as a movement corridor for mule deer, elk, bighorn sheep, mountain goat, black bear, and mountain lion. • CDOW noted that carnivores are frequently hit in this area, and there are concerns about elk populations becoming habituated and inhabiting the area year-round. • Bighorn sheep, elk, bear, and mountain lion frequent the area and are hit occasionally. • Resident elk living close to populated areas are a concern in this area. Elk calving 0.25 miles north. • Mule deer severe winter and winter concentration north. • This area may not be suitable for establishing habitat connectivity. CDOW does not desire populations of introduced mountain goats currently inhabiting the Mount Evans area south of I-70 to have the ability to reach areas north of I-70 and compete with native bighorn sheep. Existing Structures and Fencing: Two concrete box culverts, one 4 feet in height at Georgia Gulch, the other 10 feet in height at Fall River, currently exist in this linkage interference zone. An underpass is located at the intersection of US 40 and I-70. Solid median barriers are located through the length of the linkage interference zone and a guardrail is located on the south side of I-70 through most of the zone.	Reported numbers too low for average	• Recommend new wildlife crossing structures to be as large as possible depending on engineering design requirements and topographic limitations of the area. • Factor improvements into bridge redesign (Fall River Road Interchange) such as a wider span and leaving adequate space along road and river for wildlife passage.
	Zone 13: Mount Vernon Canyon (mp 246.5–258.1) Setting: • Several Denver Mountain Park and Jefferson County open space properties are situated in or adjacent to this zone. • Mountain subdivisions have been extensively built through this area. • The 2,340-acre Denver Mountain Park (Genesee) extends north and south of I-70 between mp 251 and 254 and approximately 20 percent is fenced for bison rangeland adjacent to I-70. The park includes open forests and grasslands. Wildlife Movement: • Overall, this zone sees more reported roadkill than any other zone through the Corridor. • Several deer and elk highway conflict areas mapped by CDOW. • Bear summer and human conflict areas south of I-70. • Due to extensive subdivisions, elk in zone have habituated to human presence. • Resident elk are frequently hit by vehicles; groups of five or more elk have been killed in individual accidents in this linkage interference zone. Existing Structures and Fencing: CDOW indicated that fencing in this area would be detrimental and could trap wildlife in the roadway. CDOW also indicated that it would be difficult to direct wildlife to crossing structures in this zone. No wildlife fencing and very little guardrail and median barriers exist in this zone. No suitable wildlife crossing structures currently exist for larger mammals, except for a transportation dirt road underpass at Soda Creek near mp 249.	2.37 per mile per year	• Recognized as a problem area; mitigation measures currently being evaluated. • Fencing throughout the length of the zone may be the only solution. However, CDOW has stated that fencing could be detrimental to the wildlife in the area and has suggested that wildlife fencing through the zone not be considered as a mitigation measure for the area. • Investigate costs of adding intelligent signs to warn motorists about wildlife movement.

Structural

Elements Common to all Alternatives. All alternatives would result in some degree of landform modification to accommodate them within the mountainous terrain of the Corridor. Cut-and-fill slopes could result in barriers to wildlife movement depending on the height and steepness of the slope, whereas retaining walls generally would present more of a challenge depending on their height and length.

Development Influence

I-70, human population centers, increasing development, and human intrusion act as barriers to wildlife that historically crossed the Corridor in their migration or daily movements to access key habitats that supply forage or prey, cover, and water; to repopulate additional areas; and to fulfill breeding and young-rearing requirements. Transportation corridors and the communities that have developed have been a prominent cause of habitat fragmentation in the Colorado mountains in general (WRNF 2002). Mountain valleys that contain important habitats and serve as wildlife migration and movement pathways are often subject to development.

Linkage Interference Zones

Figure 3.2-2 illustrates the location of linkage interference zones in relation to alternatives. Table 3.2-1 details the environmental consequences of alternatives in relation to linkage interference zones.

3.2.4 Mitigation Measures

Mitigation measures for biological resources center on reducing habitat losses as soon as possible in areas that can be reclaimed, reducing existing barriers, and controlling runoff from road surfaces.

Efforts to minimize impact in Tier 1 analyses have included screening and refinement of alternatives to avoid and minimize new disturbance. Early alternative alignments that bypassed the Corridor were eliminated during the screening process due to substantially greater impacts of the new alignment. All remaining alternatives closely follow the existing interstate. Additionally, shifts in the alternative alignment and structured elements have been employed in alternative designs to avoid sensitive resources, such as old-growth forest.

Mitigation measures for biological resources will be developed and refined at the Tier 2 level of study in context of a specific project. However, mitigation measures that normally apply to construction projects to reduce impacts are addressed in the text below.

3.2.4.2 Wildlife

Barrier Effect

In developing the linkage interference zones, the ALIVE committee addressed measures that would facilitate decreasing the barrier effect of I-70 and decrease the AVCs. These measures would include providing more crossing opportunities with bridging or overpasses to the extent practical, placing more wildlife fencing, or repairing existing fencing where appropriate.

The Mount Vernon Canyon linkage interference zone is recognized as a problem area, especially for elk AVCs, and mitigation measures are currently being evaluated. Problems in developing mitigation measures for this area would include lack of locations

for suitable crossing structures because of the terrain and the number of access points that are required for private properties that adjoin the I-70 right-of-way.

Table 3.2-1 provides specific mitigation recommendations developed by the ALIVE committee for each linkage interference zone throughout the Corridor. The strategies for mitigation of linkage interference zones developed for the Tier 1 stage of this PEIS are not specific to alternatives. Additional mitigation can be specified at the design level for specific alternatives during the Tier 2 phase.

Habitat Loss

Construction of project alternatives would be placed in the existing right-of-way to the extent possible by engineering design. This would include using as much of the already disturbed areas and median as possible to reduce impacts on adjacent habitats. CDOT will work with USFS and local entities to identify other previously disturbed areas where habitat restoration is beneficial. Removal of trees and shrubs for implementation of project alternatives would be accomplished during the non-nesting periods per the Migratory Bird Treaty Act.

Road Effect Zone

Impacts on adjacent habitats from the project alternatives will be reduced to the extent possible by project design, to control runoff of contaminants and winter maintenance materials, as well as control of noxious weed species in the right-of-way.

3.3.4 Mitigation Measures (Threatened, Endangered and Special Status Species)

Informal Section 7 consultation with the USFWS was initiated through a letter requesting the species expected to occur in the project area Appendix F, Biological Resources and Wetlands Documentation). Also, field inspections were conducted to identify fens and old-growth forest to be avoided by project alternatives. Habitat loss of TES species would be minimized by placing the new facilities (such as lanes or structures) in the right-of-way and avoiding rare habitats where possible. Impacts on biological resources would be minimized where possible through alignment shifts and structural adjustments away from sensitive habitats.

Habitat loss of TES species would be minimized by placing the new facilities (such as lanes or structures) in the right-of-way and avoiding rare habitats where possible. Impacts on biological resources would be minimized where possible through alignment shifts and structural adjustments away from sensitive habitats, using elevated segments in critical areas such as Idaho Springs, and through the use of walls to minimize cut-and-fill slopes.

Adding wildlife crossing structures and improving existing structures, as recommended by the ALIVE committee, would reduce the barrier effect of I-70 through the Corridor in areas that are especially important linkages and identified as linkage interference zones. Wildlife fencing would need to be established, extended, or repaired in these areas as well to reduce animal-vehicle collisions.

Road effect zone impacts related to sedimentation and contaminated runoff would be reduced through construction of sedimentation ponds to capture runoff and through the use of other CDOT best management practices to reduce erosion and road runoff. When

projects reach the Tier 2 level, weed management plans would be included (per CDOT regulations) to curtail the spread of noxious weeds into habitats.

Intensive surveys of TES species habitats will be required as part of specific project development, and this information will be incorporated in project design to avoid affecting such species to the extent possible. The analysis of impacts on TES species has been coordinated with the USFWS at this Tier 1 level of study and will continue in Tier 2 studies. A Biological Assessment according to ESA requirements and USFWS guidelines will document such actions, and a Biological Evaluation per USFS guidelines for TES species and management indicator species has been developed for this project. Protection measures for TES and management indicator species will be addressed during the project design and during implementation in Tier 2 for this project.

3.19.2 Mitigation Policies

The following mitigation policies will be implemented by CDOT and FHWA during Tier 2 studies:

1. Employ design strategies to further minimize impacts on communities and the environment, including the following:
    1. 1A – Utilize the general alignment and design elements selected during Tier 1 unless other reasonable and feasible alternatives with similar or fewer impacts surface.
    2. 1B – Use standard design parameters. In isolated instances, consider variances from standard designs in order to further minimize impacts, as long as the resulting alternatives are reasonable and feasible.
    3. 1C – Utilize the principles of "Context Sensitive Design," including significant involvement of affected communities in determining the ultimate footprint, aesthetic elements, and other features germane to the alternative.
    4. 1D – Determine noise mitigation strategies with affected communities, residents, and businesses.
    5. 1E – Encourage interested parties to develop and evaluate a list of reasonable design refinements to the selected alternative that would represent an affected community's ideal of aesthetically pleasing infrastructure.
2. Apply the conditions to be set forth in the Programmatic Agreement between the consulting parties involving Section 106 of the National Historic Preservation Act.
3. Fulfill responsibilities set forth in the ALIVE (A Landscape level Inventory of Valued Ecosystem components) agreement and the Biological Assessment to be developed in conjunction with USFWS. The ALIVE program provides opportunities to address issues related to improving wildlife movement and reducing habitat fragmentation in the Corridor. Mitigation measures will be developed to offset impacts on species identified in the Biological Report for the WRNF and ARNF.
4. Comply with the 404(b)(1) guidelines of the Clean Water Act. Engage stakeholders to continue the work of the Stream and Wetland Ecological Enhancement Program (SWEEP) committee in an effort to integrate water resource needs (such as water quality, fisheries, wetlands, and riparian areas) with design elements for construction activities and long-term maintenance and operations of the transportation system.

5. Integrate winter storm management and maintenance procedures into the template of the infrastructure. Highway alternative templates throughout Clear Creek County would include snow storage areas in select locations to capture snow and other roadway runoff to reduce impacts on adjacent ecosystems.
6. Implement the Sedimentation Control Action Plans (SCAPs) developed specifically for Straight Creek and Black Gore Creek to identify methods to control the existing transport of winter sanding materials. Consider other Corridor areas such as the upper reaches of Clear Creek for additional SCAP activity.
7. Develop information systems (such as advertising campaigns to support local businesses, signage with hours of operation, and detour plans) to inform affected communities, I-70 travelers, businesses, and homeowners about construction activities and schedules.

Other examples of design strategies are outlined in section 3.19.3 and Table 3.19-1.

3.19.3 Summary of Resource Mitigation

The environmental issues and mitigation described in this section are programmatic in nature. All alternatives could result in varying degrees of impact on the resources under study. Mitigation strategies are comprehensive in nature and crafted for this Corridor to address the types of resource impacts reported in sections 3.1 through 3.18.

The mitigation policies and strategies presented in this section will be shaped to the preferred alternative as a result of public review of and comment on this Draft PEIS, then presented in the Final PEIS. These policies and strategies will undergo any necessary refinement resulting from public review and comment on the Final PEIS, and will become specific mitigation commitments in the Tier 1 ROD.

At the Tier 2 level of the NEPA process, project-specific mitigation will be further shaped with design efforts to further avoid and minimize impacts to the greatest extent possible.

Table 3.19-1, Summary of Resource Mitigation, recaps the mitigation contained in sections 3.1 through 3.18.

Table 3.19-1. Summary of Resource Mitigation

Resource Topic	Issues	Mitigation
3.1, Climate and Air Quality	• Motor vehicle emissions • Motor vehicle direct particulate matter emissions, including re-entrained dust from highway and street sanding and unpaved roads • Visibility in and near Class I and II Wilderness Areas	Because project alternatives are not anticipated to cause or result in violations of any NAAQS, mitigation measures for air quality will center on controlling fugitive dust during construction. Mitigation measures for air quality will be developed and refined at the Tier 2 level of study in the context of a specific project. However, mitigation measures that normally apply to construction projects to reduce impacts are addressed in the text below. Construction impacts will primarily be mitigated through implementation of appropriate best management practices (BMPs). Conceptual techniques for mitigation of impacts could include the following. • Control fugitive dust through a fugitive dust control plan, including wetting of disturbed areas • Use the cleanest fuels available at the time in construction equipment and vehicles to reduce exhaust emissions • Keep construction equipment well maintained to ensure that exhaust systems are in good working order • To minimize wind blown dust from blasting, particularly near community areas, control blasting and avoid blasting on days with high winds • Minimize dust from construction in tailing areas Additionally, highway maintenance strategies will continue to be explored to minimize the amount of sand used for winter maintenance and to remove the sand from the roadway to minimize re-entrained dust.
3.2, Biological Resources: Vegetation	• Loss of vegetative cover • Loss of sensitive and rare plant communities • Effects of winter maintenance • Introduction and spread of noxious weeds	Mitigation measures for biological resources center on reducing habitat losses as soon as possible in areas that can be reclaimed, reducing existing barriers, and controlling runoff from road surfaces. These mitigation measures will be developed and refined at the Tier 2 level of study in the context of a specific project. However, mitigation measures that normally apply to construction projects to reduce impacts are addressed in the text below. Vegetation impacts would be minimized to the extent possible by constructing new facilities on previously disturbed areas of the I-70 right-of-way whenever possible. Other measures to reduce the magnitude of construction impacts would focus on maintaining hydrology on both sides of the Corridor, increasing containment of traction sand and deicer, and re-establishing vegetation in areas used for construction as soon as feasible. Noxious weeds occur in all of the counties and drainage basins traversed by the Corridor. Clearing and earthmoving operations must be managed in a way that minimizes the potential for weeds to infest new areas or spread in the construction disturbance area. Best management practices (BMPs) that are specified by CDOT must be applied to all construction sites to manage open soil surfaces and topsoil that is stockpiled for reuse, and Noxious Weed Management Plans will be required for all projects. Specific mitigation measures for construction work might include: • Salvaging topsoil for use in reclamation • Using BMPs and erosion control measures to reduce soil losses, soil inundation, and sedimentation in areas adjacent to the construction area • Providing sufficient cross-slope drainage structures during new construction to allow natural hydrologic conditions to be maintained on both sides of the right-of-way • Revegetating construction areas as soon as possible, using salvaged topsoil and native species adapted to area conditions • Monitoring and controlling weed species The best technology available would be used in selecting the materials applied for winter maintenance and for material containment. Specific issues and impacts associated with operation of the transportation facility will be addressed in more detail in Tier 2 studies. Specific mitigation measures developed in Tier 2 will focus on limiting construction disturbance zones to the minimum area necessary, protecting sensitive resources along the Corridor.
3.2, Biological Resources: Wildlife	• Barriers to wildlife movement and mortality from animal-vehicle collisions • Direct habitat loss and fragmentation • Intensified impacts on adjacent habitats (road effect zone) • Indirect effects of increased population growth and land use change on habitats	**Barrier Effect:** In developing the linkage interference zones, the ALIVE committee addressed measures that would facilitate decreasing the barrier effect of I-70 and also decrease the number of animal-vehicle collisions. These measures would include providing more crossing opportunities with bridging or overpasses to the extent practical, erecting more wildlife fencing, or repairing existing fencing where appropriate. Section 3.2 provides specific mitigation recommendations developed by the ALIVE committee for each linkage interference zone in the Corridor. The strategies for mitigation of linkage interference zones developed for this Tier 1 PEIS are not specific to alternatives. Additional mitigation can be specified at the design level for specific alternatives during the Tier 2 phase. **Habitat Loss:** Construction of project alternatives would use the existing right-of-way to the extent possible by engineering design. This would include using as much median and areas already disturbed as possible to reduce impacts on adjacent habitats. CDOT will work with USFS and local entities to identify other previously disturbed areas where habitat restoration would be beneficial. Removal of trees and shrubs for implementation of project alternatives would be accomplished during the non-nesting periods per the Migratory Bird Treaty Act. **Road Effect Zone:** Impacts on adjacent habitats from project alternatives will be reduced to the extent possible by project design to control runoff of contaminants and winter maintenance materials, and noxious weed species in the right-of-way.

Resource Topic	Issues	Mitigation
3.3, TES and MIS Species	**Effects on:** • Species that are federally listed as threatened or endangered and species that are proposed or candidates for listing as such in accordance with the Endangered Species Act • Species listed by the Colorado Division of Wildlife as threatened, endangered, or Species of Concern • Species included on sensitive species lists developed by USFS Region 2 or BLM • Species identified by the Colorado Natural Heritage Program as rare or endangered • Selected MIS species for the Arapaho and Roosevelt National Forests and White River National Forest	Habitat loss for TES species would be minimized by constructing any new facilities (such as lanes or structures) in the right-of-way and avoiding rare habitats where possible. Impacts on biological resources would be minimized where possible by means of alignment shifts and structural adjustments away from sensitive habitats, using elevated segments in critical areas such as Idaho Springs, and through the use of walls to minimize cut-and-fill slopes. Adding wildlife crossing structures and improving existing structures as recommended by the ALIVE committee would reduce the barrier effect of I-70 through the Corridor in areas that are especially important linkages and identified as linkage interference zones. Wildlife fencing would need to be erected, extended, or repaired in these areas as well to reduce animal-vehicle collisions. Road effect zone impacts related to sedimentation and contaminated runoff will be reduced by construction of sedimentation ponds to capture runoff and by use of other CDOT BMPs to reduce erosion and road runoff. When projects reach the Tier 2 level, weed management plans will be included (per CDOT regulations) to curtail the spread of noxious weeds into habitats. Intensive surveys of TES species habitats will be required as part of specific project development, and this information will be incorporated in project design to avoid affecting such species to the extent possible. Analysis of impacts on TES species has been coordinated with USFWS at this Tier 1 level of study, and will continue in Tier 2 studies. A Biological Assessment according to ESA requirements and USFWS guidelines will document such actions, and a Biological Evaluation per USFS guidelines for TES species and management indicator species has been developed for this project. Protection measures for TES and MIS species will be addressed during project design and during implementation in Tier 2 for this project.
3.4, Water Resources	**Direct Impacts** • Highway runoff and winter roadway maintenance activities' impact on water quality • Disturbance of historic mine waste materials due to highway construction activities that might release contaminants (such as heavy metals) into streams • Potential additional impacts on water quality impaired streams and streams with classifications and standards requiring special consideration • Effects on stream stability, hydrologic function, system health, and riparian system **Indirect Impacts** • Spills and hazardous materials transport possibly releasing contaminants into nearby waterways • Development and urbanization possibly resulting in impacts on water quality and streams • Channelization and other changes to stream morphology	All action alternatives would require effective drainage of the roadway surface to maintain the integrity of the roadbed and the safety of the traveling public. All water that is captured within the I-70 transportation template will be discharged rapidly through an effective drainage system. Local watershed initiatives will be incorporated into Tier 2 project alternative mitigation strategies, and mitigation will consider the goals of the local watershed planning entity. BMPs implemented along the Corridor, for example, could be designed to address individual watershed entity concerns. In some cases, a monitoring program could be implemented to provide timely information needed for ongoing management of the watershed. Any required control regulations, TMDLs, National Pollutant Discharge Elimination System (NPDES) permits, state standards, or other mandatory control measures, as well as voluntary measures, could then be included in the overall program. CDOT will coordinate with local watershed entities during Tier 2 studies and during design/construction stages to achieve these goals and ensure consistency in the process. In addition, CDOT will work closely with regulatory and resource agencies and the general public throughout this process to ensure adherence to water quality goals at the local, state, and federal levels. In Tier 2 studies, steps will be taken to safeguard intakes for public water supplies in the immediate vicinity of I-70, including alluvial wells associated with Corridor streams, from sediment, deicers, and other constituents contained in highway runoff. Implementation of a project alternative will be done in conformity with Section 107.25 and Section 208 of the CDOT *Standard Specifications for Road and Bridge Construction*. These specifications also include measures that protect water quality and streams. Tier 2 studies will evaluate and identify permanent mitigation measures for specific issues, including structural controls (beyond the Black Gore Creek and Straight Creek SCAPs). **Winter Maintenance and Stormwater Runoff** Increased impervious surface would impact winter maintenance activities and stormwater runoff. BMPs, highway maintenance strategies, and drainage/sediment control structures will be implemented as appropriate to minimize impacts from winter maintenance and increased stormwater. Methods of capturing and reducing the amount of sand/salt applied to the Corridor include structural sediment control and retrieval, automated deicing systems, solar snow storage zones, and porous pavement (CDOT 2002a, 2002b). Areas requiring the most plowing and use of traction sand are the higher elevation zones of the Corridor above 9,000 feet that receive more snowfall. Black Gore Creek and Straight Creek are areas where application of traction sand has impaired stream water quality. The SCAPs developed for the Black Gore Creek and Straight Creek I-70 corridors rely extensively on detention basins for collection of sediment (CDOT 2002). These sediment control devices or structural BMPs are effective in reducing suspended solids and total phosphorus in highway discharges. Many of the sediment control measures specified in the SCAPs have already been successful in reducing sediment loads from I-70. Reductions have been measured in Straight Creek and Black Gore Creek. When the SCAPs are fully implemented, sediment load reductions of up to 80 percent are possible (CDOT 2002). However, load reductions would be highly variable due to factors such as runoff distribution, drainage control, sand applications, maintenance procedures, and BMP design. Full implementation of SCAPs could occur in a more timely fashion with the development of a selected alternative.