Twin Tunnels Environmental Assessment

Terrestrial Wildlife Technical Memorandum

July 2012

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Acronyms and Abbreviations

CDOT	Colorado Department of Transportation
CPW	Colorado Parks and Wildlife
CR	County Road
EA	Environmental Assessment
FHWA	Federal Highway Administration
I-70	Interstate 70
MP	milepost
NEPA	National Environmental Policy Act
PEIS	Programmatic Environmental Impact Statement
ROD	Record of Decision
TM	Technical Memorandum
USFS	United States Forest Service

Section 1. Purpose of the Memorandum

The Federal Highway Administration (FHWA), in cooperation with the Colorado Department of Transportation (CDOT), is preparing an environmental assessment (EA) for proposed changes to the eastbound lanes of Interstate 70 (I-70) and the eastbound bore of the Twin Tunnels between milepost (MP) 241 and MP 244 in Clear Creek County, Colorado. The Twin Tunnels area is one of the most congested locations along the I-70 Corridor. Improvements are necessary to improve safety, operations, and travel time reliability in the eastbound direction of I-70 in the study area. The improvements will be consistent with the *I-70 Mountain Corridor Final Programmatic Environmental Impact Statement* (PEIS) Record of Decision (ROD), I-70 Mountain Corridor Context Sensitive Solutions process, and other commitments of the I-70 PEIS.

This technical memorandum (TM) discusses the regulatory setting and describes the affected environment and impacts of the Proposed Action on terrestrial wildlife within the identified study area. The TM also documents mitigation measures, including applicable measures identified in the *I-70 Mountain Corridor Final PEIS*, that would reduce any impacts during construction and operation. The I-70 PEIS identified comprehensive improvements for the Corridor. The Proposed Action would immediately address safety, mobility, and operations in the eastbound direction at the Twin Tunnels, but would not address all of the needs in the Twin Tunnels area. The Proposed Action would not preclude other improvements needed and approved by the I-70 PEIS ROD.

Section 2. How Does the Analysis Relate to the Tier 1 PEIS?

The I-70 Mountain Corridor Final Programmatic Environmental Impact Statement (PEIS) (CDOT, 2011) committed to conducting additional analysis and coordination regarding biological resources during Tier 2 projects. The analysis of terrestrial wildlife included the following during this Tier 2 process:

- Adhere to any new or revised laws or regulations pertaining to biological resources.
- Develop specific best management practices for each project.
- Develop specific and more detailed mitigation strategies and measures.
- Consider opportunities for enhancement on a project-by-project basis.
- Fulfill responsibilities set forth in the ALIVE Memorandum of Understanding.

Section 3. What Process Was Followed to Analyze Wildlife Resources?

An existing conditions wildlife assessment for the Twin Tunnels study area was completed in the fall of 2011. The purpose of this assessment was to evaluate plant communities and other habitat features within the study area to determine the wildlife species likely to occur. Particular attention was focused on culturally/economically important species such as bighorn sheep (*Ovis canadensis*) mule deer (*Odocoileus hemionus*) and Rocky Mountain elk (*Cervus elaphus*). In addition, the area was surveyed for the presence of any raptor nests, and other special wildlife attributes. Terrestrial wildlife issues were also assessed by performing a review of existing environmental sources. Primary sources of existing data included: the I-70 Mountain Corridor PEIS – Biological Resources Technical Report (CDOT, 2010) and the I-70 Mountain Corridor Final PEIS (CDOT, 2011).

Section 4. Description of the Proposed Action

The Proposed Action would add a third eastbound travel lane and consistent 10-foot outside shoulder to the I-70 highway between the East Idaho Springs interchange and the base of Floyd Hill. The eastbound bore of the Twin Tunnels would be expanded to accommodate the wider roadway section, and the existing tunnel portal face would be removed and replaced. Additionally, the Proposed Action would straighten the curve west of the Hidden Valley interchange where the highest number and most serious crashes occur. This curve reconstruction also involves replacing a bridge on I-70 over Clear Creek.

Other proposed improvements include reconstructing the chain station west of the Twin Tunnels, constructing and operating new sediment basins throughout the study area to treat stormwater runoff, installing wildlife fencing, and constructing retaining walls. **Figure 1** illustrates the project limits and the proposed changes.

CDOT is considering a range of widths between 4 and 10 feet for the inside shoulder between the west project limits and the Hidden Valley interchange. A 4-foot inside shoulder would be provided east of Hidden Valley. A range of tunnel widths, corresponding to the variations in the inside median, is being evaluated.

CDOT is also considering whether the additional capacity will operate exclusively as a general purpose lane or as a tolled lane during peak periods (also called a managed lane).

Section 5. What Are the Wildlife Resources in the Study Area?

The study area varies in elevation from 7,240 feet on the eastern end of the project (approximately MP 244) to 7,470 feet on the western end of the project (approximately MP 241). The study area encompasses both Foothills and Montane Zone vegetation, which is characterized by ponderosa pine (*Pinus ponderosa*) woodlands, deciduous scrublands including mountain mahogany (*Cercocarpus montanus*) and Douglas-fir (*Pseudotsuga menziesii*) forests. The area north of the study area, and in the vicinity of Twin Tunnels, consists of open rocky/steep habitat intermixed with low shrubs and trees. In addition, the tunnels act as a land bridge over I-70, and mule deer have been observed accessing the steep, rocky terrain to safely cross I-70.

Habitat adjacent to Clear Creek within the study area is characterized by steep, riprap banks that generally lack contiguous riparian habitat or larger cottonwood woodlands. Riparian habitat is an important feature for wildlife due to the numbers and richness of wildlife supported and its value as a general wildlife movement corridor. Terrestrial wildlife within the study area can be broken into the following categories: big game, predators and other mammals, and birds. These categories are described below.

Big Game

Three big game species, mule deer, bighorn sheep, and elk, utilize suitable habitat within the study area throughout the year. Mule deer and elk typically occupy higher elevations, usually forested habitat, during the summer and then migrate to lower elevations and south facing slopes in the winter. Portions of the study area are considered overall range for all three species (CPW, 2010). Two seasonal ranges, designated by CPW, occur with the study area for mule deer: winter range and summer range. Winter concentration areas generally occur on the north side of I-70 outside the study area (CPW, 2010). Only one seasonal range occurs within the study area for elk: winter range. Mule deer and elk seasonal activity areas within the study area are shown in **Figure 2**.

Figure 1. Proposed Action [note: managed lane extents are not set, graphic below is an estimate]

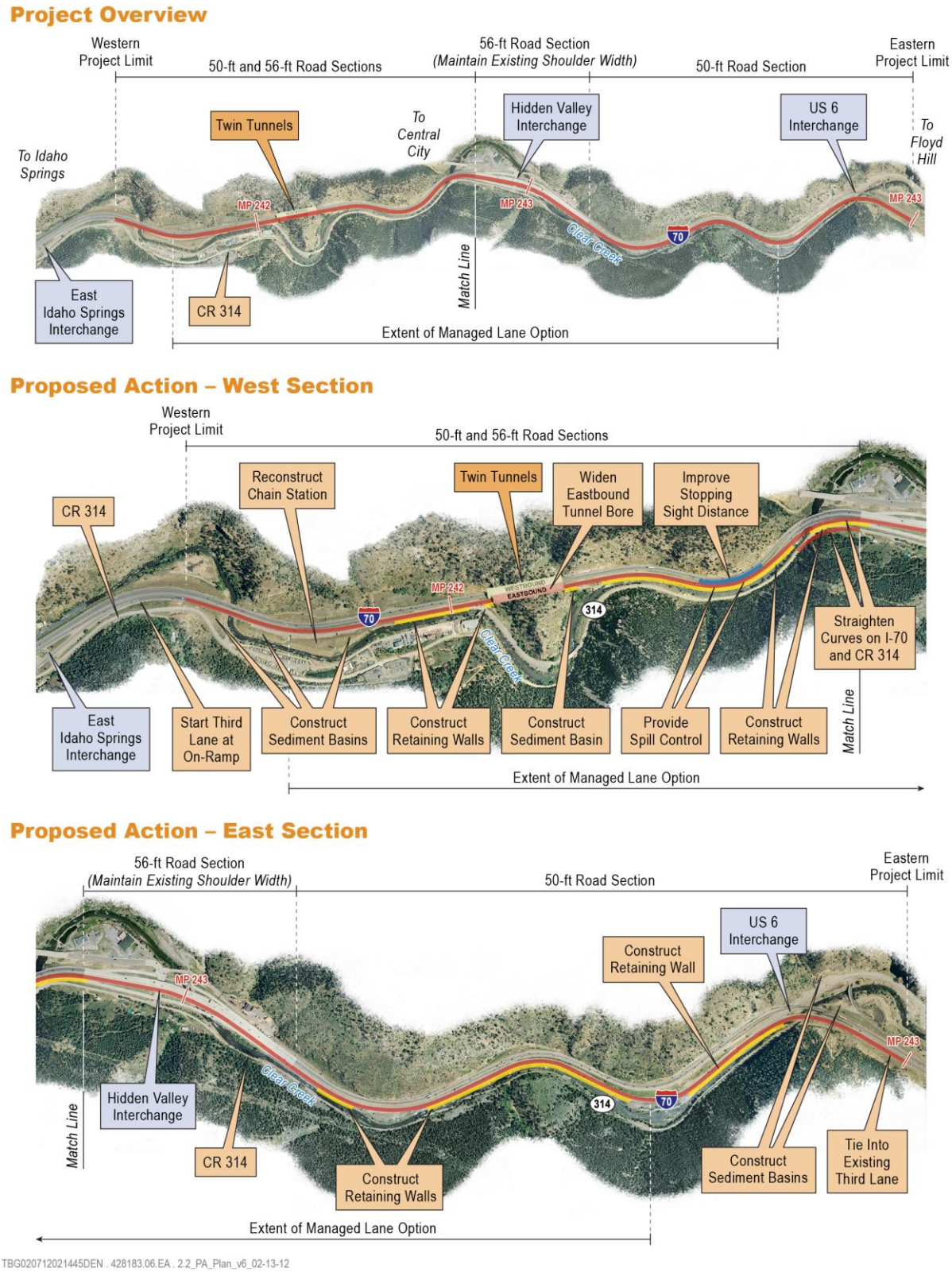
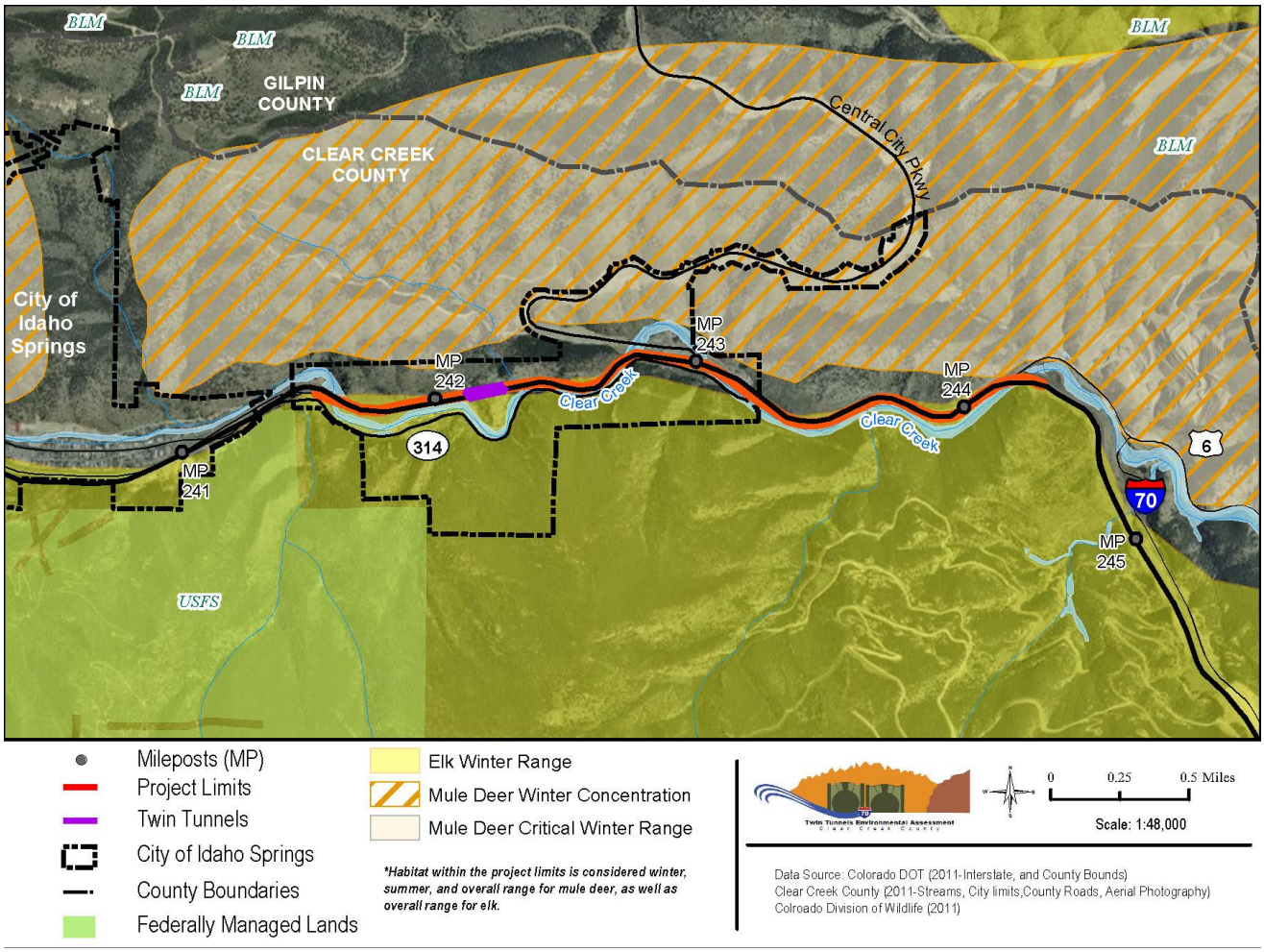


Figure 2. Mule Deer and Elk Seasonal Activity Areas within the Study Area

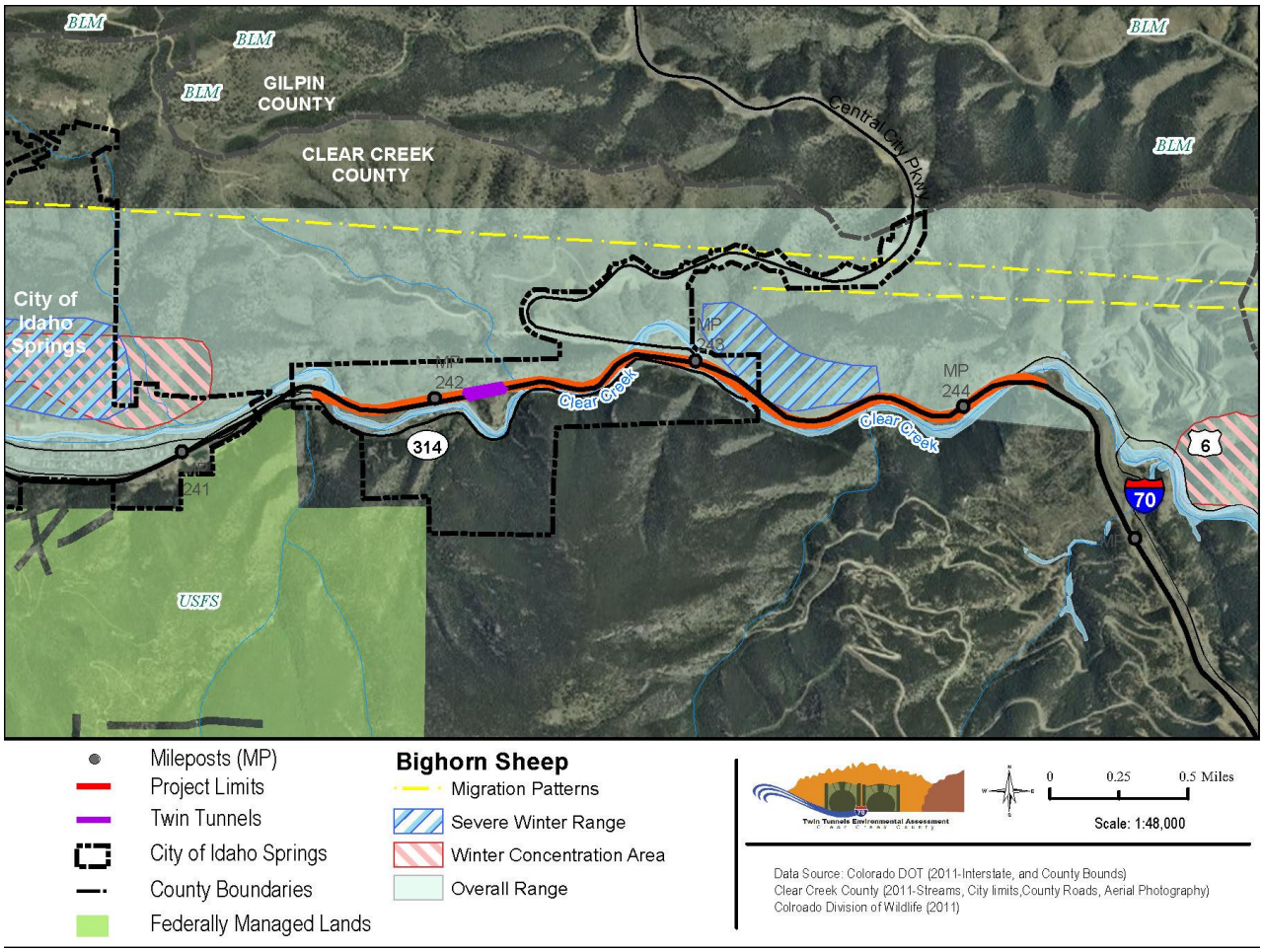


Bighorn Sheep

Bighorn sheep typically occur in steep, high mountain terrain. In Colorado, they prefer habitat dominated by grass, low shrubs, rock cover and areas with good escape terrain and topographic relief (Fitzgerald et al., 1994). They often retreat to rest on inaccessible cliffs. In the vicinity of the study area, bighorn sheep (part of the Georgetown sheep management herd) are frequently observed alongside the north side of I-70 Corridor from Idaho Springs (milepost 240) to near Floyd Hill (milepost 245). Moreover, the majority of occupied sheep habitat occurs adjacent to the westbound lanes of I-70.

Within the project area, bighorn sheep have been observed crossing I-70 via the Twin Tunnels land bridge to access the rocky/open south facing slopes. Although sheep are observed on rocky steep habitat in the vicinity of the land bridge, sheep generally do not cross Clear Creek to access habitat on the south side of I-70. In general, habitat south of Clear Creek in the vicinity of the study area is densely forested and considered unsuitable for sheep. In addition, no lambing is known to occur in the study area (CPW- Sherri Huwer personal communication, 2011). Bighorn sheep seasonal activity areas within the study area are shown in **Figure 3**.

Figure 3. Bighorn Sheep Seasonal Activity Areas within the Study Area



Predators and other Mammals

There is suitable forage habitat within the study area for several common predator species that are habituated to human presence. These species include: coyote (*Canis latrans*), red fox (*Vulpes vulpes*), bobcat (*Lynx rufus*), raccoon (*Procyon lotor*), and striped skunk (*Mephitis mephitis*). The entirety of the study area is considered overall range of the black bear (*Ursus americanus*) and fall concentration areas have been mapped west of the study area. In addition, mountain lions (*Felis concolor*) are found throughout the region in areas that support populations of deer, bighorn sheep, and elk. Common small mammal species include: ground squirrels, mice, chipmunks, and rabbits. A variety of beaver (*Castor canadensis*) activity has been observed adjacent to Clear Creek and several bank dens are located within the study area.

Migratory Birds and Raptors

The Migratory Bird Treaty Act (MBTA), passed in 1918, protects raptors and other migratory birds and their active nest sites. The MBTA provides that it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried, or received any migratory bird, part, nest, egg, or product, manufactured or not. In Colorado, most birds, except for the European Starling (*Sturnus vulgaris*), House

Sparrow (*Passer domesticus*), Rock Dove (*Columbia livia*) (Pigeon), Eurasian Collared-Dove (*Streptopelia decaocto*), and common Grouse/Pheasant species (*Order Galliformes*), are protected under the MBTA. The Migratory Bird Permit memorandum issued in April 2003 stipulates that there is no prohibition against destruction of inactive nests as long as the breeding season is avoided (approximately April 1 through August 31). Additionally, any disturbance to these nesting areas must follow the stipulations outlined in the MBTA.

In addition to the MBTA, the Bald and Golden Eagle Protection Act (Eagle Act) provides for the protection of the Bald Eagle (*Haliaeetus leucocephalus*) and the Golden Eagle (*Aquila chrysaetos*) by prohibiting the taking, possession, and use of these two species for commerce except under certain specified conditions. The definition of "take" includes the following: pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb.

The mixed montane forest, riparian habitat, and steep rocky terrain found within the study area provides both foraging and nesting habitat for a variety of migratory birds and raptors that summer, winter, or migrate through the area. An on-site nest survey was completed in the fall of 2011 to identify the presence/absence of any active migratory or raptor nest locations within the project limits. Several areas of suitable nesting habitat were observed, however, no nests were identified at time of survey. Another nest survey will be conducted in 2012 during the breeding season, between approximately late March through mid-August, for an accurate determination of nesting avian presence.

Habitat adjacent Clear Creek within the study area is mapped as winter range and winter forage for Bald Eagles. While Bald Eagles are known to winter along suitable habitat adjacent to Clear Creek, the lack of contiguous riparian habitat or large cottonwood woodlands limits the suitability of habitat within the study area.

Landscape Level Inventory of Valued Ecosystem Components (ALIVE)

During the NEPA process completed for the I-70 Mountain Corridor Final PEIS, lead agencies examined habitat connectivity and animal-vehicle collisions through an interagency committee known as "A Landscape Level Inventory of Valued Ecosystem Components" (ALIVE) Committee. The Committee identified 13 areas where the I-70 Mountain Corridor interferes with wildlife migration, including elk, mule deer, bighorn sheep, and Canada lynx (*Lynx canadensis*). These locations are referred to as linkage interference zones (LIZs). By focusing on areas of known migration and wildlife use, and creating wildlife crossings, animal-vehicle collisions can be reduced and habitat connectivity can be increased. A Memorandum of Understanding (MOU), signed in April 2008, details the responsibilities of each agency in addressing animal-vehicle collisions. In order to fulfill responsibilities set forth in the ALIVE MOU, the ALIVE Committee scheduled two meetings to discuss wildlife connectivity issues and solicit input on any relevant topics related to the Twin Tunnels Project.

Since the release of the Final PEIS, additional data has been compiled, and a systematic process was developed, to refine the 13 priority connectivity zones originally delineated in 2004. As a result, new analysis completed for the I-70 Mountain Corridor has identified 17 LIZs, covering approximately 51 miles (Kintsch et.al. 2011). This updated analysis identified one new LIZ that occurs within the study area (identified as the Clear Creek Junction LIZ) from MP 243.0- 244.9. The only area of concern within the study area is the divided bridge at the Central City Parkway exit (MP 243.0). The specific recommendation at this location includes opening up the terrestrial pathway under the highway bridge and restoring the natural stream banks. Additional site specific recommendations within the Clear Creek Junction LIZ at MP 244.2 and MP 244.9 do not occur within the study area. Specific mitigation opportunities for wildlife connectivity at the Central City Parkway Bridge are discussed in the Mitigation Section.

5.2 Is the future of terrestrial wildlife considered to be at risk?

Past and present effects of I-70 highway construction and ongoing residential and commercial growth in the I-70 Mountain Corridor have substantially changed the health of terrestrial wildlife, resulting in habitat loss and fragmentation (PEIS, CDOT, 2011). Reasonably foreseeable future actions are likely to continue to negatively affect wildlife resources.

5.3 What agencies were involved in this analysis and what are their issues?

The lead agencies for the Twin Tunnels project, CDOT and FHWA, have coordinated with the USFWS, USFS, and CPW. Habitat connectivity for species of importance, such as elk, deer, bighorn sheep, and animal-vehicle collisions are a common concern among stakeholders and agencies, and were addressed by the ALIVE Committee. In addition, a series of onsite meetings with CPW northeast region terrestrial wildlife biologist and district wildlife managers were held to discuss specific wildlife concerns and potential avoidance, minimization, and mitigation measures related to wildlife potentially impacted by construction and operation of the Twin Tunnels project.

During onsite meetings with CPW (held on October 18, November 10, December 6, 2011 and January 13, 2012) bighorn sheep were the primary concern and wildlife species discussed. The Georgetown sheep herd is one of the largest in Colorado; the 2008 population count estimated the herd at 370 bighorn (CPW, 2010a). In addition to being the largest in Colorado, it is also one of the most highly valued because it provides opportunities for hunting, wildlife viewing, photography, and serves as a source for reintroductions and herd supplements throughout Colorado. Due to the importance and size of this herd, CPW has prepared a detailed management plan to address population objectives and specific management issues (CPW, 2010a). One particular concern that has been documented for this herd (and has been discussed in several onsite meetings with CPW) is low lamb recruitment, which has been observed in the herd since 2001. In the past, studies have noted that bighorn sheep population decline is often caused by high lamb mortality, possibly from lungworm-induced pneumonia, but lamb mortality also occurs from weather and from predation by coyotes, bobcats, mountain lions, and Golden Eagles (Fitzgerald et al., 1994). CPW initiated a study of the Georgetown herd in 2005 to identify possible causes of high lamb mortality.

In addition to high lamb mortality, it is estimated that vehicle caused mortality kills approximately eight percent of the sheep population per year (CPW, 2010a). Because wildlife (sheep in particular) are attracted to the salts from deicers, vehicle mortality also occurs in areas where sheep are attracted to the shoulder of the roadway. While no studies have been completed in Colorado, other studies have identified road salt attraction as a main reason for kills of bighorn sheep and a minor reason for kills of elk due to animal-vehicle collisions. In the vicinity of the study area, sheep are spotted in close proximity to the highway on the north side of I-70 just west of the west portal of the Twin Tunnel and sheep have been killed in vehicle collisions at this location as well as tangled in cattle fencing adjacent to the roadway.

Section 6. What Are the Environmental Consequences?

6.1 How does the No Action Alternative affect wildlife resources?

Under the No Action Alternative, continued highway maintenance and transportation improvements with approved funding sources would be implemented in the future. These activities could result in additional impacts to wildlife species and habitat.

6.2 How does the Proposed Action affect wildlife resources?

Direct effects to wildlife were identified based on the loss of existing habitats due to construction activities associated with the Proposed Action. Short-term direct effects include temporary habitat loss, construction noise disturbance, and mortality. Long-term direct effects generally include: habitat fragmentation and permanent loss of habitat.

Indirect impacts to wildlife include bisecting a potential wildlife corridor, which may cause an increase in animal vehicle collisions or interruptions of migration patterns. In addition, indirect effects could be caused by the introduction and spread of noxious or invasive weed species, which degrades wildlife habitat.

6.2.1 What are the direct effects of the Proposed Action with a managed lane?

The Proposed Action would directly impact wildlife foraging and nesting habitat. Approximately 12.32 to 12.66 acres of habitat will be converted to transportation use. However, the majority of habitat that would be converted is disturbed roadside habitat that has already been degraded. No permanent impact to wetland or riparian habitat is anticipated. The direct disturbance of wildlife habitat will slightly reduce habitat availability for a variety of common small mammals, birds, and their predators. Habitat loss resulting from the construction of Proposed Action is shown in Table X in Section X. The disturbance of wildlife habitat from the Proposed Action could result in some direct mortality to small mammals, birds, and their predators and displacement of songbirds from construction activity.

No direct permanent impacts to big game (mule deer, bighorn sheep, or elk) migration corridors or winter range, critical winter range, and winter concentration areas would result from the construction of the Proposed Action.

6.2.2 How does the Proposed Action change without tolling?

The effects of managing traffic are not applicable to wildlife resources, so if the Proposed Action is implemented without a managed lane, there are no changes in the impact assessment from what is documented in 6.2.1.

6.3 What indirect effects are anticipated?

Construction of the Proposed Action (primarily in the vicinity of the Twin Tunnels land bridge) would have short-term effects on large and small mammal movement due to construction noise and vegetation removal and could increase animal vehicle collisions. Soil disturbance from construction equipment would also create favorable conditions for noxious weeds to introduce and establish, or to further spread. Temporary impacts during construction are discussed below in Section 3.1.6.4. Based on the existing conditions in the study area, no long-term impact or disruption of movement or migration corridors is anticipated in the vicinity of the Twin Tunnels land bridge or along Clear Creek.

6.4 What effects would occur during construction?

Wildlife species that are sensitive to indirect human disturbance (noise and visual disturbance) will be impacted most during the duration of construction. Construction activities would include blasting work on the tunnel, and use of the eastbound I-70 detour route. Construction activities would temporarily affect wildlife resources due to disturbance from construction noise and increased human presence. In addition, construction activities in the vicinity of the Twin Tunnels land bridge would have short-term effects on large and small mammal movement due to construction noise (blasting and vibration) and operation of detour route.

6.4.1 Displacement/Disturbance

Blasting work on the tunnel will be done from both ends by two different crews consisting of 12-15 people working 24/7 with blasting anticipated to last from March through September. At the beginning of construction the blasting will be done at the portals. As the work progresses, the blasting will be inside of the tunnel. It is anticipated noise from the blasting inside the tunnel would be largely muffled by the mountain. Each blast will be relatively small; removing only six feet of rock at a time. Blasting activities would temporarily affect wildlife resources due to disturbance from construction noise and increased human presence. Noise disturbance to wildlife would be the greatest while blasting occurs at the portals (approximately March/April) then would gradually decrease as work progresses inside the tunnel.

Increased levels of human disturbance (e.g., traffic, blasting/vibration, or the operation of heavy machinery) would likely cause some wildlife species or individuals to avoid the study area during construction and operation of the detour. Although wildlife can become accustomed to human activity, they are generally sensitive to human encroachment. The presence of the construction work force, heavy machinery, and construction noise and vibration from blasting would likely lead to temporary wildlife displacement to individuals that occur in the vicinity of the project. Some species may be more susceptible to displacement than others, but species inhabiting adjacent areas may periodically be disturbed or displaced by human activity. Because of the mobility of many species, they are generally capable of avoiding activities causing disturbance. It is anticipated that wildlife would return to their habitats once blasting and construction is complete.

6.4.2 Operation of the Detour

During agency scoping it was noted that the land bridge is not considered a significant travel or movement corridor for big game species. However, wildlife species, particularly mule deer, have been observed accessing the land bridge to safely cross I-70. The temporary disruption of wildlife movement in the vicinity of the land bridge during operation of the detour could result in an increase in animal vehicle collisions to mule deer and other mammals. In addition, salt and deicing liquids placed on old US 40 could attract bighorn sheep down to the roadway in the vicinity of the Twin Tunnels land bridge while the detour is in operation. As a result, specific mitigation measures listed in Section 3.1.7 are proposed to minimize animal vehicle collisions and prevent bighorn sheep from accessing the roadway while the detour is in operation.

Section 7. What Mitigation Is Needed?

7.1 What Tier 2 mitigation approaches are relevant?

Tier 2 mitigation approaches that are relevant to this EA include:

- Compliance with the Migratory Bird Treaty Act requirements.
- Complianace with ALIVE processes and commitments.
- Protection of Twin Tunnels Wildlife Land Bridge.

7.2 What mitigation is needed for this project?

All appropriate BMPs to prevent and minimize temporary impacts to vegetation and riparian habitat will be followed during construction. Section 3.6 (Vegetation) and Sections 3.9 (Water Quality) include a number of measures that would be applied during construction to reduce construction-related and/or long-term operation impacts to vegetation/wildlife habitat from the Proposed Action. To fulfill responsibilities in the ALIVE MOU, several mitigation measures have been incorporated into the project in several

locations that occur outside the study area. The purpose of these mitigation measures is to improve connectivity for terrestrial wildlife on the I-70 Mountain Corridor.

Table 1. Mitigation Commitments for Terrestrial Wildlife

Activity	Location	Impact	Mitigation*
Construction related disturbance between April 1 and August 31.	Twin Tunnels Project Area in the vicinity of active nests	Potential loss of eggs or young of nesting migratory birds.	If construction is to commence between April 1 and August 31, to avoid impacts to nesting birds in accordance with the MBTA, a qualified biologist will conduct a nest survey prior to construction. If active nests are found, coordination with CPW and USFWS is required to determine an appropriate course of action, which may include, but is not limited to, a delay in construction to avoid the breeding season.
Loss of vegetation-riparian tree and shrub removal.	Twin Tunnels Project Area (Riparian habitat adjacent to Clear Creek)	Loss of vegetation, including sensitive habitats Riparian trees and shrubs provide important nesting and foraging habitat for avian species as well as general wildlife. Riparian habitat is also important for bank stabilization and erosion control.	Riparian trees and shrubs removed during construction will be replaced as stipulated in CDOT's Guidelines for Senate Bill 40 Wildlife Certification, which state that trees removed during construction, whether native or non-native, shall be replaced with a goal of 1:1 replacement based on a stem count of all trees with diameter at breast height of two inches or greater. Shrubs removed during construction, whether native or non-native will be replaced based on their preconstruction areal coverage. In all cases, all such trees and shrubs will be replaced with native species.
Placement of temporary erosion control blankets for erosion control.	Twin Tunnels Project Area (where BMPs will control erosion adjacent to Clear Creek)	Potential snake mortality from entanglement in plastic mesh deployed for erosion control.	Erosion control blankets will have flexible natural fibers to allow for safe passage of snakes through the erosion control blanket.
Loss of vegetation or impacts to riparian and wetland habitat.	Twin Tunnels Project Area- Riparian and wetland habitat adjacent to Clear Creek.	Loss vegetation and impacts to sensitive habitats	Wetland/riparian areas not temporarily impacted by the project will be protected from construction activities by temporary and/or construction limit fencing.
During expansion of the eastbound tunnel bore, old US 40 (the game check area) and CR 314 would carry I-70 traffic around the Twin Tunnels on a one-mile detour route	One segment of the temporary detour will use the old US 40 alignment for approximately 1,200 feet in the vicinity of the Twin Tunnels Land Bridge	Potential for increased animal/vehicle collisions in the vicinity of the Twin Tunnels Land Bridge while the detour is in place. In addition, deicing liquids and salt placed on old US 40 during the detour may attract big horn sheep down to the roadway in the vicinity of the Twin Tunnels Land Bridge.	A 10 foot high temporary wildlife fence will be constructed along the north side of old US 40 (the game check area). The fencing would begin near the west portal of the eastbound tunnel and extend east along old US 40 and around the base of the Twin Tunnels land bridge. The fence will be tied in to the west side of the Doghouse bridge. The fencing is intended to keep wildlife off the north side of Old US 40 and prevent big horn sheep from coming down to access the roadway while the detour is in

Table 1. Mitigation Commitments for Terrestrial Wildlife

Activity	Location	Impact	Mitigation*
			place. The fence will be removed when the detour is no longer in place. If an increase in animal/vehicle collisions is observed during operation of the detour, temporary fencing will be considered on the south side of the roadway.
During expansion of the eastbound tunnel bore, old US 40 (the game check area) and CR 314 would carry I-70 traffic around the Twin Tunnels on a one-mile detour route	One segment of the temporary detour will use the old US 40 alignment for approximately 1,200 feet in the vicinity of the Twin Tunnels Land Bridge	Potential for increased animal/vehicle collisions in the vicinity of the Twin Tunnels Land Bridge while the detour is in place.	The existing vegetation at the edge of pavement on the north side of old US 40 will be removed to improve visibility and detection of wildlife for drivers. In addition, temporary lighting will be used on the detour to improve safety and detection of wildlife on the roadway.
During expansion of the eastbound tunnel bore, old US 40 (the game check area) and CR 314 would carry I-70 traffic around the Twin Tunnels on a one-mile detour route	One segment of the temporary detour will use the old US 40 alignment for approximately 1,200 feet in the vicinity of the Twin Tunnels Land Bridge	Deicing liquids and salt placed on old US 40 during the detour may attract big horn sheep down to the roadway in the vicinity of the Twin Tunnels Land Bridge.	Colorado Parks and Wildlife will place salt blocks on the north side of I-70 before blasting begins to keep sheep away from the roadway during the detour.
Reconstruction of the bridge on I-70 over Clear Creek at Hidden Valley, the new bridge would be a single span bridge over Clear Creek (this area was identified in the Clear Creek Junction LIZ).	I-70 over Clear Creek at Hidden Valley (near MP 243)	Potential to decrease wildlife connectivity if existing bench is not extended. In addition, the upstream side of the creek is steep and there is large rip rap on the south side of the existing bridge that is not favorable for wildlife movement.	When this bridge is replaced, there is opportunity to improve movement for wildlife under the bridge. In general, when the bridge is replaced, the existing bench under the bridge will be extended to maintain the existing crossing. The approach on the upstream side of Clear Creek will also be softened and large riprap will be replaced with smaller substrate to allow animals to move more freely.
Improving connectivity for terrestrial wildlife on the I-70 Mountain Corridor. Opportunities to decrease sheep entanglement in barbed wire livestock fencing on the north side I-70 outside the west portal of the tunnel.	The existing barbed and woven wire livestock fence, which is located north of I-70 from the westbound portal of the tunnel to Clear Creek. *This mitigation opportunity is located outside the study area.	Sheep have been caught and tangled in this livestock fence. In addition, the fence contains several areas of woven wire, which is the most lethal type of fence to wildlife.	The existing barbed and woven wire fencing between Clear Creek and the west portal of the westbound tunnel will be replaced in the same location. The new fence would still contain livestock but would be replaced with a combination smooth wire/barbed wire design that is more wildlife-friendly per CPW's recommendations and publication- *Fencing with Wildlife in Mind*. Specifications for this fence have been included in Attachment A.
Improving connectivity for terrestrial wildlife on the I-70 Mountain Corridor. Opportunities to decrease sheep vehicle collisions.	The north side I-70 outside the west portal of the westbound tunnel. *This mitigation opportunity is located outside the study area.	Sheep like to come down to the north side of I-70 just west of the tunnel to lick salt off the shoulder of the highway and graze on vegetation. On average,	In order to improve a driver's ability to see sheep (when vehicles exit the west bound tunnel) some of the trees, primarily junipers and pines, will be removed. This will improve motorists' ability to detect sheep as they exit the tunnel.

Table 1. Mitigation Commitments for Terrestrial Wildlife

Activity	Location	Impact	Mitigation*
		one sheep per year is hit by a vehicle at this location.	
Improving connectivity for terrestrial wildlife on the I-70 Mountain Corridor.	Opportunities to enhance wildlife movement/connectivity at a concrete box culvert (CBC) near MM 242. The CBC at this location carries flows from an intermittent drainage under I-70 and discharges to Clear Creek *This mitigation opportunity is located outside the study area.	The CBC currently has a concrete bottom and the discharge point at Clear Creek has a steep drop-off, which is not conducive to wildlife movement or use.	To encourage use by wildlife, a natural substrate will be placed along the bottom of the CBC and baffles will be installed to retain the substrate and prevent scour. Material will also be used to fill in the steep drop-off at the CBC discharge point. In addition, when the barbed and woven wire fence is replaced this drainage will be left open- and instead of fencing across the drainage (like the existing condition) the fence will be tied into the CBC to encourage wildlife usage.

*Mitigation is not necessary if impact can be avoided through changes in the design or construction of the Proposed Action (ie. the activity is avoided)

Section 8. References

Colorado Department of Transportation (CDOT). 2010. I-70 Mountain Corridor PEIS- Biological Resources Technical Report. August 2010. http://www.coloradodot.info/projects/i-70mountaincorridor/final-peis/final-peis-file-download.html

Colorado Parks and Wildlife (CPW). 2010. Species Activity Mapping, Colorado Species Distribution- Mule Deer, Elk, and Bighorn Sheep. Colorado Parks and Wildlife, Fort Collins, CO. http://ndis.nrel.colostate.edu/ftp/index.html

Colorado Parks and Wildlife (CPW). 2010a. Bighorn Sheep Management Plan: Data Analysis for Unit RBS-3, Georgetown Herd. Prepared by Sherri Huwer, Northeast Region Terrestrial Wildlife Biologist. Colorado Parks and Wildlife, Denver, Co.

CPW 2011. Personal Communication with Sherri Huwer, Northeast Region Terrestrial Wildife Biologist. November 2011.

Fitzgerald, J.P, C.A. Meaney, D.M. Armstrong. 1994. Mammals of Colorado. University Press of Colorado, Niwot. 467 pp.

Hanophy, W. 2009. *Fencing with Wildlife in Mind*. Colorado Division of Wildlife, Denver, CO.

Kintsch, J., P.Singer, M. Huijser, J. Crane, and A. Huyett. 2011. A Regional Ecosystem Framework for Terrestrial and Aquatic Wildlife Along the I-70 Mountain Corridor, Colorado

ATTACHMENT A

Fencing Figure