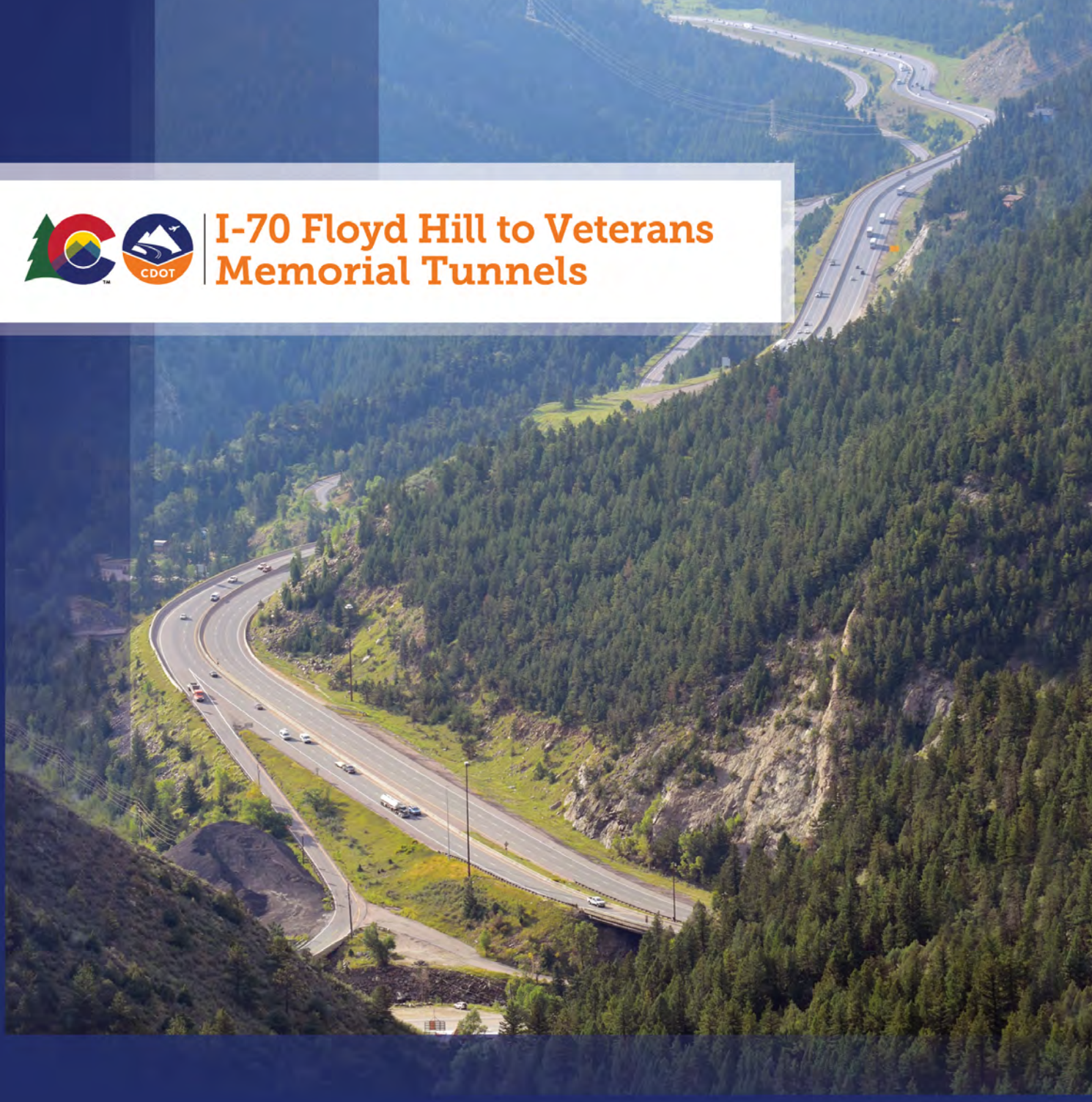

I-70 Floyd Hill to Veterans Memorial Tunnels

Threatened and Endangered Species Technical Report

May 2021

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List of Appendices

List of Exhibits

List of Acronyms

ALIVE	A Landscape Level Inventory of Valued Ecosystem Components
BMPs	Best management practices
BLM	Bureau of Land Management
CDOT	Colorado Department of Transportation
CNHP	Colorado Natural Heritage Program
CPW	Colorado Parks and Wildlife
CR	County Road
EA	Environmental Assessment
ESA	Endangered Species Act
FHWA	Federal Highway Administration
I-70	Interstate Highway 70
IPaC	Information for Planning and Consultation
MP	milepost
MIS	Management Indicator Species
mph	mile per hour
NEPA	National Environmental Policy Act
PBA	Programmatic Biological Assessment
PBO	Programmatic Biological Opinion
PEIS	Programmatic Environmental Impact Statement
PMJM	Preble's meadow jumping mouse
ROD	Record of Decision
ROW	right of way
SPWRAP	South Platte Water Related Activities Program
SWIFT	Statewide Impact Finding Tables
US 6	U.S. Highway 6
US 40	U.S. Highway 40
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service

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1. Introduction and Purpose of this Report

The Colorado Department of Transportation (CDOT) and the Federal Highway Administration (FHWA), in cooperation with local communities and other agencies, are conducting the Interstate 70 (I-70) Floyd Hill to Veterans Memorial Tunnels Environmental Assessment (EA) to advance a portion of the program of improvements for the I-70 Mountain Corridor identified in the 2011 Tier 1 *Final I-70 Mountain Corridor Programmatic Environmental Impact Statement* (PEIS) and approved in the 2011 *I-70 Mountain Corridor Record of Decision* (ROD). The EA is a Tier 2 National Environmental Policy Act (NEPA) process and is supported by resource-specific technical reports.

The purpose of this technical report is to document the existing conditions, impacts, and mitigation for federal and state-listed threatened and endangered species and species of special concern. This report also includes a description of applicable laws and regulations and a summary of the resource analysis and mitigation framework from the PEIS and ROD.

General wildlife species and the state and federal laws and regulations that protect these species (including the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act) are presented in the *I-70 Floyd Hill to Veterans Memorial Tunnels Terrestrial Wildlife and Aquatic Species Technical Report* (CDOT 2020a). Additional information on habitat conditions are included in the *I-70 Floyd Hill to Veterans Memorial Tunnels Aquatic Resources Technical Report* (CDOT, 2020b) and the *I-70 Floyd Hill to Veterans Memorial Tunnels Vegetation and Noxious Weeds Technical Report* (CDOT, 2020c).

2. Proposed Action and Alternatives

2.1. Description of Proposed Action and Alternatives

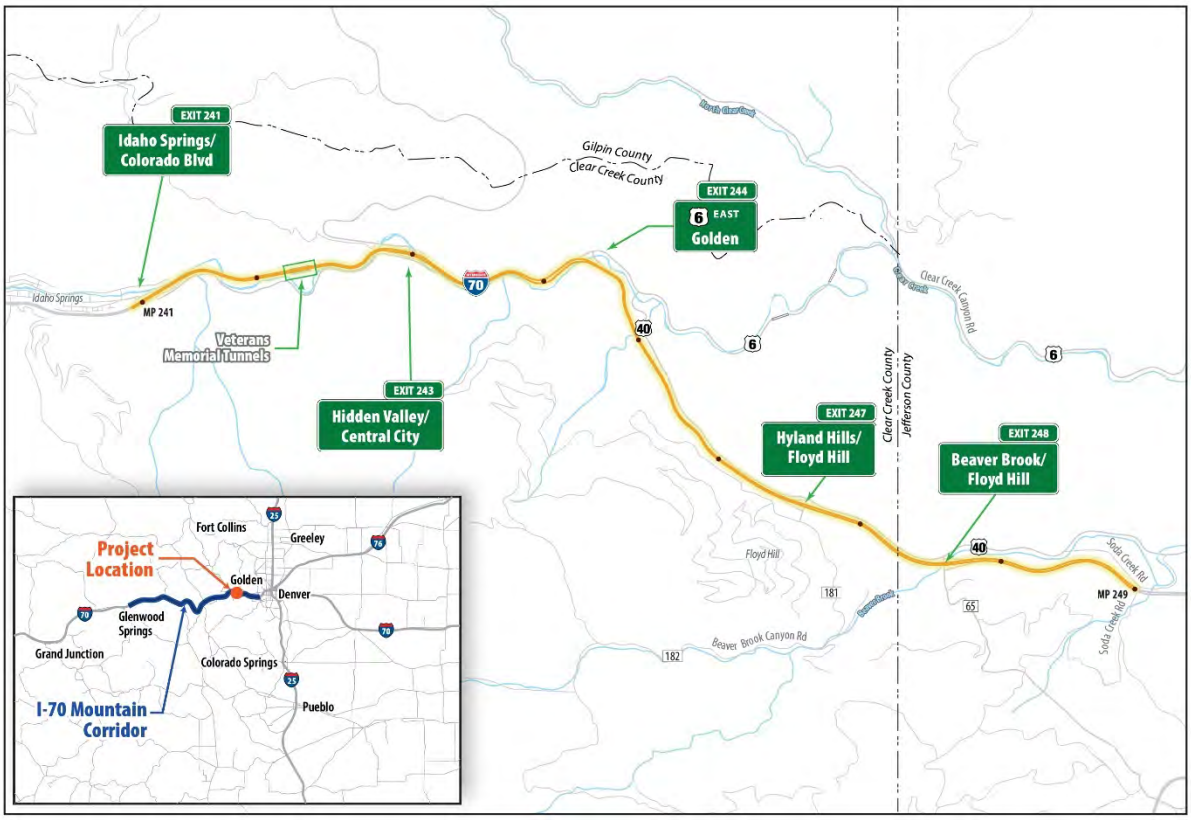
CDOT and FHWA propose improvements along approximately 8 miles of the I-70 Mountain Corridor from the top of Floyd Hill through the Veterans Memorial Tunnels to the eastern edge of Idaho Springs. The purpose of the Project is to improve travel time reliability, safety, and mobility, and address the deficient infrastructure through this area.

The major Project elements include:

- Adding a third westbound travel lane to the two-lane section of I-70 from the current three-lane to two-lane drop (approximately milepost (MP) 246) through the Veterans Memorial Tunnels
- Constructing a new frontage road between the U.S. Highway 6 (US 6) interchange and the Hidden Valley/Central City interchange
- Improving interchanges and intersections throughout the Project area
- Improving design speeds and stopping sight distance on horizontal curves
- Adding an eastbound auxiliary lane to I-70 on Floyd Hill between the US 6 interchange and the Hyland Hills/Floyd Hill interchange
- Improving the multimodal trail (Clear Creek Greenway) between US 6 and the Veterans Memorial Tunnels
- Reducing animal-vehicle conflicts and improving wildlife connectivity with new and/or improved wildlife overpasses or underpasses
- Providing two permanent air quality monitors at Floyd Hill and Idaho Springs to collect data on local air quality conditions and trends
- Coordinating rural broadband access with local communities, including providing access to conduits and fiber in the interstate right-of-way

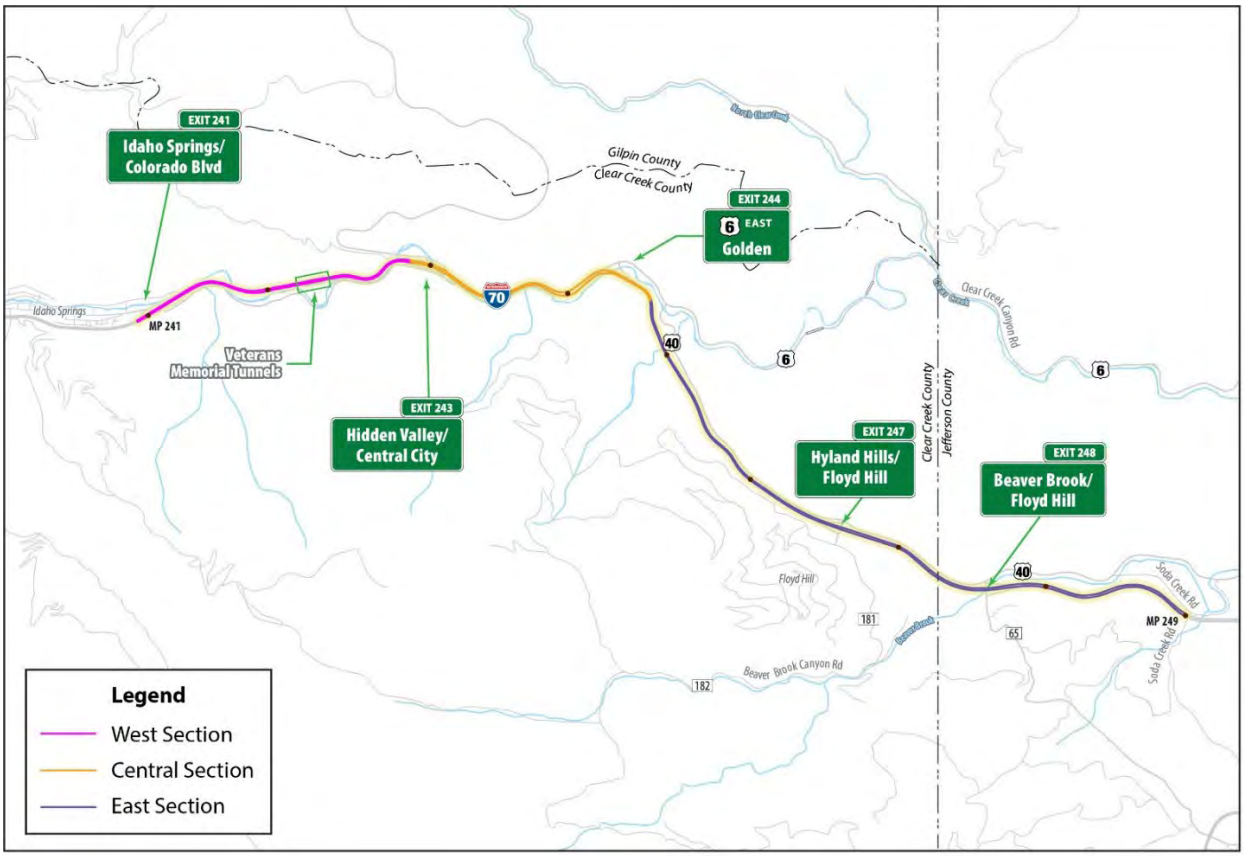
The Project is located on I-70 between MP 249 (east of the Beaver Brook/Floyd Hill interchange) and MP 241 (Idaho Springs/Colorado Boulevard), west of the Veterans Memorial Tunnels. It is located mostly in Clear Creek County, with the eastern end in Jefferson County (see Exhibit 1). The primary roadway construction activities would occur between County Road (CR) 65 (the Beaver Brook/Floyd Hill interchange) and the western portals of the Veterans Memorial Tunnels (MP 247.6 and MP 242.3, respectively), with the Project area extended east and west to account for signing, striping, and fencing.

Exhibit 1. Project Location



Three alternatives are being evaluated in the EA: (1) No Action Alternative, (2) Tunnel Alternative, and (3) Canyon Viaduct Alternative. The Project improvements are grouped into three geographic sections: (1) East Section (top of Floyd Hill to US 6 interchange), (2) Central Section (US 6 interchange to Hidden Valley/Central City interchange), and (3) West Section (Hidden Valley/Central City interchange through Veterans Memorial Tunnels) (see Exhibit 2).

Exhibit 2. East, Central, and West Project Sections



The action alternatives—the Tunnel Alternative and Canyon Viaduct Alternative—include the same improvements in the East Section and West Section to flatten curves, add a third westbound travel lane (the new lane would be an Express Lane), provide wildlife and water quality features, and improve interchange/intersection operations.

Through the Central Section between the US 6 interchange and the Hidden Valley/Central City interchange, the action alternatives vary in how they provide for the third westbound I-70 travel lane and frontage road connections, as follows:

- The **Tunnel Alternative** would realign westbound I-70 to the north (along the curve between MP 244.3 and MP 243.7) through a new 2,200-foot-long tunnel west of US 6. Eastbound I-70 would be realigned within the existing I-70 roadway template to flatten curves to improve design speed and sight distance. This alternative also would include two design options for the alignment of the new frontage road—north or south of Clear Creek. The Clear Creek Greenway trail would be reconstructed in its current location on the south side of Clear Creek.

- The **Canyon Viaduct Alternative** would realign approximately one-half mile of both the westbound and eastbound I-70 lanes (along the curve between MP 244 and MP 243.5) on viaduct structures approximately 400 feet south of the existing I-70 alignment on the south side of Clear Creek Canyon. Through the realigned area, the frontage road would be constructed under the viaduct on the existing I-70 roadway footprint north of Clear Creek. The Clear Creek Greenway would be reconstructed in its current location on the south side of Clear Creek. The viaduct would cross above Clear Creek and the Clear Creek Greenway twice.

Additional information regarding the alternatives evaluated in the EA can be found in *the I-70 Floyd Hill to Veterans Memorial Tunnels Alternatives Analysis Technical Report* (CDOT, 2020d).

2.2. No Action Alternative

The No Action Alternative includes ongoing highway maintenance. In addition, due to its poor condition, the westbound I-70 bridge at the bottom of Floyd Hill is programmed to be replaced regardless of whether CDOT moves forward with one of the action alternatives. Therefore, replacing the bridge in kind (as a two-lane bridge) is part of the No Action Alternative. Under the No Action Alternative, the bridge would be replaced in its current location but would need to be designed to current standards, with a 55 mile-per-hour (mph) design speed and improved sight distance with wider shoulders.

2.3. Action Alternatives: East Section

In the East Section between the top of Floyd Hill and the US 6 interchange, the Action Alternatives are the same. Through this section, westbound I-70 would be widened to the south to accommodate a third travel lane, which is planned as an Express Lane. The typical section would include an additional 12-foot travel lane and inside and outside shoulders of varying widths, depending on sight distance needs around curves. The proposed footprint would include a 4-foot buffer between the new Express Lane and the existing (general purpose) lanes.

In the eastbound direction, the three travel lanes would be retained but the roadway would be realigned where needed to accommodate westbound widening or curve modifications to improve sight distance and safety. An approximately one-mile-long eastbound auxiliary (climbing) lane would be added in the uphill direction from the bottom of Floyd Hill to the Hyland Hills/Floyd Hill interchange (Exit 247). Water quality features would be added along the south side of the eastbound lanes.

At the Beaver Brook/Floyd Hill and Hyland Hills/Floyd Hill interchange systems, the split-diamond interchange configuration (with on- and off-ramps connected by U.S. Highway 40 [US 40]) would remain, and no new accesses would be provided. However, roundabout intersections constructed on US 40 as part of a separate project address immediate issues with traffic flow and delays at the Floyd Hill neighborhood ingress and egress.

Wildlife fencing would be added along the north and south sides of I-70 between the Hyland Hills/Floyd Hill interchange on the west and Soda Creek Road on the east to reduce wildlife-vehicle collisions.

2.4. Action Alternatives: Central Section

The Central Section of the Project involves the most substantial improvements—including realigning curves, adding a third westbound travel lane, improving the Clear Creek Greenway, and providing the frontage road connection. These improvements occur within the most-constrained section of the Project area, where the existing I-70 footprint and planned roadway improvements are located between canyon rock walls north and south of existing I-70 and Clear Creek. Because of these constraints, the Action Alternatives within this section include the same improvements but differ with respect to the I-70 mainline and frontage road alignments and the relationship of the roadway improvements to the rock walls and the creek. The Clear Creek Greenway would be reconstructed generally along its existing alignment under both Action Alternatives, but the Clear Creek Greenway's location to the creek and roadway infrastructure would differ.

2.4.1. I-70 Mainline

The I-70 mainline through this section continues the same roadway typical section from the East Section. Both alternatives would provide an additional westbound 12-foot travel lane; inside and outside shoulders of varying widths, depending on sight distance needs around curves; and a 4-foot buffer between the new planned Express Lane and the existing (general purpose) lanes.

Under the Tunnel Alternative, approximately one mile of westbound I-70 would be realigned to the north near the US 6 interchange. A portion of the realignment would extend through a 2,200-foot-long tunnel that would tie in to the existing westbound I-70 alignment and elevation just east of the Hidden Valley/Central City interchange. The three eastbound I-70 lanes through this area would remain within the existing roadway prism but would be realigned, moving approximately 100 feet north into the rock face adjacent to the existing westbound lanes to flatten horizontal curves and improve the design speed and sight distance.

Under the Canyon Viaduct Alternative, the westbound I-70 alignment would shift to the south on a new 5,300-foot-long viaduct beginning at approximately MP 245 east of the exit ramp to US 6 and it would rejoin the existing alignment about one-half mile east of the Hidden Valley/Central City interchange at approximately MP 243.5. Through this area, eastbound I-70 also would be realigned on a separate viaduct structure next to westbound I-70 from MP 243.4 east to just beyond MP 244.3. Both viaduct structures would cross Clear Creek and the Clear Creek Greenway twice near MP 243.9 and MP 243.5 (approximately 60 feet above ground level).

2.4.2. Frontage Road

Both alternatives include a new approximately 1.5-mile-long frontage road connection between the Hidden Valley/Central City interchange and the US 6 interchange. The frontage road would run from the intersection of CR 314 and Central City Parkway (south of the I-70 eastbound off-ramp at the Hidden Valley/Central City interchange where CR 314, which acts as a frontage road from east Idaho Springs, terminates) to the US 6/I-70 ramp terminal. The roadway section for the frontage road would consist of two 11-foot lanes (one in the eastbound direction and one in the westbound direction) with consistent 2-foot shoulders. The design speed would be 30 mph and the roadway would be constructed to comply with Clear Creek County local access standards.

The Tunnel Alternative includes two design options for this frontage road:

- **North Frontage Road Option** would provide the new frontage road connection between the two interchanges mostly on the north side of Clear Creek. The I-70 mainline would be realigned north into the mountainside, requiring substantial rock cuts (150 feet high) to make room for the frontage road between the creek and existing I-70. The Clear Creek Greenway would be reconstructed along its current alignment south of Clear Creek. In the Sawmill Gulch area where the existing trail's grade does not meet Americans with Disabilities Act (ADA) standards, the Greenway trail would be lowered to meet grades.
- **South Frontage Road Option** would provide the new frontage road connection between the two interchanges mostly on the south side of Clear Creek. Moving the frontage road to the south side of the creek would require new rock cuts on the south side of Clear Creek Canyon and less substantial rock cuts on the north side of I-70. The Clear Creek Greenway would be reconstructed generally along its current alignment south of Clear Creek; in the Sawmill Gulch area, an approximately 1,500-foot new section of the Greenway trail would be constructed across the creek to the north (with two pedestrian bridge crossings of the creek) to be ADA compliant, and the existing trail would remain in place but not be resurfaced. The Clear Creek

Greenway would be located closer to the frontage road than under the North Frontage Road Option; although the design seeks to maximize horizontal and vertical separation between the facilities and includes a new section of trail to meet ADA compliance, the alignment of the frontage road nearer to the Greenway and between the Greenway and creek is not supported by Clear Creek County, Idaho Springs, community members, or the Project Technical Team because it diminishes the recreational experience.

Under the Canyon Viaduct Alternative, the existing I-70 pavement under the elevated structures would be repurposed for the frontage road; excess right of way would be available for other uses—presumably, creek and recreation access—through this approximately one-mile area of the canyon.

2.5. Action Alternatives: West Section

The West Section between the Hidden Valley/Central City interchange and the Veterans Memorial Tunnels continues the widening of the interstate to add the third westbound travel lane and to flatten the S-curve in this location. Improvements in this section are the same under both Action Alternatives. The curve modifications require realigning both the I-70 mainline and frontage road through this section. The I-70 mainline alignment would shift south approximately 100 feet around the first curve from the Hidden Valley/Central City interchange, then north around the second curve approximately 50 feet, continuing a slight (25 foot) shift north before tying in to the existing alignment at the Veterans Memorial Tunnels. Much of CR 314 would be realigned south between the Doghouse Rail Bridge over Clear Creek near the Veterans Memorial Tunnels east portal and the Hidden Valley/Central City interchange. A small section of CR 314 (between MP 242.6 and MP 242.7) would remain and connect to the reconstructed portions west and east.

These alignment shifts result in substantial rock cuts on both the north and south sides of the canyon. On the north side, rock cuts up to 160 feet high would be required next to the I-70 westbound lanes (along the curve in the area where CR 314 is not reconstructed). To realign CR 314 south, rock cuts from 70 feet to 100 feet high are required on the south side of the canyon. Additionally, a 1,200-foot section of Clear Creek, which is located between I-70 and CR 314, would need to be relocated south near MP 242.5.

The Hidden Valley/Central City interchange would not be reconstructed, and the I-70 bridges would remain because they are wide enough to accommodate the widened I-70 footprint without being replaced. All the on- and off-ramps for the interchange would be reconstructed, but the bridges over Clear Creek for the I-70 westbound off-ramp and I-70 eastbound on-ramp also can be retained. New bridges over Clear Creek to the west would be needed for the I-70 westbound on-ramp and I-70 eastbound off-ramp to accommodate the curve flattening and shift of I-70 to the south in this location. The CDOT maintenance facility would need to be relocated.

No changes are required west of the Veterans Memorial Tunnels. Within the westbound tunnel, the roadway would be restriped for the third lane (the expansion of the tunnel to accommodate the third lane was completed in 2014). After the tunnel, restriping and signing would continue west to the next interchange at Idaho Springs/Colorado Boulevard (Exit 241), where the third lane would terminate. The Express Lane would operate in conjunction with the westbound Mountain Express Lane (MEXL) during peak periods (winter and summer weekends).

2.6. Construction of Action Alternatives

CDOT is planning to use a Construction Manager/General Contractor (CMGC) delivery method for construction of the Project. This contracting method involves a contractor advising in the design phases to better define Project technical requirements and costs, improve design quality and constructability,

and reduce risks through the construction phase. This method promotes innovation and aligns well with the multidisciplinary Context Sensitive Solutions process. It was used successfully on the Twin Tunnels projects to reduce environmental impacts and accommodate community values in the design and construction project development phases.

Construction of the action alternatives is anticipated to be complex and take four to five years but could occur generally within the proposed right of way. CDOT would work with the CMGC to refine the construction details and develop a plan that promotes safety and minimizes disruption to the traveling public and nearby residents and businesses.

The Tunnel Alternative would take approximately one year longer to build than the Canyon Viaduct Alternative; most of the additional time would be needed for the tunnel rock blasting and construction that could take place without disrupting traffic. However, in addition to the tunnel rock blasting, the Tunnel Alternative has considerable rock cuts at the tunnel portals and along the north side of I-70 to realign curves, widen the highway, and add the frontage road connection. Rock cuts, staging for the excavation of the tunnel portals, and haul of waste rock are major construction activities that are likely to interrupt traffic on I-70 due to increased construction equipment traffic on the highway and the proximity of construction to live traffic, the need for temporary lane closures and detours, and closures for blasting. The North Frontage Road Option has significantly larger (taller and longer) rock cuts than the South Frontage Road Option.

The Canyon Viaduct Alternative has substantially less rock cuts and blasting compared to the Tunnel Alternative but would require more work in the existing highway right of way. Bridge construction over and pier placement within the highway template will need to be carefully coordinated. However, construction of some elements, such as the bench portion of the viaduct, are separated from the existing I-70 alignment and could be constructed offline similarly to the tunnel excavation.

Specific construction methods and phasing will be determined with contractor input and could affect the duration and/or physical requirements for construction activities. The focus of environmental impact analysis during the NEPA process is to identify resources and locations sensitive to construction impacts and incorporate reasonable mitigation measures, including the potential to avoid impacts by avoiding sensitive areas, to inform the contractor's plans. Final design and construction plans will consider changes in resource impacts, and reevaluations will be completed as needed during final design.

3. Applicable Laws, Regulations, and Guidance

This section of the document lists the applicable federal and state laws, regulations, and guidance pertaining to the protection of federal and state-listed wildlife species that also are specific to the I-70 Floyd Hill to Veterans Memorial Tunnels Project. Some regulations that were included in the Tier 1 PEIS are not included in this document because they are not applicable to the Project. More specifically, the Study Area does not occur within or adjacent to any federal lands; therefore, regulations pertaining to U.S. Forest Service (USFS) Sensitive Species and Bureau of Land Management (BLM) Sensitive Species are not included in the list below. For more information on USFS and BLM Sensitive Species that occur along the I-70 Mountain Corridor, please see the *I-70 Mountain Corridor PEIS Biological Resources Technical Report* (CDOT, 2011a).

3.1. Endangered Species Act of 1973

The purpose of the Endangered Species Act (ESA) is to protect and recover imperiled species and the ecosystems upon which they depend. It is administered by the U.S. Fish and Wildlife Service (USFWS), which has the primary responsibility for terrestrial and freshwater organisms. Under the ESA, species may be listed as endangered, threatened, proposed, or candidate. An endangered species is in danger of extinction throughout all or a significant portion of its range. A threatened species is likely to become endangered within the foreseeable future. Proposed species are protected species that are found to warrant listing under the ESA as either endangered or threatened and have been proposed as such in the Federal Register. Candidate species are those that are petitioned for listing as endangered or threatened under the ESA but are currently not federally protected. All species of plants and animals, except pest insects, are eligible for listing as endangered or threatened.

Section 7 of the ESA requires all federal agencies to participate in the conservation and recovery of listed species by ensuring all actions that are federally authorized, funded, or carried out are not likely to jeopardize the continued existence of listed species or modify their critical habitat. Consultation with the USFWS is required if a proposed project has the potential to affect federally listed species. Regulations governing interagency cooperation for threatened and endangered species are found in the Joint Counterpart ESA Section 7 Consultation Regulations (50 Code of Federal Regulations 402).

3.2. South Platte Water Related Activities Program

In addition to analysis of direct impacts on protected species within the I-70 Mountain Corridor, depletion of the South Platte River Basin constitutes an action that may indirectly affect special-status species that occur downstream from the I-70 Mountain Corridor and depend on the river for their existence. Clear Creek is located with the South Platte River Basin.

Depletions to the Platte River system due to CDOT activities are addressed by the state of Colorado's participation in the South Platte Water Related Activities Program (SPWRAP) through the *Memorandum of Agreement for Implementation and Operation of the Colorado Portion of the Platte River Recovery Implementation Plan* (SPWRAP, 2009). The state has made and continues to make financial and other contributions to the Platte River Recovery Implementation Program. In addition, the SPWRAP has created a "Class X-1" membership specifically for and limited to the state of Colorado for comparatively small diversions and depletions by state agencies. CDOT falls into this category because its typical depletive activities—for instance, wetland creation and water quality ponds, or water used for compaction, concrete, and dust control—generally do not require large amounts of water.

3.3. The Colorado Nongame, Endangered, or Threatened Species Conservation Act

The intent of the Colorado Nongame, Endangered, or Threatened Species Conservation Act (Colorado Revised Statutes 33-2-101-108) is to protect endangered, threatened, and rare species in Colorado. There are two categories of imperilment for these wildlife species in Colorado: an endangered species is one whose prospects for survival or recruitment within the state are in jeopardy and a threatened species is not in immediate jeopardy of extinction but is vulnerable because of small numbers, restricted ranges, or low recruitment or survival.

Species within Colorado also can be listed as Species of Concern even though it is not a statutory category. Species of Concern include species that have been removed from state listing within the last five years but are proposed for federal listing as candidates, or species that have experienced a downward trend in numbers or distribution in the state and warrant evaluation.

4. Threatened and Endangered Species in the Tier 1 PEIS

4.1. Context

During the Tier 1 PEIS analysis, CDOT sought input from federal and state agencies to develop a list of protected species within the I-70 Mountain Corridor. The Project team determined the likely presence of protected species by the presence of suitable habitat and known distribution records. The PEIS noted that many protected species were "unlikely to occur in the area," and, therefore, were not considered further in the PEIS. The PEIS noted that threatened, endangered, and sensitive species potentially occurring along the I-70 Mountain Corridor were subject to change and require ongoing consultation.

In addition to analysis of direct impacts on protected species within the I-70 Mountain Corridor, the PEIS identified that the potential depletion of the South Platte River Basin constitutes an action that may indirectly affect special-status species that occur downstream from the I-70 Mountain Corridor and depend on the river for their existence.

The lead agencies, FHWA and CDOT, examined habitat connectivity and animal-vehicle collisions through an interagency committee known as A Landscape Level Inventory of Valued Ecosystem Components (ALIVE) Issue Task Force (ITF). The ALIVE ITF identified 13 areas where I-70 interferes with and impedes wildlife migration or movement. These locations are referred to as linkage interference zones. Species affected include elk (*Cervus canadensis*), mule deer (*Odocoileus hemionus*), bighorn sheep (*Ovis canadensis*), and Canada lynx (*Lynx canadensis*). Of these, Canada lynx is a threatened species. By focusing on areas of known migration and wildlife use to create wildlife crossing opportunities, animal-vehicle collisions can be reduced, and habitat connectivity increased. The linkage interference zones are discussed further in the *I-70 Floyd Hill to Veterans Memorial Tunnels Terrestrial and Aquatic Wildlife Technical Report* (CDOT, 2020a).

4.1.1. Federally Listed Threatened, Endangered, Proposed and Candidate Species

During the Tier 1 PEIS analysis, the USFWS provided a list of 21 threatened, endangered, or candidate species known or suspected to occur along the I-70 Mountain Corridor (see Exhibit 3).

Exhibit 3. I-70 Mountain Corridor PEIS Tier 1 Threatened and Endangered Species List

Species		Status	Included or Excluded from PEIS Analysis
Common Name	Latin Name		
BIRDS			
Whooping Crane	*Grus americana*	Endangered	Included as part of downstream water depletions (Platte River species) only. No suitable habitat within the PEIS Study Area.
Least Tern	*Sterna antillarum*	Endangered	Included as part of downstream water depletions (Platte River species) only. No suitable habitat within the PEIS Study Area.
Piping Plover	*Charadrius melodus*	Threatened	Included as part of downstream water depletions (Platte River species) only. No suitable habitat within the PEIS Study Area.

Species		Status	Included or Excluded from PEIS Analysis
Common Name	**Latin Name**		
Mexican Spotted Owl	*Strix occidentalis lucida*	Threatened	Excluded; no suitable habitat within PEIS Study Area.
MAMMALS			
Black-footed ferret	*Mustela nigripes*	Endangered	Excluded; no suitable habitat within PEIS Study Area.
Preble's meadow jumping mouse	*Zapus hudsonius preblei*	Threatened	Included
Canada lynx	*Lynx canadensis*	Threatened	Included
Gunnison's Prairie dog	*Cynomys gunnisoni*	Candidate	Excluded; no suitable habitat within PEIS Study Area.
FISH			
Pallid sturgeon	*Scaphirhynchus albus*	Endangered	Included as part of downstream water depletions (Platte River species) only. No suitable habitat within the PEIS Study Area.
Razorback sucker	*Xyrauchen texanus*	Endangered	Included as part of Colorado River Endangered Species for water depletions only.
Bonytail chub	*Gila elegans*	Endangered	Included as part of Colorado River Endangered Species for water depletions only.
Colorado pikeminnow	*Ptychocheilus lucius*	Endangered	Included as part of Colorado River Endangered Species for water depletions only.
Humpback chub	*Gila cypha*	Endangered	Included as part of Colorado River Endangered Species for water depletions only.
Greenback cutthroat trout	*Oncorhynchus clarki stomias*	Threatened	Included
PLANTS			
Colorado butterfly plant	*Gaura neomexicana* ssp. *coloradensis*	Threatened	Excluded; no suitable habitat within PEIS Study Area.
Colorado hookless cactus	*Sclerocactus glaucus*	Threatened	Excluded; no suitable habitat within PEIS Study Area.
Ute ladies'-tresses orchid	*Spiranthes diluvialis*	Threatened	Included. Plants and potential habitat present. Downstream effects possible (Clear Creek and Platte River drainages).
Western prairie fringed orchid	*Platanthera praeclara*	Threatened	Included as part of downstream water depletions (Platte River species) only. No suitable habitat within the PEIS Study Area.
DeBeque phacelia	*Phacelia submutica*	Candidate	Excluded; no suitable habitat within PEIS Study Area.
Parachute penstemon	*Penstemon debilis*	Candidate	Excluded; no suitable habitat within PEIS Study Area.
INVERTEBRATES			
Uncompahgre fritillary butterfly	*Boloria acrocnema*	Endangered	Excluded; no suitable habitat within PEIS Study Area.

As summarized in Exhibit 3, the following eight of the 21 species were eliminated from further consideration in the PEIS due to lack of suitable habitat within the Mountain Corridor, including: Mexican Spotted Owl (*Strix occidentalis lucida*), black-footed ferret (*Mustela nigripes*), Gunnison's prairie dog (*Cynomys gunnisoni*), Colorado butterfly plant (*Gaura neomexicana* ssp. *coloradensis*), Colorado hookless cactus (*Sclerocactus glaucus*), DeBuque Phacilia (*Phacelia submutica*), Parachute penstemon (*Penstemon debilis*), and Uncompahgre fritillary butterfly (*Boloria acrocnema*).

Impacts to the remaining 13 species were evaluated in the PEIS and included in the PEIS Programmatic Biological Assessment (PBA)—a study prepared to determine the likely effects of a project on federally listed species—because the species had the potential to occur within the PEIS Study Area or be affected by I-70 Mountain Corridor alternatives project activities as part of downstream water depletions. The PBA was submitted to the USFWS for concurrence, and the USFWS responded with a Programmatic Biological Opinion (PBO) on March 24, 2011 (Appendix A). The PBO noted that Tier 2 projects affecting the five Platte River species and four Colorado River endangered fishes were covered under existing agreements.

- **Platte River Species.** The Least Tern (*Sterna antillarum*), Piping Plover (*Charadrius melodus*), western prairie fringed orchid (*Platanthera praeclara*), Whooping Crane (*Grus Americana*), and pallid sturgeon (*Scaphirhynchus albus*) have potential to be impacted by depletions to the Platte River System. CDOT participates in the SPWRAP; however, the PBO noted that because FHWA funded the PEIS, Section 7 consultation with USFWS as part of the PEIS was required. During the Tier 1 PEIS Section 7 consultation, it was not possible to determine the amount of water that would be used from the Platte River system. Therefore, the PBO requires Tier 2 projects to estimate project-specific water usage and follow streamlined consultations under the Platte River Recovery Implementation Program.

- **Colorado River Endangered Fishes.** The bonytail chub (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), and razorback sucker (*Xyrauchen texanus*) occur within the Colorado River. The USFWS determined that the Tier 2 projects under the PEIS fall under the umbrella of the Colorado River PBO issued on December 20, 1999, and can rely on the Recovery Implementation Program Recover Action Plan to offset depletions to the Colorado River (USFWS, 2011). A determination also was made that the I-70 Mountain Corridor project alternatives in the PEIS were not likely to jeopardize the continued existence of these Colorado River fishes nor likely to destroy or adversely modify designated critical habitat.

For the remaining four threatened and endangered species, the I-70 Mountain Corridor PBO concluded that the I-70 Mountain Corridor project alternatives were likely to adversely affect but, with conservation measures, not likely to jeopardize the continued existence of the Canada lynx, Preble's meadow jumping mouse (*Zapus hudsonius preblei),* greenback cutthroat trout (*Oncorhynchus clarki stomias*), and the Ute ladies'-tresses orchid (*Spiranthes diluvialis*). The PBO noted that project-specific Biological Assessments would be required for Tier 2 projects to assess specific project impacts that could not be determined with programmatic-level project information. Of these, only the Preble's meadow jumping mouse (PMJM) has the potential to occur in the Floyd Hill Project Area or be affected by the Project. Section 5 of this report describes the potential for habitat and occurrences of the Canada lynx, greenback cutthroat trout, and Ute ladies'-tresses orchid in the Project Area. Conservation measures for PMJM included in the PBO include the following:

- No staging will occur within 300 feet of the 100-year floodplain of streams with PMJM habitat.
- Removal of herbaceous plants, shrubs, and willow will be avoided in PMJM habitat.
- If vegetation removal in PMJM habitat areas is unavoidable, native plants and shrubs will be planted per the CDOT Landscape Architect, in consultation with the USFWS and the CDOT Region 1 Biologist, to 80 percent of the cover of the surrounding area.

- Ledges will be installed in the Beaver Brook culvert to facilitate PMJM movement under the highway.
- Ledges will be installed in all culverts greater than 48 inches in diameter within PMJM habitat as determined during Tier 2 processes.
- PMJM habitat taken will be replaced at a 2:1 ratio.

The North American wolverine (*Gulo gulo luscus*) was listed as a candidate species on December 14, 2010, after the PBA was submitted to the USFWS. As such, the PBO noted that future Tier 2 analyses would need to include the North American wolverine. As noted in Section 5 of this document, the Project Area does not contain suitable habitat for the North American wolverine. Additionally, it was determined that the Project PEIS alternatives were "not likely to affect" the Yellow-Billed Cuckoo (*Coccyzus americanus)*, a candidate species, and it would not need to be addressed in Tier 2 projects. The Yellow-Billed Cuckoo is not discussed further in this report.

All federally listed species considered as part of the I-70 Floyd Hill to Veterans Memorial Tunnels Project are discussed in more detail in Section 5 of this document.

4.1.2. U.S. Forest Service Sensitive Species and Management Indicator Species

USFS sensitive species are defined as those plant and animal species identified by a regional forester for which population viability is a concern, as evidenced by (1) significant current or predicted downward trends in population numbers or density, or (2) significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution (USFS, 1997).

Management Indicator Species (MIS) are animals or plants identified by the USFS because changes in these species' populations respond to the effects of USFS management activities. The MIS list is one of the many tools the USFS uses to provide for the diversity of plant and animal communities and gauge the effects of its management activities.

During the PEIS analysis, the Arapaho-Roosevelt National Forest and White River National Forest provided lists of USFS sensitive animal, plant, and aquatic species; MIS; and other species or habitats occurring on forest lands to be analyzed (CDOT, 2011a).

The Project Area for the I-70 Floyd Hill to Veterans Memorial Tunnels Project does not occur within or adjacent to USFS lands; therefore, these species are not discussed further in this document.

4.1.3. Bureau of Land Management Sensitive Species

BLM sensitive species occur on BLM lands and have been designated by the State BLM Director as those that could easily become endangered or extinct in the state. The I-70 Floyd Hill to Veterans Memorial Tunnels Project Area does not occur within or adjacent to BLM lands; therefore, these species are not discussed further in this document.

4.1.4. State Threatened, Endangered, and Species of Concern

Colorado Parks and Wildlife (CPW), called the Colorado Division of Wildlife during development of the PEIS, provided input on state-listed species and species habitat during the PEIS analysis (CDOT, 2011a). All but two of the identified state-listed species also are designated as federally listed species and are discussed above in Section 4.1.1, Section 4.1.2, and Section 4.1.3 of this document. The remaining two species, midget faded rattlesnake (*Crotalus oreganus concolor*) and common garter snake (*Thamnophis sirtalis*), were identified in the PEIS as State Species of Concern and have been analyzed in this document.

Existing conditions for these and other state-listed species included in the analysis for the I-70 Floyd Hill to Veterans Memorial Tunnels Project are discussed in Section 5 of this report.

4.1.5. Colorado Natural Heritage Program

The Colorado Natural Heritage Program (CNHP) tracks information on the status and location of rare special-status species and natural plant communities and shares this information with a wide range of stakeholders and partners for the purpose of ensuring biodiversity resources are not diminished. The CNHP tracks rare species and natural plant communities that have been identified as special status by the state or federal government. These species and plant communities are noted in the I-70 Mountain Corridor PEIS for continued awareness during Tier 2 processes (CDOT, 2011a).

4.2. Analysis in Tier 2 Processes

Lead agencies are responsible for conducting a project-specific analysis of direct and indirect impacts to special-status species. A project-specific Biological Assessment for federally protected species needs to be prepared and submitted to the USFWS when impacts from Tier 2 projects have the potential to result in a "may affect, likely to adversely affect" determination.

Lead agencies also committed to conduct further analysis of direct and indirect impacts on protected species during future project-specific Tier 2 processes. The following actions listed in the I-70 Mountain Corridor PEIS are applicable to this Project:

- Lead agencies will perform surveys for protected species and their habitat. The USFWS, USFS, and CPW will provide relevant and updated species lists. This information will be incorporated into the project's design to avoid or minimize effects on such species.
- Using the Tier 1 process as a foundation, lead agencies will complete a project-specific BA to analyze impacts to protected species.
- Lead agencies will determine the effects on federally listed species that occur downstream from the I-70 Mountain Corridor in coordination with the USFWS.
- Lead agencies will adhere to any new or revised laws or regulations pertaining to protected species, including following CDOT's Statewide Impact Finding Tables (SWIFT) process, where applicable.
- Lead agencies will develop specific and more detailed mitigation strategies and measures.

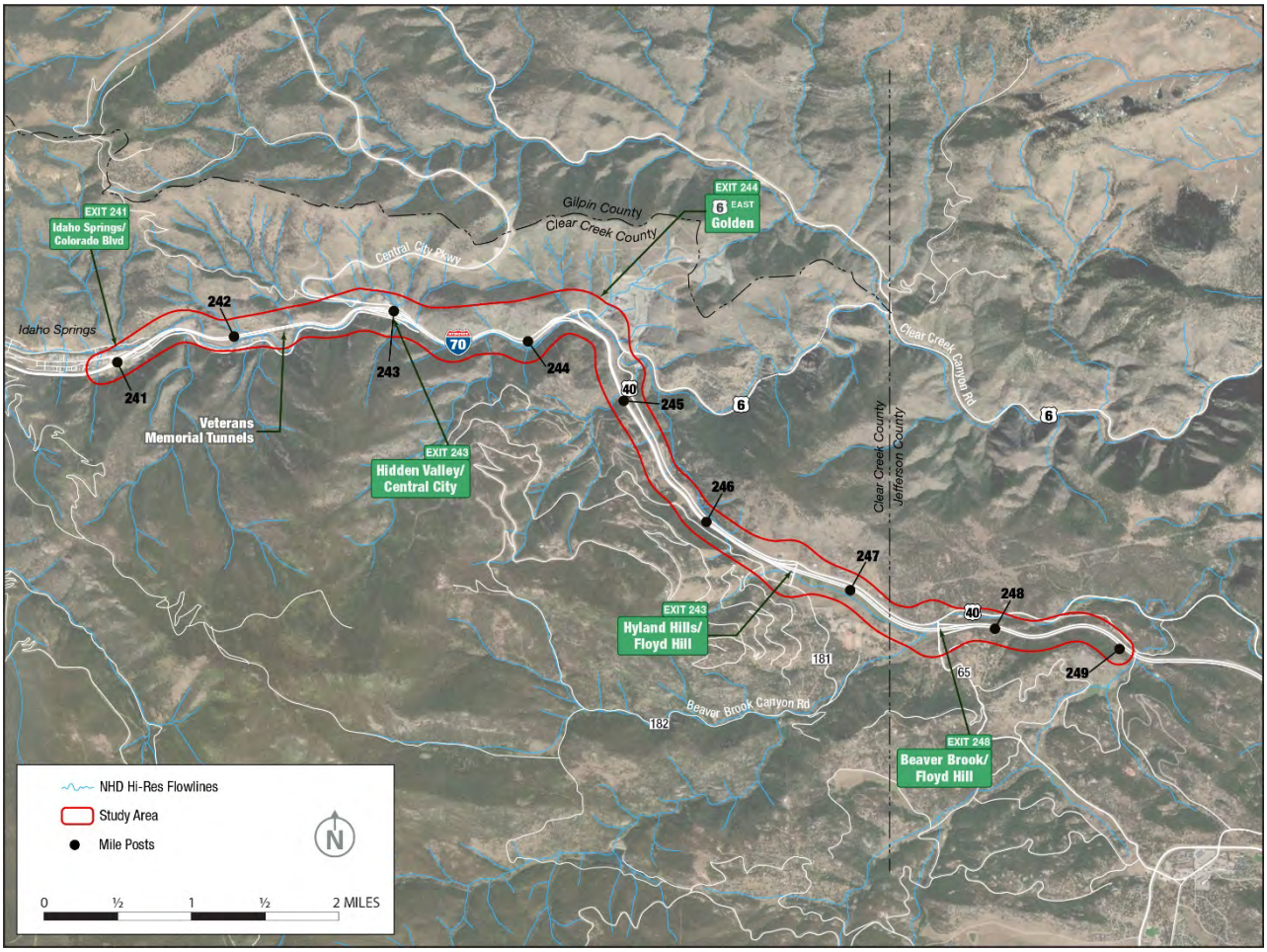
Since completing the PEIS, CDOT developed the SWIFT process for clearances under Section 7 of the ESA. The process follows the PBA/PBO for the CDOT Biological Evaluation Process (CDOT 2014a, USFWS 2015) for CDOT projects (including those in the I-70 Mountain Corridor) involving consultations for federally listed species with a determination of "no effect" or "may affect, not likely to adversely affect."

5. Affected Environment

5.1. Study Area

The Study Area for potential direct effects for special-status species consists of approximately 1,340 acres and was delineated by adding a 500-foot buffer around the I-70 Floyd Hill highway segment, identified in Section 2.1 of this document, and a 1,000-foot buffer around the interchange areas (see Exhibit 4) on either side of the existing I-70 Corridor between MP 249 and MP 241.

Exhibit 4. Floyd Hill Threatened and Endangered Species Study Area



The Study Area is located within the Southern Rockies Ecoregion (Level III Ecoregions), which is within the Crystalline Mid-Elevation Forests Ecoregion (21c of Level IV Ecoregions) (U.S. Environmental Protection Agency [EPA], 2013). It varies in elevation from approximately 7,100 feet to 7,900 feet and encompasses both Foothills and Montane Zone vegetation, which is characterized by mixed conifer forests, ponderosa pine (*Pinus ponderosa*) woodlands, deciduous scrublands with mountain mahogany (*Cercocarpus montanus*), Douglas-fir (*Pseudotsuga menziesii*) forests, and barren rock outcrops (CNHP, 2011).

Within the Study Area, several drainages intersect or parallel I-70 that contain narrow bands of riparian habitat along steep, riprapped stream banks. Vegetation identified in these drainages varies and includes narrowleaf cottonwood (*Populus angustifolia*), thinleaf alder (*Alnus incana*), river birch (*Betula fontinalis*), numerous willow species (*Salix* spp.), and Engelmann spruce (*Picea engelmannii)*.

Approximately 42 percent of the Study Area is developed (CDOT, 2020c). I-70 and other transportation facilities make up most of these developed areas. There also are commercial and residential developments and sparsely developed single-family residences at the eastern end of the Project and a large rock quarry on the north side of I-70 at the bottom of Floyd Hill (approximately MP 244.6). Between the US 6 interchange and the Veterans Memorial Tunnels, developed areas include a small number of commercial businesses, residences, a CDOT maintenance yard, and the Black Hawk City Water Plant. To the west of the Veterans Memorial Tunnels, developed areas are located south of I-70.

For more information on vegetation and land cover found in the Study Area, refer to the *I-70 Floyd Hill to Veterans Memorial Tunnels Vegetation and Noxious Weeds Technical Report* (CDOT, 2020c). For more information on riparian and wetland vegetation, refer to the *I-70 Floyd Hill to Veterans Memorial Tunnels Aquatic Resources Technical Report* (CDOT, 2020b).

5.2. Federally Listed Threatened and Endangered Species

To obtain information on federally listed species, an updated report from the USFWS's Information for Planning and Consultation (IPaC) system was generated on January 6, 2020, to identify federally listed threatened, endangered, and candidate species with potential to occur within the Study Area (see Appendix B). Three mammals, four birds, two fish, and two plants are included on the list (USFWS, 2020a). Exhibit 5 presents the list and status of these species, along with an assessment of whether they have potential to be affected by the Project and subject to impact analysis.

One species, the Mexican Spotted Owl, was excluded from analysis because the PEIS concluded suitable habitat for this species was lacking within the I-70 Mountain Corridor. Habitat conditions and species occurrences have not changed since the PEIS was completed; therefore, this species is not discussed further in this document.

Three species—Ute ladies'-tresses orchid, Canada lynx, and North American wolverine—also were excluded from further analysis because, although the I-70 Mountain Corridor contains habitat for these species, the Floyd Hill Study Area lacks suitable habitat for Ute ladies'-tresses orchid and North American wolverine, and Canada lynx habitat within the Study Area is considered marginal (see Exhibit 5).

CPW has identified potential suitable lynx habitat south of the study area; however, because the study area is located below 8,000 feet in elevation, lynx would not be expected to use the study area except rarely as a movement corridor. Lynx crossings on I-70 east of Empire Junction have not been documented (Ivan, 2012). An analysis of wildlife vehicle collision data collected by CDOT does not identify any lynx collisions in the I-70 corridor near Idaho Springs. The closest designated Linkage Interference Zone (LIZ) that identified lynx as the target species is LIZ N (Empire Junction from milepost [MP] 231.6-232.9) (Kintsch et al., 2011).

Exhibit 5. Federally Listed Threatened, Endangered, and Candidate Species with Potential to Occur within the Study Area or be Affected by Project Activities

Species	Status	Determination from the I-70 Mountain Corridor PBO	Species Analyzed Further?	Reason for Excluding from the Floyd Hill Project Analyses
MAMMALS				
Canada lynx *(Lynx canadensis)*	Threatened	Not likely to jeopardize the continued existence of the species.	No	Lynx prefer dense subalpine forests characterized by persistent snow and dense horizontal cover in areas with abundant snowshoe hare populations (CPW, 2019). In Colorado, these habitat areas occur at an elevation range of 10,000 feet to 12,000 feet (Ruediger et al., 2000). They also prefer areas that are relatively isolated from and unaffected by human developments and activities (Ruediger et al., 2000). The Study Area occurs at an elevation range of 7,100 feet to 8,000 feet and includes a high level of human disturbance and activity (i.e., the interstate, which has high traffic volumes, residential and commercial developments, and human recreational activities). Therefore, potential habitat within the Study Area is considered marginal. Rarely, individual animals may cross through the area during the summer months in search of more suitable high-elevation habitat (Ivan, 2012); however, the Project Area is far from any suitable denning and foraging habitat, so the Project is not expected to impact the species.
North American wolverine (*Gulo gulo luscus)*	Proposed	Not applicable. Species listed after the PEIS BA was submitted to the USFWS. Species needs to be included in all Tier 2 analyses.	No	No suitable habitat within the Study Area. The species is restricted to high elevations with arctic and subarctic conditions (NatureServe, 2018). In addition, CDOT has prepared a streamlined consultation process with the USFWS as part of SWIFT. The tables cover 93 common CDOT actions and it evaluates the effects on listed threatened and endangered species. Using this process, a no effect determination was identified for the wolverine; therefore, no further consultation is required for this species.
Preble's meadow jumping mouse *(Zapus hudsonius preblei)*	Threatened	Not likely to jeopardize the continued existence of the species.	Yes	Not excluded, discussed in Section 5.2.1.

Species	Status	Determination from the I-70 Mountain Corridor PBO	Species Analyzed Further?	Reason for Excluding from the Floyd Hill Project Analyses
BIRDS				
Mexican Spotted Owl *(Strix occidentalis lucida)*	Threatened	Excluded from analysis—lack of suitable habitat within the I-70 Mountain Corridor.	No	No suitable habitat within the Study Area. Species excluded from the PBO due to lack of habitat within the I-70 Mountain Corridor.
Whooping Crane *(Grus Americana)*	Endangered	South Platte River species found downstream of the I-70 Mountain Corridor. Potentially affected by water depletions to the Platte River basin.	Yes	Not excluded, discussed in Section 5.2.2.
Interior Least Tern *(Sterna antillarum)*	Endangered	South Platte River species found downstream of the I-70 Mountain Corridor. Potentially affected by water depletions to the Platte River basin.	Yes	Not excluded, discussed in Section 5.2.2.
Piping Plover *(Charadrius melodus)*	Threatened	South Platte River species found downstream of the I-70 Mountain Corridor. Potentially affected by water depletions to the Platte River basin.	Yes	Not excluded, discussed in Section 5.2.2.
FISH				
Pallid sturgeon *(Scaphirhynchus albus)*	Endangered	South Platte River species found downstream of the I-70 Mountain Corridor. Potentially affected by water depletions to the Platte River basin.	Yes	Not excluded, discussed in Section 5.2.2.
Greenback cutthroat trout (*Oncorhynchus clarki stomias)*	Threatened	Not likely to jeopardize the continued existence of the species. However, information regarding the known distribution needs to be re-analyzed during all Tier 2 projects.	No	No known occurrences of the species in the Study Area (CPW 2017a, and Personal communication with Paul Winkle, Aquatic Biologist with CPW, Denver, November 2017).

Species	Status	Determination from the I-70 Mountain Corridor PBO	Species Analyzed Further?	Reason for Excluding from the Floyd Hill Project Analyses
PLANTS				
Ute ladies'-tresses orchid (*Spiranthes diluvialis*)	Threatened	Not likely to jeopardize the continued existence of the species. However, surveys of appropriate habitat are required during Tier 2 analysis. If any plants are detected, re-analysis of effects may become necessary.	No	The Study Area is outside the known elevation range of the species. Occupied habitat consists of seasonally moist soils and wet meadows of drainages below 7,000 feet (USFWS, 2018a). The Study Area occurs at an elevation range of 7,100 feet to 8,000 feet. There also are no known occurrences in Clear Creek County (CNHP, 2014). Additionally, the Project would not involve the construction of a major in-stream reservoir and it is not a hydropower diversion/return project that would divert water or sediment from the mainstem of the Creek. Construction activities that may require water usage would be minor in nature and include mixing concrete, compaction of road base, and dust suppression. Water used for these activities would come from a municipal water source.
Western prairie fringed orchid (*Platanthera praeclara*)	Threatened	South Platte River species found downstream of the I-70 Mountain Corridor. Potentially affected by water depletions to the Platte River basin.	Yes	Not excluded, discussed in Section 5.2.2.

5.2.1. Preble's Meadow Jumping Mouse

The PMJM is a small mammal approximately 9 inches in length with large hind feet adapted for jumping. It has a long bi-colored tail, which accounts for 60 percent of its length, and a distinct dark stripe down the middle of its back that is bordered on either side by gray to orange-brown fur. The species enters hibernation in September or October and doesn't emerge until May. Its diet changes seasonally and consists of insects, seeds, fungus, fruit, and more (USFWS, 2020b).

The habitat range for this largely nocturnal mouse occurs along the foothills of southeastern Wyoming south to Colorado Springs along the eastern edge of the Front Range of Colorado. Beaver Brook and Clear Creek within the Study Area are part of the PMJM Overall Range (CPW, 2017b; see Exhibit 6).

Suitable habitat is comprised of well-developed riparian vegetation with adjacent, relatively undisturbed grassland communities and a nearby water source. The riparian habitat typically includes a dense combination of grasses, forbs, and shrubs. The species is known to regularly range outward into adjacent uplands to feed and hibernate (USFWS, 2020b). No critical habitat for this species is located within or adjacent to the Study Area. The closest critical habitat is located 8 miles to the northeast along Ralston Creek, upstream and west of Ralston Reservoir, and west of State Highway 93.

Previous trapping efforts documented one PMJM occurrence within the Study Area along Beaver Brook in June 2004 (David Evans and Associates, 2004). However, the trapping effort did not include genetic testing to confirm that the jumping mouse was a PMJM. The Study Area is located at the lower elevational boundary of the western jumping mouse (*Zapus princeps*) and common meadow jumping mouse (*Zapus hudsonius*) and the high elevation boundary for the PMJM. Therefore, the mouse trapped in 2004 could have been a western or common meadow jumping mouse and not a PMJM. Two additional PMJM trappings were recorded along Clear Creek approximately 5 miles downstream of the Study Area, along the US 6 corridor in Jefferson County (see Exhibit 6) (USFWS, 2018b).

A field visit to survey PMJM habitat along Beaver Brook within the Study Area was conducted in June 2018. Suitable habitat was documented along Beaver Brook on the north and south side of I-70 in areas having a mid- and over-story of willows and trees and an understory of herbaceous plants (see Exhibit 7). Habitat along Clear Creek was delineated from aerial photos and windshield surveys in 2018 and documented as marginal because the riparian zone and floodplain of Clear Creek is highly restricted by I-70 and frontage and collector roads adjacent to I-70 (see Exhibit 7). Clear Creek also is heavily riprapped with steep slopes and lacks riparian habitat along most of Clear Creek within the Study Area. This was confirmed during a site visit with CPW in May 2020. Please see Appendix C for photos taken in the Beaver Brook Area.

An additional PMJM trapping survey occurred on Beaver Brook and an unnamed tributary to Beaver Brook in July 2020 (Appendix D). Tissue samples were collected from each individual jumping mouse (*Zapus* spp.) captured during the survey and sent to the Molecular Ecology Lab in Fort Collins, Colorado for genetics analyses. The DNA analysis of the tissue samples was conducted in May 2021 (after a long closure due to work restrictions surrounding the COVID-19 pandemic) and confirmed that all captured individuals analyzed were western jumping mouse (*Zapus princeps*). No Preble's meadow jumping mice (*Zapus hudsonius preblei*) were captured during the survey.

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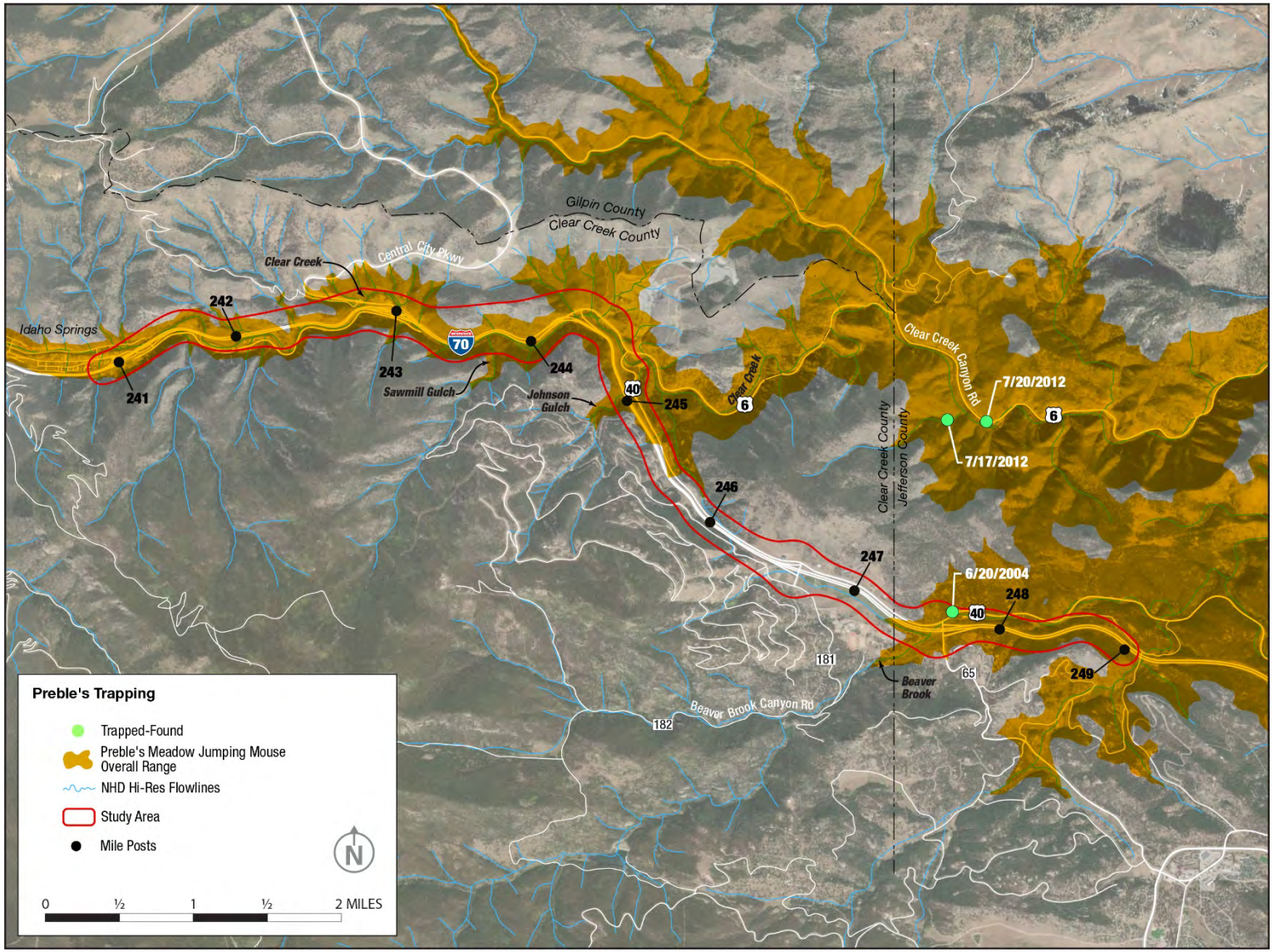
5.2.2. South Platte River Species

The following five species occur in the South Platte River, downstream from the Study Area, and have potential to be affected by water depletion to the South Platte River Basin: Least Tern, pallid sturgeon, Piping Plover, western prairie fringed orchid, and Whooping Crane. As discussed in Section 4 of this document, to address the effects of South Platte River basin depletions on these species, CDOT, as a state agency, is participating in the SPWRAP. However, CDOT is cooperating with FHWA on this Project, which provides a federal nexus for the Project and the need for formal consultation with the USFWS for any water used from the South Platte River basin.

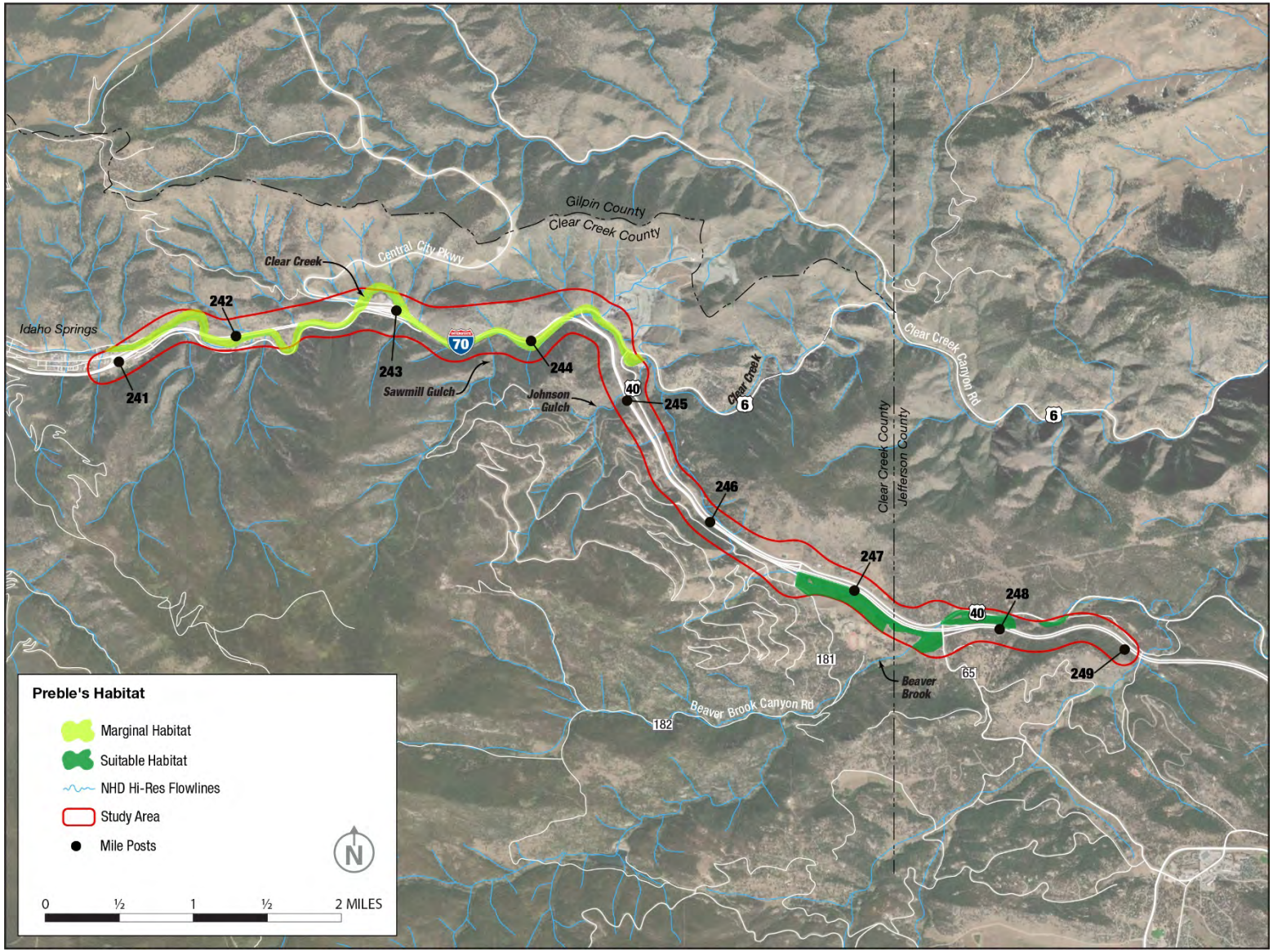
FHWA prepared a PBA, dated February 2, 2012, that estimates total water usage until 2019. On April 4, 2012, the USFWS signed a PBO that concurred with this approach and requires a yearly reporting of water usage beginning the year that Project construction commences (CDOT, 2011b). This agreement expired on December 30, 2019. The PBA has since been extended through 2032. The extension, which has the same reporting requirements, was signed by the USFWS on March 29, 2019. The water used for this Project will be reported to the USFWS at the year's end after the completion of the Project. Effects to species not addressed in the PBA or affected by causes other than water depletions to the South Platte River basin are analyzed separately.

Exhibit 6. Potential Preble's Habitat in the Study Area



Source: CPW, 2017b and USFWS 2018b

Exhibit 7. Suitable Preble's Habitat in the Study Area



Source: CPW, 2017b, Google Earth aerial imagery, and data collected during a site visit in June 2018.

5.3. State Threatened, Endangered, and Species of Concern

Information on state-listed species with potential to occur within the Study Area was obtained from review of species listed in the PEIS *Biological Resources Technical Report* (CDOT, 2010 and CDOT, 2011a) and the PEIS PBO (USFWS, 2011), and a desktop review of readily available information from the CPW Species Profile website (CPW, 2017a). Three state-listed species were identified as having potential to occur within the Study Area (see Exhibit 8).

Exhibit 8. State-Listed Species with Potential to be Present in the Study Area

Species Name	Status	Habitat Characteristics/ Information	Habitat within Study Area?	Reason for Exclusion
MAMMALS				
Townsend's big-eared bat (*Corynorhinus townsendii pallescens*)	Species of Concern	Mines, caves, and large rock cavities below approximately 9,500 feet.	Yes	Not excluded, discussed in Section 5.3.1.
BIRDS				
Peregrine Falcon (*Falco peregrines anatum*)	Species of Concern	Cliffs with tall rock faces (over 425 feet in height) that dominate surrounding topographic features and offer an extensive panoramic view of the area (Craig and Enderson, 2004).	No	There are no tall rock faces over 425 feet tall that dominate surrounding topographic features within or adjacent to the Study Area. The Project Area is not considered potential Peregrine Falcon nesting habitat (CPW, 2017b).
Bald Eagle (*Haliaeetus leucocephalus*)	Species of Concern	Roosts above rivers, lakes, and reservoirs.	Yes	Not excluded. Species analyzed in the *I-70 Floyd Hill to Veterans Memorial Tunnels Terrestrial and Aquatic Wildlife Technical Report* (CDOT, 2020a).
REPTILES & AMPHIBIANS				
Boreal toad (*Bufo boreas boreas*)	Endangered	Mountain lakes, ponds, meadows, and wetlands in subalpine forests between 7,500 feet and 12,000 feet in elevation.	No	The Study Area is outside the known distribution area of the species in Colorado (CPW, 2017a).
Northern leopard frog (*Lithobates pipiens*)	Species of Concern	Wet meadows and banks of marshes, ponds, lakes, reservoirs, streams, and irrigation ditches.	Yes	Not excluded, discussed in Section 5.3.2.
Midget faded rattlesnake (*Crotalus oreganus concolor*)	Species of Concern	In Colorado, the species occurs in Mesa, Delta, and Garfield Counties (CPW, 2017a).	No	The Study Area is outside the known distribution area of the species.

Species Name	Status	Habitat Characteristics/ Information	Habitat within Study Area?	Reason for Exclusion
Common garter snake (*Thamnophis sirtalis*)	Species of Concern	In Colorado, the species occurs along the South Platte River and its tributaries at elevations below 6,000 feet and along the North Fork Republican River drainage in Yuma County at about 3,500 feet to 3,600 feet (CPW, 2017a).	No	Study Area outside the known elevation range for the species.
MOLLUSKS				
Cylindrical papershell (*Anodontoides ferussacianus*)	Species of Concern	Mud or sandy substrate of lakes and quiet streams.	No	Species restricted to two locations in Boulder County (USFWS, 2018a).

Source: CPW 2017a; CPW 2017b

5.3.1. Townsend's Big-Eared Bat

Townsend's big-eared bat (*Corynorhinus townsendii pallescens*) is considered a cave obligate, requiring caves and abandoned mines for roosting (Gruver and Keinath, 2006). The species is known to select roosts occurring in a variety of vegetative habitats, generally in dry upland sites, but also may occur in mesic coniferous and deciduous forests. In Colorado, it is reported to occur in low and high elevations with vegetation ranging from sagebrush to lodgepole pine and sub-alpine spruce-fir communities (Gruver and Keinath, 2006).

Moths, the preferred prey of Townsend's big-eared bats, reproduce on shrubs, trees, and flowering plants, but not on grasses (Ellison et. al, 2004). Thus, suitable foraging habitat for Townsend's big-eared bat likely consists of a heterogeneous mosaic of forested and edge habitats, including riparian zones, which also are used for commuting and drinking (Fellers and Pierson, 2002). Areas with substantial beaver activity enhance the quality of foraging habitat by increasing ecosystem productivity (Naiman et al., 1986); providing gaps in the forest canopy; providing small, quiet ponds for drinking; and causing an increase in insect activity (Gruver and Keinath, 2006).

The primary threats to Townsend's big-eared bats are loss, modification, and disturbance of roosting and foraging habitat, as well as exposure to environmental toxins. Disturbance to roosting habitat includes uninformed closure of abandoned mines, which eliminates potential roosting habitat and leads to mortality of bats trapped inside. Additionally, human recreation in and around mines and caves can disrupt reproductive and hibernal periods (Gruver and Keinath, 2006). Disturbance to foraging habitat includes elimination of forest canopy, elimination or alteration of wetland habitat, and conversion of native shrubs and grasslands to urban or agricultural uses.

No caves or abandoned mines exist within the Study Area; however, potential foraging habitat for the Townsend's big-eared bat does exist.

5.3.2. Northern Leopard Frog

Northern leopard frogs (*Lithobates pipiens*) mostly occur in the western United States in cool climates. They are known throughout Colorado and could potentially occur within the Study Area along Clear Creek and Beaver Brook.

Northern leopard frogs require a mosaic of habitats to meet the requirements of all life stages. They breed in a variety of aquatic habitats that include slow-moving or still water along streams and rivers, wetlands, permanent or temporary pools, beaver ponds, and human-constructed habitats such as earthen stock tanks and borrow pits (USFWS, 2020c). Subadult northern leopard frogs typically migrate to feeding sites along the borders of larger, more permanent bodies of water. Recently metamorphosed frogs will move up and down drainages and across land to locate new breeding areas (USFWS, 2020c).

Mortalities during dispersal are attributed to roadways, road construction, cattle grazing, and other wildlife trampling that typically occurs in wetland areas (Smith and Keinath, 2007). The northern leopard frog has been declining or becoming severely reduced at lower elevations in many sites in Colorado and it also has declined in the Great Plains (Smith and Keinath, 2007).

Many factors play a role in the decline of the northern leopard frog, including disease, habitat degradation and fragmentation, predation, and water quality. In addition to the chytrid fungus, the leopard frog is susceptible to ranavirus, which is a lethal virus peculiar to ranid frogs. Habitat degradation and fragmentation occurs from livestock grazing, road construction, water development projects, and other land management activities; grazing is the most adverse impact to this species. In addition, chemical contamination, acidification of water, increased penetration of ultraviolet light, and climate changes contribute to the decline in northern leopard frogs (Smith and Keinath, 2007).

6. Impacts

This section describes potential direct and indirect impacts of the proposed action alternatives and the No Action Alternative on federally threatened and endangered species, state-listed species of concern, and their habitats. Direct impacts occur at the same time and place as the proposed action and are caused by Project elements and construction activities. They occur when wildlife species are physically impacted during construction or wildlife habitats are degraded or destroyed. Indirect effects also result from the Proposed Action, but they occur later in time and often in different locations. Examples of indirect impacts to wildlife include increased shading to a river or stream, changes to plant species composition, increased barriers to wildlife movement, and changes in habitat connectivity.

6.1. Methodology

Permanent and temporary direct impacts were identified by overlaying GIS layers of the action alternatives with wildlife habitat data. Locations within the construction limits where suitable habitat would be replaced with transportation facilities were identified as having permanent impacts. Locations where suitable habitat would be damaged or removed during construction but restored afterward were identified as having temporary direct impacts.

In addition, areas of the existing edge of pavement that would not be incorporated into the proposed edge of pavement would be reclaimed and reseeded with native species.

6.2. No Action Alternative Impacts

As described in Section 2.2 of this document, the No Action Alternative would include ongoing highway maintenance and replacement of the westbound I-70 bridge at the bottom of Floyd Hill. The new bridge would be constructed in the same location and it would be wider than the existing bridge. The US 6 interchange area is classified as a high-intensity developed area that is dominated by impervious surfaces, including I-70, US 6, and the Clear Creek Greenway Trail (CDOT, 2020c). Several other areas at the interchange are heavily disturbed and lack vegetation, including parking areas, creek pullouts, dirt piles, and the riprapped banks of Clear Creek. Vegetation in the area is sparse and consists of herbaceous plants along the roadside and bridge abutments and a few small trees and shrubs (CDOT, 2020c). As a result, habitat for all four special-status species is considered marginal at the US 6 interchange.

More specifically, Clear Creek in this location is heavily channelized with steep riprapped banks and fast-moving water. Riparian habitat needed to support PMJM and northern leopard frog does not exist at this location (CDOT, 2020b and CDOT, 2020c). Mitigation measures also would be incorporated into Project design that would avoid impacts to Clear Creek. Additionally, no known occurrences of PMJM or northern leopard frog occur at this location (CPW, 2017b and USFWS, 2018b). Therefore, impacts to PMJM and northern leopard frog are unlikely to occur from implementation of the No Action Alternative.

Townsend's big-eared bats are cave obligates that rarely roost under bridges (Sherwin et. al, 2000). The species forages among foliage of trees and shrubs and along forest edges (Fellers and Pierson 2002), which also are conditions that do not exist at the US 6 interchange area (see Photo 1, below). Additionally, no known occurrences of the species are from the US 6 interchange area (CPW, 2017b). Construction noise and nighttime lighting could impact individual bats that occasionally travel through the area; however, individual bats would be able to fly around the construction area and avoid potential impacts. Therefore, no impacts to Townsend's big-eared bats would occur from implementation of the No Action Alternative.

Photo 1. I-70 Westbound Bridge—Bottom of Floyd Hill

6.3. Tunnel Alternative Impacts

6.3.1. East Section

This section describes potential direct, indirect, and construction-related impacts to special-status species in the East Section of the Project.

6.3.1.1. Direct Impacts

Preble's Meadow Jumping Mouse

Suitable habitat for PMJM occurs along the Beaver Brook drainage and an unnamed tributary to Beaver Brook (Exhibit 7). Within the Study Area, these two drainages extend from approximately MP 248 (Beaver Brook/Floyd Hill interchange) to MP 246.6 (Hyland Hills/Floyd Hill interchange). The only Project improvement that would occur in this area would be the placement of wildlife fencing on the south side of I-70. The wildlife fence would be placed between the riparian habitat and I-70. Temporary impacts to vegetation on the edge of the riparian habitat could occur during installation of the fence and fence posts, but they would be minor in nature. Additionally, the fence would not act as a barrier because PMJM would travel within the riparian corridor, parallel with the fence, and not across it.

Potential impacts to PMJM will be documented in a project-specific Biological Assessment, which will be submitted to the USFWS under separate cover, per ESA Section 7 requirements.

Northern Leopard Frog

Potentially suitable habitat for the northern leopard frog is the same as for the PMJM (Exhibit 7). Therefore, Project-related impacts to this species would be the same as those discussed above for PMJM.

Townsend's Big-Eared Bat

There are no caves or mines within the East Section of the Project Area; therefore, it is highly unlikely that Townsends' big-eared bats frequent the Study Area. Construction noise and nighttime lighting could impact individual bats that occasionally travel through the area; however, individual bats would be able to fly around the construction area and avoid potential impacts.

6.3.1.2. Indirect Impacts

Preble's Meadow Jumping Mouse

Potential indirect impacts could result from future increased traffic volumes along the I-70 corridor, which could lead to an increase in chemicals (de-icers, petroleum, etc.) accumulating on roadside vegetation. These chemicals could impact cover and foraging habitat for PMJM. However, these areas are already impacted by roadside chemicals.

Northern Leopard Frogs

Potential indirect impacts to northern leopard frogs would be the same as those listed above for the PMJM.

Townsends' Big-Eared Bat

Removal of trees, shrubs, and herbaceous plants in the area could impact the number of moths, the preferred food source for Townsend's big-eared bats. However, these impacts would be minor and temporary.

6.3.2. Central Section

This section describes potential direct, indirect, and construction-related impacts to special-status species in the Central Section of the Project, for both the North and South Frontage Road Design Options.

6.3.2.1. Direct Impacts

Preble's Meadow Jumping Mouse

Most of Clear Creek in the Central Section of the Project is heavily channelized with riprapped banks that lack wetlands and riparian habitat (CDOT, 2020b and CDOT, 2020c); however, there are 15 small wetlands located within the creek channel (CDOT, 2020b). These wetlands lack the well-developed riparian vegetation with adjacent undisturbed grasslands required to support PMJM. Additionally, proposed improvements would occur primarily outside of Clear Creek and its associated wetlands (CDOT, 2020b); therefore, direct impacts to potential PMJM habitat would be minimal for both North and South Frontage Road Design Options.

North Frontage Road Option

To connect the existing frontage road on the west side of the Hidden Valley/Central City interchange with the proposed frontage road on the east side, a new bridge span would be constructed over Clear Creek. Approximately 4 square feet of one wetland would be impacted by installation of a bridge pier (CDOT, 2020b). The wetland is located on the north side of Clear Creek and is confined by I-70 and the riprapped bank of Clear Creek on the north. There are no adjacent grasslands, which are preferred by PMJM.

Temporary impacts related to construction would result from vegetation removal, earth moving, grading activities, and staging of equipment.

South Frontage Road Option

The South Frontage Road Option would not result in wetland impacts (CDOT, 2020b).

Northern Leopard Frog

The heavily channelized banks of Clear Creek have resulted in fast-flowing water through the Central Section of the Project. There are no slow-moving or still waters along the creek that are required for this species. As a result, northern leopard frogs are unlikely to occur within the Central Section of the Project.

Townsend's Big-Eared Bat

Potential direct impacts would be the same for both frontage road design options. There are no caves or mines within the Central Section of the Project Area; therefore, it is highly unlikely that Townsends' big-eared bats frequent the Study Area. Construction noise and nighttime lighting could impact individual bats that occasionally travel through the area; however, individual bats would be able to fly around the construction area and avoid potential impacts.

6.3.2.2. Indirect Impacts

Preble's Meadow Jumping Mouse

Indirect impacts could result from soil disturbance, which would provide an opportunity for non-native invasive plants and noxious weeds to be introduced and spread across the area. Additionally, areas of the wetland that currently receive a lot of direct sunlight may become shaded, which could change vegetation habitat conditions in the area.

Potential indirect impacts also could result from future increased traffic volumes along the I-70 corridor, which could lead to an increase in chemicals (de-icers, petroleum, etc.) accumulating on wetland vegetation and impacting potential cover and foraging habitat for PMJM. The potential for increased chemical accumulation would be greater for the South Frontage Road Design Option because there would be a road on both sides of Clear Creek.

Townsend's Big-Eared Bat

Moths, the preferred prey of Townsend's big-eared bats, reproduce on shrubs, trees, and flowering plants. Therefore, vegetation removal associated with both frontage road design options could impact the abundance of moths in the area. However, vegetation on the south side of Clear Creek is denser that on the north side of I-70. It consists of trees with an understory of shrubs and herbaceous plants. Therefore, impacts associated with the South Frontage Road Option would be greater than those associated with the North Frontage Road Option

6.3.3. West Section

This section describes potential direct, indirect, and construction-related impacts to special-status species in the West Section of the Project, which would be very similar to those in the Central Section.

6.3.3.1. Direct Impacts

Preble's Meadow Jumping Mouse

Clear Creek in the West Section also is heavily channelized with riprapped banks that lack wetlands and riparian habitat (CDOT, 2020b and CDOT, 2020c); however, there are several small wetlands scattered throughout the Clear Creek corridor (CDOT, 2020b). These wetlands lack the well-developed riparian vegetation with adjacent undisturbed grasslands required to support PMJM. Therefore, potential impacts are unlikely to occur.

East of the Veterans Memorial Tunnels, to accommodate the realignment of I-70, approximately 1,365 linear feet of Clear Creek would be shifted to the south, which would impact approximately 40 square feet of one wetland in the area (CDOT 2020b). The wetland is located within the narrow creek channel on the south edge of the creek. It is very thin and confined on the south by a riprapped bank and CR 314. There are no adjacent grasslands, which are required for PMJM.

Potential impacts to PMJM will be documented in a project-specific Biological Assessment, which will be submitted to the USFWS under separate cover, per ESA Section 7 requirements.

Northern Leopard Frog

The heavily channelized banks of Clear Creek have resulted in fast-flowing water through the West Section of the Project. There are no slow-moving or still waters along the creek that are required for this species. As a result, northern leopard frogs are unlikely to occur within the West Section of the Project.

Townsend's Big-Eared Bat

There are no caves or mines within the West Section of the Project Area; therefore, it is highly unlikely that Townsends' big-eared bats frequent the Study Area. Construction noise and nighttime lighting could impact individual bats that occasionally travel through the area; however, individual bats would be able to fly around the construction area and avoid potential impacts.

6.3.3.2. Indirect Impacts

Preble's Meadow Jumping Mouse

Indirect impacts could result from soil disturbance, which would provide an opportunity for non-native invasive plants and noxious weeds to be introduced and spread across the area. Additionally, areas of the wetland that currently receive a lot of direct sunlight may become shaded, which could change vegetation habitat conditions in the area.

Potential indirect impacts also could result from future increased traffic volumes along the I-70 corridor, which could lead to an increase in chemicals (de-icers, petroleum, etc.) accumulating on wetland vegetation and impacting potential cover and foraging habitat for PMJM. The potential for increased chemical accumulation would be greater for the South Frontage Road Design Option because there would be a road on both sides of Clear Creek.

Townsend's Big-Eared Bat

Moths, the preferred prey of Townsend's big-eared bats, reproduce on shrubs, trees, and flowering plants. Therefore, vegetation removal associated with both frontage road design options could impact the abundance of moths in the area. Vegetation on the south side of Clear Creek is denser that on the north side of I-70. It consists of trees with an understory of shrubs and herbaceous plants. Therefore, impacts would be greater with the South Frontage Road Option.

6.4. Canyon Viaduct Alternative Impacts

6.4.1. East Section

The Canyon Viaduct Alternative's proposed changes in the East Section of the Project are the same as those described for the Tunnel Alternative. Therefore, impacts would be the same as those discussed for the Tunnel Alternative. See Section 6.3.1 of this document for more detail.

6.4.2. Central Section

The Canyon Viaduct Alternative would move both westbound and eastbound I-70 lanes to a viaduct approximately 400 feet south of the existing I-70 alignment on the south side of Clear Creek Canyon. The viaduct would cross above Clear Creek twice but would not impact Clear Creek or associated wetlands.

6.4.2.1. Direct Impacts

Preble's Meadow Jumping Mouse

Potential impacts to PMJM habitat would be the same as those listed for the Tunnel Alternative, North Frontage Road Option. See Section 6.3.2.1 of this document for more detail.

Northern Leopard Frog

Potential impacts to northern leopard frog habitat would be the same as those listed for the Tunnel Alternative, North Frontage Road Option. See Section 6.3.2.1 of this document for more detail.

6.4.2.2. Indirect Impacts

Preble's Meadow Jumping Mouse

Potential impacts to PMJM habitat would be the same as those listed for the Tunnel Alternative, North Frontage Road Option. See Section 6.3.2.2 of this document for more detail.

Townsend's Big-Eared Bat

Potential impacts to PMJM habitat would be the same as those listed for the Tunnel alternative North Frontage Road Option. See Section 6.3.2.2 of this document for more detail.

6.4.3. West Section

The Canyon Viaduct Alternative's proposed changes in the East Section of the Project are the same as those described for the Tunnel Alternative. Therefore, impacts would be the same as those discussed for the Tunnel Alternative. See Section 6.3.3 of this document for more detail.

7. Mitigation

Mitigation measures are recommended to address permanent and temporary adverse impacts of the Project alternatives. Impacts identified in Section 6 are summarized in tabular format in this section to align with recommended mitigation (see Exhibit 9 and Exhibit 10).

7.1. Relevant Tier 2 Mitigation

To mitigate for potential impacts to federally listed species identified in the PEIS, FHWA and CDOT committed to supporting the following policies and programs:

- Lead agencies will follow the conservation measures identified in the I-70 Mountain Corridor PBO.
- If a Tier 2 project results in a "may affect, likely to adversely affect" determination for any federally listed species, a project-specific BA will be prepared and submitted to the USFWS for consultation. All conservation measures identified in the project-specific BA/BO will be followed.
- Mitigation of impacts to Platte River Species will comply with the SPWRAP, the Platte River Recovery Implementation Program, and the Colorado River Recovery Implementation Program for CDOT projects.

The following mitigation strategies were identified to reduce potential for impacts to federally listed species (USFWS 2011):

- Inclusion of snow storage area and drainage/sediment control structures.
- Development and implementation of post-construction rehabilitation plans.
- Use of seed from native species of grasses and herbaceous vegetation.
- Preparation and implementation of an integrated weed management plan for the Corridor.
- Avoidance and minimization of construction of temporary roads.
- Implementation of best management practices (BMPs) to protect water quality from sedimentation.
- Development and implementation of restoration plans for affected riparian, terrestrial, or aquatic habitats.
- Addition of wildlife crossing structures and improvement of existing structures to reduce barrier effects.
- Strict adherence to all aspects of the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

Mitigation strategies specific to the PMJM (USFWS 2011) include the species-specific conservation measures outlined in the PBO:

- No staging will be allowed within 300 feet of the 100-year floodplain of streams with PMJM habitat.
- Removal of herbaceous plants, shrubs, and willow will be avoided in PMJM habitat.
- If vegetation removal is unavoidable, native plants and shrubs will be planted per the CDOT Landscape Architect, in consultation with the USFWS and the CDOT Biologist, to 80 percent of the cover of the surrounding area.
- Ledges will be installed in all culverts greater than 48 inches in diameter within PMJM habitat as determined during Tier 2 processes.
- Habitat will be replaced at a 2:1 ratio.

7.2. Action Alternatives

Exhibit 9. Recommended Mitigation Measures for Permanent Impacts from All Alternatives

Location	Activity	Impact	Mitigation
Throughout the Project Area	Removal of trees, shrubs, and herbaceous plants	Potential impacts to Townsend's big-eared bat foraging habitat	• Avoid unnecessary disturbance to existing trees and shrubs to the maximum extent possible. • Revegetate disturbed areas with native species.
South side of I-70 between the Soda Creek Road and Exit 247, Floyd Hill/Hyland Hills interchanges	Installation of wildlife fencing along Beaver Brook riparian areas	Potential impacts to PMJM and northern leopard frog habitat	• Place the wildlife fence outside or on the edge of riparian areas to limit disturbance to PMJM and northern leopard frog habitat. • Install fence outside of the PMJM hibernation period (September to May); coordinate with the USFWS if work needs occur during these months.
East Section of the Project	Construction activities near Beaver Brook and Clear Creek riparian areas	Potential impacts to PMJM and northern leopard frog habitat	• All suitable PMJM habitat will be identified as a no work zone and protected from construction activities by installing construction limit fencing. • Follow measures identified in the I-70 Mountain Corridor PBO (USFWS, 2011), described in Section 7.1, for all areas identified as suitable for PMJM habitat.

Exhibit 10. Recommended Mitigation Measures for Temporary Impacts for All Alternatives

Location	Activity	Impact	Mitigation
Throughout the Project Area	Ground-disturbing activities	Introduction and spread of noxious weeds, which could impact PMJM and northern leopard frog habitat	Develop and implement an Integrated Noxious Weed Management Plan.
Throughout the Project Area	Nighttime construction lighting	Impacts to Townsend's big-eared bats foraging behavior	Use shielded lighting during all night work activities.

8. Agency Coordination

The lead agencies, CDOT & FHWA, have coordinated with and are continuing to coordinate with CPW, USFS, Clear Creek County, Jefferson County, and USFWS on issues related to special-status species and potential special-status species habitat during the NEPA process.

CDOT and the Project Team are conducting on-going coordination with the above agencies and other stakeholders as part of the ALIVE meetings, which focus on impacts to wildlife as well as opportunities for mitigation for the Project. ALIVE meetings have taken place continuously for the Project from 2018 through 2020. Additional information can be found in the *I-70 Floyd Hill to Veterans Memorial Tunnels Terrestrial and Aquatic Wildlife Technical Report* (CDOT, 2020a). In addition to ALIVE (wildlife issues task force), CDOT also has been conducting coordination meetings through the Stream and Wetland Ecological Enhancement Program, known as the SWEEP Issues Task Force, from 2018 through 2020. Additional information can be found in the *I-70 Floyd Hill to Veterans Memorial Tunnels Terrestrial and Aquatic Wildlife Technical Report* (CDOT, 2020a) and the *I-70 Floyd Hill to Veterans Memorial Tunnels Drainage and Water Quality Report* (CDOT, 2020e).

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Appendix A: PEIS Programmatic Biological Opinion

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Colorado Field Office
P.O. Box 25486, DFC (65412)
Denver, Colorado 80225-0486

IN REPLY REFER TO:
ES/LK-6-CO-11-F-008
TAILS: 65412-2011-F-0063

MAR 24 2011

John Cater, Division Administrator
Colorado Federal Aid Division
U.S. Department of Transportation, Federal Highway Administration
12300 West Dakota Avenue, Suite 180
Lakewood, Colorado 80228

Dear Mr. Cater:

In accordance with section 7 of the Endangered Species Act (Act) as amended (16 U.S.C. 1531 et seq.) and the Interagency Cooperative Regulations (50 CFR 402), this document transmits the U.S. Fish and Wildlife Service's (Service) final programmatic biological opinion on impacts to the federally threatened Least Tern (*Sternula antillarum*), Piping Plover (*Charadrius melodus*), and Western prairie fringed orchid (*Platanthera praeclara*), the endangered Whooping Crane (*Grus americana*) and Pallid sturgeon (*Scaphirhynchus melodus*), collectively known as the Platte River species; the endangered Bonytail chub (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), Humpback chub (*Gila cypha*), and Razorback sucker (*Xyrauchen texanus*), collectively known as the Colorado River fishes; as well as the threatened Canada lynx, (*Lynx canadensis*), Preble's meadow jumping mouse (*Zapus hudsonius preblei*), greenback cutthroat trout (*Oncorhychus clarki stomias*), and Ute ladies'-tresses orchid (*Spiranthes diluvialis*), from the Federal Highway Administration's (FHWA) authorization and funding of improving 144 miles of the I-70 Mountain Corridor between its intersection with C-470 to Glenwood Springs in Jefferson, Clear Creek, Summit, Eagle and Garfield counties, Colorado. In addition, the project will not likely affect the Yellow-billed Cuckoo (*Coccyzus americanus*), a Candidate for listing. The project will be constructed by the Colorado Department of Transportation (CDOT) with the participation and funding of the FHWA. Your request for formal consultation was received by the Service on November 3, 2010.

This biological opinion is based on the project proposal as described in the October 2010, report entitled "U.S. Fish and Wildlife Service Programmatic Biological Assessment, I-70 Mountain Corridor PEIS, October 2010" (biological assessment), the "I-70 Mountain Corridor Revised Draft Programmatic Environmental Impact Statement, September 2010" (PEIS), as well as subsequent email and telephone correspondence. The biological assessment programmatically addresses the potential direct, indirect, and cumulative impacts of the selected corridor-wide transportation solution described below. This broad assessment is adequate for Tier 1 analysis. Subsequent site-specific Tier 2 analysis will be required for any future components of the Proposed Action. Tier 2 analyses will be much more detailed in terms of project design and impact, and avoidance and minimization measures will be defined and implemented at that level. The Service concurs with your determination that the proposed project is likely to adversely affect the Platte River species, the

Colorado River fishes, the Canada lynx, the Preble's meadow jumping mouse, the greenback cutthroat trout, and the Ute ladies-tresses orchid. In addition, the Service concurs with your determination that the project is not likely to adversely affect the Yellow-billed Cuckoo. On December 14, 2010, the North American wolverine (*Gulo gulo*) was listed as a Candidate species. Because this listing took place after you submitted your biological assessment, and because no viable population is believed to currently exist in Colorado, the species will be addressed during Tier 2.

Platte River Species

Depletions to the Platte River system due to CDOT activities are addressed by the State of Colorado's (State) participation in the South Platte Water Related Activities Program (SPWRAP) through the "Memorandum of Agreement for Implementation and Operation of the Colorado Portion of the Platte River Recovery Implementation Plan (PRRIP)" (SPWRAP 2006). The State has made and continues to make financial and other contributions to the PRRIP. In addition, SPWRAP has created a "Class X-1" membership specifically for and limited to the State of Colorado for diversions and depletions by State agencies that are comparatively small. CDOT falls into this category because their typical depletive activities such as wetland creation and water quality ponds, as well as water used for compaction, concrete, and dust control do not generally require large amounts of water. According to the Memorandum of Agreement (MOA), contributions previously made are deemed payment of all SPWRAP assessments for the Class X-1 membership for the duration of the First Increment of the PRRIP, which expires in 2020. However, because the FHWA is funding the project, in order to satisfy their obligation under the Act, section 7 consultation is required.

Because the amount of water used cannot be anticipated at the Programmatic level, a PRRIP template biological assessment will be submitted to the Service during the Tier 2 analysis for streamlined section 7 consultation. This Tier 2 biological assessment will estimate the water usage for that particular Tier 2 project. Following streamlined consultation and the Service's issuance of a biological opinion, project-level depletions will be monitored annually by FHWA/CDOT and reported to the USFWS. The Platte River species will not be considered further in this document.

Colorado River Endangered Fishes

A Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin was initiated on January 22, 1988. The Recovery Program was intended to be the reasonable and prudent alternative for individual projects to avoid the likelihood of jeopardy to the endangered fishes from depletions from the Upper Colorado River Basin. In order to further define and clarify the process in the Recovery Program, a section 7 agreement was implemented on October 15, 1993, by the Recovery Program participants. Incorporated into this agreement is a Recovery Implementation Program Recovery Action Plan (RIPRAP) which identifies actions currently believed to be required to recover the endangered fishes in the most expeditious manner.

On December 20, 1999, the Service issued a final programmatic biological opinion for Bureau of Reclamation's Operations and Depletions, Other Depletions, and Funding and Implementation of

Recovery Program Actions in the Upper Colorado River above the Confluence with the Gunnison River. The Service has determined that projects that fit under the umbrella of the Colorado River PBO would avoid the likelihood of jeopardy and/or adverse modification of critical habitat for depletion impacts. The Colorado River PBO states that in order for actions to fall within the umbrella of the Colorado River PBO and rely on the Recovery Implementation Program Recovery Action Plan to offset its depletion, the following criteria must be met.

1. A Recovery Agreement must be offered and signed prior to conclusion of section 7 consultation.

2. A fee to fund recovery actions will be submitted as described in the proposed action for new depletion projects greater than 100 acre-feet/year. The fiscal year 2011 fee is $18.91 per acre-foot and is adjusted each year for inflation.

3. Reinitiation stipulations will be included in all individual consultations under the umbrella of this programmatic.

4. The Service and project proponents will request that discretionary Federal control be retained for all consultations under this programmatic.

The subject Recovery Agreements are between non-Federal water user entities and the Service, because Federal agencies, under the section 7 (a)(1) Endangered Species Act, already are obligated to support recovery actions for endangered species. Because the proposed project is being carried out by the FHWA, a Recovery Agreement is not required. The depletions associated with this project are expected to be under 100 acre-feet/year, therefore, the FHWA does not make a contribution to fund recovery actions. The FHWA has continued jurisdiction over the proposed action because the proposed action is being implemented by the FHWA, therefore, Federal jurisdiction will remain in effect should section 7 consultation need to be reinitiated. The Service concludes that the subject project meets the criteria to rely on the Recovery Implementation Program Recovery Action Plan to offset depletion impacts and is not likely to jeopardize the continued existence of the Colorado River fishes and is not likely to destroy or adversely modify designated critical habitat.

FHWA has committed to monitor water depletions throughout the life of the project. If, at any time during implementation of the Preferred Alternative the 100 acre-foot/year cap is approached, reinitiation may be necessary and payment of the fee to fund recovery actions may be required.

CONSULTATION HISTORY

In December 2004, the I-70 Mountain Corridor Draft PEIS was submitted to the Service for review. Draft biological opinions were submitted to the Service for review in March and April 2006. During this time, numerous informal meetings involving CDOT, FHWA, and the USFWS were held to discuss the content of the biological assessment, the Tier 2 consultation process, and species-specific conservation measures.

Public comment on the Draft PEIS identified several areas that needed more attention such as the lack of an identified long-range vision for corridor transportation solutions; commitment in the Draft PEIS to revisit and enhance stakeholder consultation; overwhelming public interest in having greater involvement in the decision-making process; and, use of a cost threshold to identify a preferred group of alternatives.

To address these comments, in 2007, FHWA and CDOT initiated the I-70 Mountain Corridor Context Sensitive Solutions process, which involved a facilitated 27-member Collaborative Effort team composed of agencies and stakeholders, to reach consensus for corridor transportation solutions.

The Service, FHWA, and CDOT, together with the U.S. Forest Service (USFS), Bureau of Land Management (BLM), Colorado Department of Natural Resources (DNR), and the Colorado Division of Wildlife (CDOW) have been working together since 2000 on development of the I-70 Mountain Corridor PEIS. The purpose of the collaboration was to incorporate wildlife improvement into the corridor planning. The collaboration resulted in the development of the ALIVE (A Landscape Level Inventory of Valued Ecosystem Components) Memorandum of Understanding (MOU), which the parties signed on April 11, 2008. The MOU developed a landscape-based ecosystem approach for consideration of wildlife needs and conservation measures. It also identified measures to improve existing aquatic and terrestrial ecosystem connectivity across I-70.

On June 10, 2010, an updated species list for the corridor was requested and on July 6, 2010, was sent to CDOT. Informal conversations regarding the biological assessment, the Tier 2 consultation process, and conservation measures continued.

The I-70 Mountain Corridor Revised Draft PEIS was submitted in September 2010 and the Final EIS was submitted March 2011.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The proposed action is multimodal, with transit and highway components. The Advanced Guideway System (AGS) is a fully elevated transit system with 15 proposed stations along the route. The highway improvements include, but are not limited to, widening, interchange improvements, safety improvements, auxiliary lanes, and additional snow storage.

The Preferred Alternative Maximum Program 55 mph, the proposed action, is a combination 6-lane highway with AGS. The Maximum Program of improvements has two components: all elements of the Minimum Program as described below, as well as construction of additional general-purpose highway lanes in Dowd Canyon and between the Continental Divide and Floyd Hill. These general purpose lanes will be constructed if consultation with stakeholders determines that they are needed. These two components are discussed below.

The PEIS developed for the project also examined impacts from the Maximum Program 65 mph option. The impacts due to the 65 mph option are less than the impacts from the 55 mph option; therefore, we are analyzing the effects of the 55 mph option (the proposed action) in this programmatic consultation because it is the alternative with the greatest potential impacts to listed species.

Minimum Program

The Minimum Program includes non-infrastructure-related components, AGS, and specific highway improvements. The Minimum Program represents the initial set of improvements under the Preferred Alternative.

Non-infrastructure-related components

Non-infrastructure-related components can begin in advance of major infrastructure improvements to address immediate issues in the Corridor. These strategies and the potential tactics for implementation require actions and leadership by agencies, municipalities, and other stakeholders beyond CDOT and FHWA. The strategies include, but are not limited to:

- Increased enforcement
- Bus, van, or shuttle service in mixed traffic
- Programs for improving truck movements
- Driver education
- Expanded use of existing transportation infrastructure in and adjacent to the Corridor
- Use of technology advancements and improvements to increase mobility without additional infrastructure
- Traveler information and other intelligent transportation systems
- Shift passenger and freight travel demand by time of day and day of week
- Convert day trips to overnight stays
- Promote high occupancy travel and public transportation
- Convert single occupancy vehicle commuters to high occupancy travel and/or public transportation
- Implement transit promotion and incentives
- Other transportation demand management measures to be determined

Advanced Guideway System

The Advanced Guideway System (AGS) is a central part of the Preferred Alternative and will provide transit service from C-470 to the Eagle County Regional Airport, a distance of approximately 118 miles. At this Tier 1, or programmatic, level, a specific AGS technology has not been chosen, but will be determined in subsequent study. It is anticipated that the AGS will be a fully elevated transit system on two tracks that aligns to the north, south, or in the median of the I-70 Mountain Corridor. AGS connects to the Regional Transportation District network in Jefferson County and local and regional transit services at most of the 15 proposed transit stations along the route.

AGS requires new tunnel bores at both the Eisenhower-Johnson Memorial Tunnels and the Twin Tunnels east of Idaho Springs. At the Eisenhower-Johnson Memorial Tunnels, the proposed third tunnel bore is located to the north of the existing tunnel bores and accommodates a bidirectional AGS. At the Twin Tunnels, the proposed third tunnel bore is located to the south of the existing tunnel bores and accommodates a bidirectional AGS.

Highway Improvements

Highway improvements are needed to address current conditions as well as future demands in the corridor. No priority has been established for improvements and those improvements must be planned considering all components of the Preferred Alternative and be consistent with local land use planning. The "specific highway improvements" identified below will be completed before implementation of any future highway and non-AGS transit capacity improvements, and their effectiveness in meeting the project purpose will be assessed in order to determine if additional highway and non-AGS transit capacity improvements are needed. These highway improvements include the following:

- Specific Highway Improvements:
  - Six-lane highway from Floyd Hill through the Twin Tunnels – Includes a bike trail and frontage roads from Idaho Springs to Hidden Valley and Hidden Valley to US 6
  - Empire Junction (US 40/I-70) interchange improvements
  - Eastbound auxiliary lane from Eisenhower-Johnson Memorial Tunnels to Herman Gulch
  - Westbound auxiliary lane from Bakerville to Eisenhower-Johnson Memorial Tunnels

- Other highway improvements:
  - Truck operation improvements (pullouts, parking and chain stations)
  - Curve safety modifications west of Wolcott
  - Safety and capacity improvements at Dowd Canyon
- Interchange improvements at the following locations:
  - Glenwood Springs
  - Gypsum
  - Wolcott
  - Eagle
  - Edwards
  - Avon
  - Minturn
  - Vail West
  - Copper Mountain
  - Frisco/Main Street
  - Eagle County Airport – part of the No Action Alternative
  - Frisco/SH 9
  - Loveland Pass
  - Silverthorne
  - Georgetown
  - Empire Junction
  - Downieville
  - Fall River Road
  - Base of Floyd Hill/U.S. 6
  - Hyland Hills
  - Beaver Brook
  - Lookout Mountain
  - Morrison

- Additional auxiliary lanes
  - Avon to Post Boulevard (Exit 168) (eastbound)
  - West of Vail Pass (eastbound and westbound)
  - Frisco to Silverthorne (eastbound)
  - Morrison to Chief Hosa (westbound)

Maximum Program

The Maximum Program of improvements includes all components of the Minimum Program, as well as additional general-purpose highway lanes in Dowd Canyon and between the Continental Divide and Floyd Hill, snow storage, and interchange and curve safety improvements, as discussed below.

- Additional lanes
  - Continental Divide to Floyd Hill – Two additional lanes between milepost 215.3 (Eisenhower-Johnson Memorial Tunnels) and milepost 247 (Floyd Hill), one eastbound and one westbound. Structured eastbound lanes may be used in the Idaho Springs area (milepost 238.9 to milepost 241.4).
- Snow storage
  - A paved ditch is provided on the north side of the highway for snow storage with widths as follows: 11 feet from Eisenhower-Johnson Memorial Tunnels to Herman Gulch (milepost 215.3 to milepost 218), 9 feet from Herman Gulch to Silver Plume (milepost 218 to milepost 226), and 2 feet for all other areas of widening.
- Interchange improvements at the following locations:
  - Silver Plume
  - Idaho Springs West
  - Idaho Springs/ SH 103
  - Idaho Springs East
- Curve safety improvements at Fall River Road

New tunnel bores would be required at Dowd Canyon (two bores), Hidden Valley (one bore), and Floyd Hill (one bore) if implementation of the 65 mph program is selected during Tier 2 processes. These were not included as part of this assessment because the highway footprint would be less with this option than with the 55 mph option, which would widen the existing highway footprint.

The locations of the improvements associated with the Preferred Alternative are shown in the biological assessment.

Consultation at the Tier 2 level will include information on construction techniques, sequencing, site preparation, and equipment to be used. Temporary activities, such as traffic detours, staging plans, and potential waste generators, such as concrete debris or lead paint, will be identified. Plan sheets, as applicable will be included, and any constraints imposed on the contractor will also be included.

No specific timeline or sequencing has been established for the entire Corridor. Tier 2 processes and feasibility studies are underway, but no funding is available for construction of the Preferred

Alternative at this time. Additional Tier 2 processes may begin shortly after the Record of Decision (ROD) has been signed, which is anticipated in Spring 2011. The PEIS addresses the purpose and need for the Corridor improvement through the year 2050 and projects could be expected to occur up to that time.

Some of the early action highway projects identified are expected to be built prior to the AGS.

Conservation Measures

Proposed conservation measures are likely to undergo refinement as a result of public review and comments on the PEIS and will become specific mitigation strategy commitments in the Tier 1 ROD. The applicability of these measures will be determined by such factors as terrain, constructability, land use, habitat and site specific conditions, all of which will be analyzed during Tier 2.

As part of this project, the following conservation measures were proposed in the biological assessment to reduce potential for impacts to listed species:

General

- **Inclusion of snow storage areas and drainage/sediment control structures** – Areas of highway widening will include snow storage space in select locations to capture snow and other roadway runoff, thereby reducing impacts on adjacent ecosystems. Drainage/sediment control structures will be constructed 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
    - Refined maintenance practices to minimize the amount of salt and sand applied to the highway
- **Development and implementation of post-construction rehabilitation plans**, with goals to enhance the recovery of desired vegetation for federally protected species, ensuring streambank and upland ground stability and erosion control and providing cover and nesting sites for wildlife.
- **Use of seed from native species of grasses and herbaceous vegetation** in areas where reseeding is necessary following ground disturbance. No planting or seeding of non-native plants will be authorized, with the exception of the use of "nursery crop" grasses, such as cereal rye (*Secale cereale* L.) or wheat. These grasses will be used for emergency stabilization of soil/watershed following disturbance.
- **Preparation and implementation of an integrated weed management plan for the corridor** – The plan is usually completed just before construction so that it is as up-to-date as it can be.
- **Avoidance and minimization of construction of temporary roads**, vehicle tracks, and construction staging areas.

- **Implementation of Best Management Practices (BMP) to protect water quality from sedimentation** – Erosion control measures will be implemented to mitigate both short-term and long-term impacts, as follows:
    - Erosion control measures including, but not limited to silt fence and erosion control logs, will be implemented to minimize any potential for short-term impacts on water quality.
    - Permanent water quality BMPs, including, but not limited to sediment traps, erosion check structures, and/or filters, will be implemented per CDOT water quality specifications to minimize long-term impacts, such as runoff and deposition in aquatic, wetland, and riparian habitats.
- **Development and implementation of restoration plans for affected riparian, terrestrial, or aquatic habitats,** including success-based monitoring. Stream water quality and riparian ecosystem health will be monitored to determine effects of construction activities (during construction). Efforts and results will be coordinated with the Service and CDOW.
- **Addition of wildlife crossing structures and improvement of existing structures to reduce the barrier effect** of I-70 through the corridor in areas that are especially important linkages for threatened, endangered, and special status species. A minimum of 13 wildlife crossings will be installed with a maximum number of 25 possible, after which the program will be assessed for effectiveness. Ten of these areas are located in lynx habitat and will feature crossings appropriate for lynx. These locations are outlined in the ALIVE MOU; however, the locations are in the process of being verified and refined based on number of animal-vehicle collisions, habitat modeling, wildlife linkage modeling, and land use.
- **Strict adherence to all aspects of the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.**

No Tier 1 surveys have been undertaken for species under consideration in this consultation. Intensive species-specific surveys of threatened, endangered and special status species' habitats will be required as part of specific project development in Tier 2. This information will be incorporated in project design to avoid affecting such species to the maximum extent possible.

BMPs to Improve Habitat Connectivity

The following BMPs are intended to be implemented with any construction or transportation improvement project on the I-70 Mountain Corridor that requires replacement or installation of culverts, bridges, retaining walls, guardrails, or cement barriers. Their purpose is to improve habitat connectivity across the highway by making drainage structures and likely barriers to movement as wildlife-friendly as possible. They are not intended to replace passages specifically designed for wildlife in areas that have been identified as Linkage Interference Zones (LIZ) by the ALIVE Committee. LIZs are high-priority locations where evidence suggests that the highway's barrier effect impedes important wildlife migration or movement routes or zones of dispersal. Of the thirteen LIZs, ten are important to Canada lynx.

The following BMPs will enhance habitat protection for the following threatened and endangered species: razorback sucker, bonytail chub, Colorado pikeminnow, humpback chub, greenback cutthroat trout, Canada lynx, and Preble's meadow jumping mouse. These BMPs will also be

beneficial to wildlife in general. Therefore, at Tier 2, the following BMPs will be applied as appropriate:

- Where a drainage structure (culvert, concrete box culverts [CBC], or bridge) is needed as part of the transportation system, install, modify, or maintain existing drainage structures to accommodate wildlife movement.
    - Install the largest bridge or culvert possible for any given location or terrain.
    - Use span-bridges and arch-structures with natural bottoms because they are preferred over CBCs or other types of enclosed culvert.
    - Replace existing structures with structures of equal size or larger.
    - Replace small culverts (less than 3 feet in diameter) with culverts of no less than 3 feet in diameter, unless site-specific conditions do not permit.
    - At a minimum, size drainage structures to provide sufficient freeboard and width to provide a dry path, preferably a natural floor, for animals to use throughout the year.
    - Avoid offsetting culverts and bridges where multiple structures are needed under a divided highway or where two roads run parallel to one another so that animals have a straight line of sight through all structures.
    - Install features to prevent human use of underpasses such as signs or barriers at potential access points.
- Use "linear wildlife guideways" that intersect I-70 when determining placement of drainage structures to the extent possible.
    - Linear wildlife guideways are defined as topographical ridges or drainages, or sharply delineated changes in vegetation, or vegetation forming a peninsula. The intersection of a linear guideway with a roadway often creates a well-defined, intensely-used crossing zone.
    - Within CDOT right-of-way, and if possible outside the right-of-way, maintain vegetated ridges and drainages, or other features with sharply delineated changes in vegetation, as described above.
    - Reduce distance to cover by maintaining natural vegetation around the inflow and outflow of drainage structures, preferably in the form of vegetated peninsulas.
- Where guardrails, retaining walls, or cement barriers or steep road cuts are required, design should consider that barrier ends tend to funnel animals onto the roadway.
    - Locate the ends of barriers where there is a good line of sight to give motorists adequate time to avoid animals that enter the roadway at these locations.
    - Locate wildlife crossings at the end of barriers.
- Design and maintain fencing with LIZs to lead wildlife to bridges, culverts, or wildlife crossings.
- Where culverts are to be the conduit for fishing streams, consult with the Colorado Division of Wildlife regarding the proper installation of the culvert. Depending on prescribed management for the stream, the best function of the culvert may be either a fish passage or a one-directional barrier to fish movement with amphibian ledges.
- Construct CBCs and bridges using natural colors and textures.

Species-specific Conservation Measures

Canada lynx

- Lynx crossings will be installed in all areas outlined by the ALIVE Committee or during subsequent refinement after a feasibility assessment has been completed during Tier 2 processes. This assessment will be written and will determine habitat condition, land status, terrain, constructability, and other site-specific conditions at the time of construction and will be submitted to the USFWS for concurrence. These locations identified by the ALIVE Committee areas are defined in the ALIVE MOU, but are currently undergoing verification and refinement.
- A minimum of 13 wildlife crossings will be installed with a maximum number of 25 possible. These crossings will be installed in the 13 LIZs identified by the ALIVE Committee or subsequent documents. Currently, ten of these areas are located in lynx habitat and will feature crossings appropriate for lynx (LIZ 3, Eagle to Wolcott [milepost 147.3-153.4]; LIZ 4, Wolcott to Avon [milepost 154.5-166.5]; LIZ 5, Dowd Canyon [milepost 169.5-172.3]; LIZ 6a, Lower West Vail Pass [milepost 181.7-186.0]; LIZ 6b, Upper West Vail Pass [milepost 186.0-188.5]; LIZ 7, East Vail Pass to Copper Mountain [milepost 190.4-194.0]; LIZ 8, Officer's Gulch/Owl Canyon [milepost 195.5-200.5]; LIZ 9a, Laskey Gulch [milepost 207.0-209.7]; LIZ 9b, Hamilton Gulch/Dead Coon Gulch [milepost 210.7-212.6]; and LIZ 10, Herman Gulch/Bakerville [milepost 216.7-220.8]). If the maximum number of crossings (25) is installed, the program will be reassessed for its effectiveness.
- All lynx crossings will have an openness ratio of no less than 0.7. (width x height / length in meters) (Ruediger, 1996) or a minimum dimension of a 10-foot diameter for corrugated metal pipes or 10 feet x 20 feet for CBCs or arch structures. These dimensions may be updated based upon future research and/or monitoring, in coordination with USFWS.
- All lynx crossings will have a natural substrate.
- Lynx crossings will not be designed to carry water as its primary purpose.
- Based on topography, up to 0.5 mile of wildlife fencing will be installed on either side of both portals of lynx crossings, per land management agency concurrence.
- The success of vegetation reestablishment at the portals of all lynx crossings and temporary impact areas within lynx habitat will be based on adjacent habitat and crossing functions.
- Lynx habitat improvement or enhancement will occur through coordination with land management agencies.
- Habitat improvements will be installed no more than one year from the completion of a site-specific project. USFS direction or schedule may delay the installation past the one-year limit.
- Within lynx habitat, night work will be limited to a 4 nights on, 3 nights off schedule.
- Within lynx habitat, construction activities will occur within as concentrated an area as possible.
- When possible, barriers (cement, w-beam) will be installed 8 feet or greater from travel lanes in lynx habitat.
- The use of barriers will be minimized in lynx habitat.

- The use of glare screen is discouraged in lynx habitat. If, for safety reasons, glare screen is required, additional lynx crossings will be provided.
- Chain link fence will not be used in lynx habitat unless it is being used to funnel wildlife to a crossing.

Preble's meadow jumping mouse

- No staging will occur within 300 feet of the 100-year floodplain of streams with Preble's meadow jumping mouse habitat.
- Removal of herbaceous plants, shrubs, and willow will be avoided in Preble's meadow jumping mouse habitat.
- If vegetation removal is unavoidable, native plants and shrubs will be planted per the CDOT Landscape Architect, in consultation with the Service and the CDOT Biologist, to 80 percent of the cover of the surrounding area.
- Ledges will be installed in the Beaver Brook culvert to facilitate movement under the highway.
- Ledges will be installed in all culverts greater than 48 inches in diameter within Preble's meadow jumping mouse habitat as determined during Tier 2 processes.
- Habitat taken will be replaced at a 2:1 ratio (currently determined to be 4.8 acres x 2 = 9.6 acres).

Greenback cutthroat trout

- CDOT will consult with the Service early during Tier 2 in order to determine if any streams containing the greenback cutthroat trout occur within the project area and, if so, what actions need to be taken.
- CDOT will maintain the existing barrier at Dry Gulch.
- No water will be taken from a greenback cutthroat trout stream.
- CDOT will check sediment control BMPs daily during spawning (April 15 – July 15) near greenback cutthroat trout waters.
- No concrete washouts will be established within 100 feet of a greenback cutthroat trout stream.
- CDOT will use the minimum grade possible for culverts in greenback cutthroat trout streams.
- CDOT will construct barriers through culvert placement in accordance with the CDOW and Service recovery efforts.
- Baffles will be installed in culverts within greenback cutthroat trout streams to maintain a movement corridor in accordance with CDOW and Service recovery efforts.

Ute ladies'-tresses orchid

- CDOT will install Water Quality BMPs at the project site to minimize sedimentation.
- During flowering (August – September), monitoring of known locations will be conducted to ensure the BMPs are sufficient.
- If sediment increases and is threatening plants, silt fences and/or erosion logs will be installed around the plants and monitored weekly to ensure functionality. The plants

will be checked within 24-72 hours after a major storm event occurs at an active construction site.

ACTION AREA

The action area includes all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. [50 CFR § 402.02] It is the area containing the most far-reaching potential effects of the federal and non-federal actions on the species being discussed. The action area is defined by measurable or detectable changes in land, air, and water or to other measurable factors that will result from the proposed action. The action area is not limited to the "footprint" of the action, but rather encompasses the biotic, chemical, and physical impacts to the environment resulting directly or indirectly from the action.

The action area for the proposed project is the area that encompasses the reach of all the direct and indirect environmental impacts of the project. That is, the area in which the biotic, chemical, and physical impacts to the environment that are anticipated to occur. The action area for the I-70 Mountain Corridor is the Southern Rockies, the South Platte River, and Colorado River ecosystems.

The area directly affected by construction, operation, and maintenance of the highway is defined for this project as the area 30 feet perpendicular to the footprint of the reconstructed highway. The area indirectly affected by the action is that area affected by sedimentation, snow and ice control and removal, weed control, noise, induced development, and severed connectivity. Sedimentation, snow plowing and de-icers, and herbicides degrade water quality adjacent to and downstream of the application site. Construction and maintenance operations and traffic create noise and increased human and vehicular activity which may deter wildlife from using habitats adjacent to the roadway, and induced development fragments habitat and may increase human use of wilderness areas.

STATUS OF THE SPECIES/CRITICAL HABITAT DESCRIPTION

Canada lynx

Status of the species is based on an analysis of appropriate information on the species' life history, habitat and distribution, and other data on factors related to its survival and recovery. This analysis considers the effects of past human and natural activities or events that have led to the current condition of the species. This information is usually presented in listing documents and refined in recovery plans (Endangered Species Consultation Handbook 1998).

The lynx was added to the list of threatened species on March 24, 2000 (65 FR 16052). We concluded that the single factor threatening the contiguous United States Distinct Population Segment (DPS) of lynx was the inadequacy of existing regulatory mechanisms, specifically the lack of guidance for conservation of lynx in National Forest Land and Resource Management Plans and Bureau of Land Management (BLM) Land Use Plans. On July 3, 2003, we published a clarification of findings published in the Federal Register (68 FR 40076) determining that

threatened species designation was appropriate for the lynx. We published a final rule to designate critical habitat for the Canada lynx in the contiguous United States on November 9, 2006 (71 FR 66007); the critical habitat designation did not include the project area. Most recently, we published a proposed rule to revise critical habitat for the Canada lynx on February 28, 2008 (73 FR 10860); critical habitat was not proposed in the project area. Therefore, this biological opinion will not analyze effects to critical habitat as none will be affected. The Service's various listing rules provide a good resource for a more thorough discussion of life history information on lynx that is summarized below.

Species Description

The lynx is a medium-sized cat with long legs; large, well-furred paws; long tufts on the ears; and a short, black-tipped tail (McCord and Cardoza 1982). The winter pelage of the lynx is dense and has a grizzled appearance with grayish-brown mixed with buff or pale brown fur on the back, and grayish-white or buff-white fur on the belly, legs, and feet. Summer pelage of the lynx is more reddish to gray-brown (Koehler and Aubry 1994). Adult males average 22 pounds in weight and 33.5 inches in length (head to tail), and females average 19 pounds and 32 inches (Quinn and Parker 1987). The lynx's long legs and large feet make it highly adapted for hunting in deep snow.

Home Range and Dispersal

Individual lynx maintain large home ranges reported as generally ranging between 12 to 83 square miles (Koehler 1990; Aubry et al. 2000; Squires and Laurion 2000; Squires et al. 2004; Vashon et al. 2005a). The size of lynx home ranges varies depending on abundance of prey, the animal's gender and age, season, and the density of lynx populations (Koehler 1990; Poole 1994; Slough and Mowat 1996; Aubry et al. 2000; Mowat et al. 2000; Vashon et al. 2005a). When densities of snowshoe hares decline, for example, lynx enlarge their home ranges to obtain sufficient amounts of food to survive and reproduce. Preliminary research supports the hypothesis that lynx home ranges at the southern extent of the species' range are generally large compared to those in the core of the range in Canada (Koehler and Aubry 1994; Apps 2000; Squires and Laurion 2000). In the Southern Rockies, lynx home ranges include 15 to 50 square miles (Reudiger et al. 2000).

The primary factor driving lynx behavior and distribution is the distribution of snowshoe hare (*Lepus americanus*), their primary prey. Lynx are highly mobile and have a propensity to disperse long distances, particularly when prey becomes scarce (Mowat et al. 2000). Cover is important to lynx when searching for food (Brand et al. 1976). Lynx have been observed (via snow tracking) to avoid large openings (Koehler 1990; Staples 1995) during daily movements within the home range, seeming to prefer to move through continuous forest, using the highest terrain available such as ridges and saddles (Koehler 1990; Staples 1995). Lynx often hunt along edges (Mowat et al. 2000). Kesterson (1988) and Staples (1995) reported that lynx hunted along the edges of mature stands within a burned forest matrix, and Major (1989) found that lynx hunted along the edge of dense riparian willow stands. In Montana, lynx preferentially foraged in spruce-fir forests with high horizontal cover, abundant hares, and large diameter trees during

the winter (Squires et al. 2006). Lynx tended to avoid sparse, open forest and forest stands dominated by small-diameter trees during the winter.

Lynx also make long distance exploratory movements outside their home ranges (Aubry et al. 2000; Moen et al. 2004). Areas or habitats used by lynx during dispersal or exploratory movements are poorly understood at this time. Evidently, lynx are able to traverse expanses of diverse habitat types and conditions during their movements. Dispersing lynx may colonize suitable but unoccupied habitats, augment existing resident populations, or disperse to unsuitable or marginal habitats where they cannot survive. Lynx are capable of dispersing extremely long distances (Mech 1977; Washington Department of Wildlife 1993); for example, a male was documented traveling 370 miles (Brainerd 1985). Lynx disperse primarily when snowshoe hare populations decline (Ward and Krebs 1985; Koehler and Aubry 1994; O'Donoghue et al. 1997; Poole 1997). Subadult lynx disperse even when prey is abundant (Poole 1997), presumably as an innate response to establish home ranges. During the early 1960s and 1970s, numerous lynx were documented in atypical habitat, such as in North Dakota. In those years, harvest returns indicated unprecedented cyclic lynx highs for the 20th century in Canada (Adams 1963; Harger 1965; Mech 1973; Gunderson 1978; Thiel 1987; McKelvey et al. 2000b). Many of these unusual observations were probably dispersing animals that either were lost from the population or later returned to suitable habitat.

Diet

Snowshoe hares are the primary prey of lynx, comprising 35 to 97 percent of the diet throughout the range of the lynx (Koehler and Aubry 1994). Other prey species include red squirrel (*Tamiasciurus hudsonicus*), grouse (*Bonasa umbellus*, *Dendragopus* spp., *Lagopus* spp.), flying squirrel (*Glaucomys sabrinus*), ground squirrel (*Spermophilus parryii*, *S. Richardsonii*), porcupine (*Erethrizon dorsatum*), beaver (*Castor canadensis*), mice (*Peromyscus* spp.), voles (*Microtus* spp.), shrews (*Sorex* spp.), fish, and ungulates as carrion or occasionally as prey (Saunders 1963; van Zyll de Jong 1966; Nellis et al. 1972; Brand et al. 1976; Brand and Keith 1979; Koehler 1990; Staples 1995; O'Donoghue et al. 1998). The primary winter prey species of lynx in Colorado are snowshoe hare and red squirrel, with other mammals and birds forming a minor part of the winter diet (Shenk 2004). Winter food items in Montana included snowshoe hare (96 percent), red squirrel, and grouse (Squires and Ruggiero 2007).

During the cycle when hares become scarce, the proportion and importance of other prey species, especially red squirrel, increases in the diet (Brand et al. 1976; O'Donoghue et al. 1998; Apps 2000; Mowat et al. 2000). However, a diet of red squirrels alone might not be adequate to ensure lynx reproduction and survival of kittens (Koehler 1990). In northern regions, when hare densities decline, the lower quality diet causes sudden decreases in the productivity of adult female lynx and decreased survival of kittens, which causes the numbers of breeding lynx to level off or decrease (Nellis et al. 1972; Brand et al. 1976; Brand and Keith 1979; Poole 1994; Slough and Mowat 1996; O'Donoghue et al. 1997). Relative densities of snowshoe hares at southern latitudes are generally lower than those in the north, and differing interpretations of the population dynamics of southern populations of snowshoe hare have been proposed (Hodges 2000b).

Snowshoe hares have evolved to survive in areas that receive deep snow (Bittner and Rongstad 1982). Primary forest types that support snowshoe hare are subalpine fir (*Abies lasiocarpa*), Engelmann spruce (*Picea engelmannii*), Douglas-fir (*Pseudotsuga menziesii*), and lodgepole pine (*Pinus contorta*) in the western United States, and spruce/fir, pine, and deciduous forests in the eastern United States (Hodges 2000b). Snowshoe hares prefer boreal forest stands that have a dense horizontal understory to provide food, cover and security from predators (Wolfe et al. 1982; Monthey 1986; Koehler and Aubry 1994). Snowshoe hares feed on conifers, deciduous trees and shrubs (Hodges 2000b). Snowshoe hare density is correlated to understory (horizontal) cover between approximately 3 to 10 feet above the ground or snow level (Hodges 2000b). Generally, earlier successional forest stages support a greater density of horizontal understory and more abundant snowshoe hares (Buehler and Keith 1982; Wolfe et al. 1982; Koehler 1990; Hodges 2000b; Homyack 2003; Griffin 2004). Mature, multistoried stands also can have adequate dense understory to support abundant snowshoe hares (Hodges 2000a; Hodges 2000b; Griffin 2004, Squires et al. 2006).

Most of the research on lynx diet has focused on the winter diet. Summer diets are poorly understood throughout the range of lynx. Mowat et al. (2000) reported through their review of the literature that summer diets have less snowshoe hare and more alternate prey species, possibly because of a greater availability of other species. In summer, lynx broaden their habitat use from older, multi-storied forest stands to include younger forest stands with an abundance of shrub cover (Squires et al. 2006). The researchers assumed "this shift in habitat use [by lynx] during summer is due to hares being abundant in young forest stands with deciduous vegetation providing high horizontal cover." Mature forests also provide snowshoe hare habitat as openings are created in the canopy when trees succumb to disease, fire, wind, ice, or insects, and the understory develops (Squires et al. 2006).

Den Site Selection

Lynx use a variety of types of large woody debris, such as downed logs, root wads, and windfalls, to provide denning sites with security and thermal cover for kittens (McCord and Cardoza 1982; Koehler 1990; Koehler and Brittell 1990; Mowat et al. 2000; Squires and Laurion 2000; Squires et al. 2006; Merrill and Schenk 2006). During the first few months of life, kittens are left alone at these sites when the female lynx hunts. Downed logs and overhead cover provide protection of kittens from predators, such as owls, hawks, and other carnivores during this period. Denning habitat that is in or near foraging habitat is likely to be most functional. The hunting range of females is restricted at the time of parturition, and their need to feed kittens requires an abundance of prey. Lynx, like other felids, frequently move their kittens until they are old enough to hunt with their mother. Multiple nursery sites are used that provide kittens with overhead cover and protection from predators and the elements.

The age of the forest stand does not seem as important for denning habitat as the amount of horizontal structure available, e.g., downed, woody debris (Mowat et al. 2000), which provides hiding cover and shelter for kittens. Den sites may be located within older regenerating stands (>20 years since disturbance) or in mature conifer or mixed conifer-deciduous (typically

spruce/fir or spruce/birch) forests. Tip-up mounds (root wads) were the most common predictor of den sites (M. McCullough, pers. comm. 2007 *in* Service 2007). In Montana, lynx selected den sites with higher horizontal cover than elsewhere in the animal's home range (Squires et al. 2006). Seventy-three percent of lynx dens were found in mature, mesic forests. Dens were also located in regenerating mesic forests (18 percent) and boulder fields (7 percent). In Washington, lynx used lodgepole pine, *Picea* spp. (spruce), and subalpine fir forests older than 200 years with an abundance of downed woody debris for denning (Koehler 1990). A den site in Wyoming was located in a mature subalpine fir/ lodgepole pine forest with abundant downed logs and a high amount of horizontal cover (Squires and Laurion 2000). Den sites in Colorado were located on steep slopes (mean 30 degree slope) at high elevations (ranging between 10,226 and 11,765 feet) with a dense understory of coarse woody debris (Merrill and Shenk 2006).

Recruitment

Breeding occurs through March and April in the north (Quinn and Parker 1987). Kittens are born in May to June in southcentral Yukon (Slough and Mowat 1996). The male lynx does not help with rearing young (Eisenberg 1986). Slough and Mowat (1996) reported yearling females giving birth during periods when hares were abundant; male lynx may be incapable of breeding during their first year (McCord and Cardoza 1982).

In northern study areas during the low phase of the hare cycle, few if any live kittens are born, and few yearling females conceive (Brand and Keith 1979; Poole 1994; Slough and Mowat 1996). However, Mowat et al. (2000) suggested that in the far north, some lynx recruitment occurs when hares are scarce and this may be important in lynx population maintenance during hare lows.

During periods of hare abundance in the northern taiga, litter size of adult females averages four to five kittens (Mowat et al. 1996). In Montana, the average litter size in the Seeley Lake study area was 2.3 kittens, and 3.2 kittens in the Purcell Mountains (Squires et al. 2006). Koehler (1990) suggested that the low number of kittens produced in northcentral Washington was comparable to northern populations during periods of low snowshoe hare abundance. In his study area, two radio-collared females had litters of three and four kittens in 1986, and one kitten in 1987 (the actual litter size of one of the females in 1987 was not determined) (Koehler 1990). In Wyoming, one female produced four kittens in 1998 and the same female produced two kittens in 1999 (Squires and Laurion 2000). In Colorado, Shenk (2006) reported that the mean number of kittens born per litter was 2.78 during the period from 2003 to 2006.

Habitat Connectivity

It is suggested in the Ecology and Conservation of Canada Lynx (Ruggiero et al. 2000) that lynx in the contiguous United States may exist as several smaller, but effectively isolated metapopulations. An example of this is the boreal forests in Colorado and Utah that are separated from the larger areas of boreal forest in northern Wyoming by at least 100 kilometers. Metapopulation stability depends not only on habitat quality, but also on successful dispersal between isolated habitat patches. The likelihood of subpopulation persistence declines with

increasing fragmentation and isolation. That does not mean that more isolated, and therefore more vulnerable, subpopulations are unimportant. In addition, these subpopulations may contain valuable genetic, physiological or behavioral adaptations that allow them to persist (Hickenbottom et al. 1999). Lynx and snowshoe hare habitats are more prone to a metapopulation structure in the western forests due to fragmented landscapes and heterogeneous distribution of topographic, climatic, and vegetative conditions. This condition is further exacerbated by the presumably greater human caused fragmentation of lynx habitat in the south (Buskirk et al. 2000).

Ruggiero et al. (2000) indicates that we know little about the degree of connectivity or its role in the viability of lynx, but assumes that connectivity plays an important role. Protecting, maintaining, and improving lynx habitat afforded by the various conservation measures contribute to the conservation of lynx and population viability. According to Ruediger et al. (2000), maintaining habitats to provide for dispersal movements and interchange among individuals and subpopulations may be the most important provision for maintenance of population viability. An interconnected ecosystem can be essential to maintain the ability of subpopulations to expand and colonize new habitats, to recolonize areas where subpopulations have been locally extirpated, to provide population support to declining populations, to allow individuals to find mates among neighboring subpopulations, and to effect dispersal and genetic interchanges (Noss and Cooperrider 1994).

Highways and their continued expansion into mountain towns and resorts increase the amount of fragmentation occurring in these long, linear landscapes. This fragmentation effect further erodes the potential for lynx to effectively cross some of these potential barriers (Ruediger et al. 2000). High-speed, high-volume highways can result in lynx roadkills, fragment and restrict lynx habitat use, impair home range effectiveness, inhibit local and dispersing movements that may lead to reduced habitat connectivity, and the decline of some wildlife populations and species over time due to genetic isolation (Forman and Alexander 1998, USFWS 2000; Alexander et al. 2004; Clevenger et al. 2002; Forman et. al. 2003). When traffic volume increases, highways often evolve from gravel roads to paved two-lane roads, and from two-lane highways to more problematic four-lane highways, and the interstate highways, which have the most adverse effects to wildlife movements. The result of this progression of upgrades in the transportation system is the mortality of individuals attempting to cross the highway and potential sub-population isolation, both of which result in a slow decline in the population and ultimately can affect viability for some of the low-density carnivores such as lynx and wolverine (Ruediger et al. 2000). Critical points in development of highways occur when gravel forest or backcountry roads are paved, which results in higher speeds, higher traffic volumes and increased human developments.

The USFWS (2000) found that lynx are impacted by high traffic volume on roads that bisect suitable lynx habitat and by associated suburban developments, but the finding also determined that the impact of high traffic volume was low except in the Southern Rockies Ecosystem. With respect to highway traffic volumes and wildlife impacts, Canadian studies suggest that 2,000-3,000 vehicles per day are problematic and $\geq$ 4,000 vehicles per day are more serious threats to mortality and habitat fragmentation (Ruediger et al. 2000). These conclusions were based upon

the general observations and professional judgment of Clevenger (Parks Canada) and Alexander (Univ. Calgary; Nov. 15, 2004, pers. comm., T. Clevenger, Parks Canada, cited in Ruediger et al. 2000), who have conducted some of the most thorough studies (e.g., Clevenger et al. 2002, Alexander et al. 2004, 2005) of wildlife highway mortality and mitigation in North America. Alexander et al. (2005) concluded that movement was impaired for carnivores, including lynx, when traffic ranged from 300-500 vehicles per day (winter traffic counts). However, the traffic data appear to be estimates of average annual daily traffic (AADT) for the road sections in their study, where year-long AADT may be 3,000-5,000 vehicles per day (assumes a ratio of 10:1 – AADT: winter traffic counts, as discussed in the study).

Mortality

Reported causes of lynx mortality vary between studies. The most commonly reported causes include starvation of kittens (Quinn and Parker 1987; Koehler 1990), and human-caused mortality. Significant lynx mortality due to starvation has been demonstrated in cyclic populations of the northern taiga, during the first two years of hare scarcity (Poole 1994; Slough and Mowat 1996). Various studies have shown that during periods of low snowshoe hare numbers, starvation can account for up to two-thirds of all natural lynx deaths. Trapping mortality may be additive rather than compensatory during the low period of the snowshoe hare cycle (Brand and Keith 1979). Hunger-related stress, which induces dispersal, may increase the exposure of lynx to other forms of mortality such as trapping and highway collisions (Brand and Keith 1979; Carbyn and Patriquin 1983; Ward and Krebs 1985; Bailey et al. 1986).

Highways have resulted in lynx mortality from vehicular collisions, which can be detrimental to small populations (Ruediger et al. 2000). Introduced lynx are more vulnerable to highway mortality than resident animals because they exhibit more extensive movements through unfamiliar landscapes (Brocke et al. 1990, 1991, 1993). While roadkills might not be a significant mortality source in resident lynx populations (Aubry et al. 2000, Ruggiero et al. 1999), it can be a significant mortality source in depleted or recovering populations until the population becomes viable.

Paved roads have been a mortality factor in lynx translocation efforts within historical lynx range. In New York, 18 of 37 translocated lynx were killed on highways (Brocke et al. 1990). Translocated animals may be more vulnerable to highway mortality than resident lynx (Brocke et al. 1990). Fifteen lynx associated with the CDOW reintroduction/monitoring program have been killed on 2- and 4-lane highways (K. Broderdorp, U.S. Fish and Wildlife Service, pers. comm. 2009). Twelve resident lynx were documented being killed on highways in Canada and Alaska (Staples 1995; Gibeau and Heuer 1996; T. Clevenger, pers. comm. 1999 *in* USFWS 2007; Alexander, pers. comm. 1999 *in* USFWS 2007). Lynx were killed on graveled, high-speed (45 miles per hour) Forest roads in flatter terrain in Maine (Mark McCollough, U.S. Fish and Wildlife Service, pers. comm. 2006 *in* USFWS 2007).

Predation on lynx by mountain lion (*Felis concolor*), coyote (*Canis latrans*), wolverine (*Gulo gulo*), gray wolf (*Canis lupus*), and other lynx has been confirmed (Berrie 1974; Koehler et al. 1979; Poole 1994; Slough and Mowat 1996; O'Donoghue et al. 1997; Apps 2000; Squires and Laurion 2000; Squires et al. 2006). Squires et al. (2006) reported 15 lynx mortalities in their

Montana study area, greater than 90 percent of which were due to mountain lion predation. Observations of such events are rare, and the significance of predation on lynx populations is unknown.

Interspecific Relationships with Other Carnivores

The two major competition impacts to lynx are likely exploitation (competition for food) and interference (avoidance). Several predators (birds of prey, coyote, gray wolf, mountain lion, bobcat, and wolverine) consume snowshoe hares and therefore compete at some level with lynx for prey. Lynx have adaptations for surviving in areas that have cold winters with deep, soft snow for extended periods; these adaptations provide lynx a competitive advantage in hunting snowshoe hare over a number of potential competitors, such as bobcats (*Lynx rufus*) or coyotes (McCord and Cardoza 1982; Buskirk et al. 2000; Ruediger et al. 2000; Ruggiero et al. 2000). In one paper, coyotes were theorized to most likely pose local or regionally important exploitation impacts to lynx, and coyotes and bobcats were deemed to possibly impart important interference competition effects on lynx (Buskirk et al. 2000). Mountain lions were described as interference competitors, possibly impacting lynx during summer and in areas lacking deep snow in winter, or when high elevation snow packs develop crust in the spring. Long-term snow conditions presumably limit the winter distribution of potential lynx competitors such as bobcats (McCord and Cardoza 1982) or coyotes. Further, bobcats and coyotes have a higher foot load (more weight per surface area of foot), which causes them to sink into the snow more than lynx. Therefore, bobcats and coyotes cannot efficiently hunt in soft or deep snow and are at a competitive disadvantage to lynx.

Exploitation competition may contribute to lynx starvation and reduced recruitment. During periods of low snowshoe hare numbers, starvation accounted for up to two-thirds of all natural lynx deaths in the Northwest Territories of Canada (Poole 1994). As described previously, major predators of snowshoe hare include lynx, Northern Goshawk (*Accipiter gentilis*), Great Horned Owl (*Bubo virginianus*), bobcat, coyote, red fox (*Vulpes vulpes*), fisher (*Martes pennanti*), and mountain lion. In southern portions of snowshoe hare range, predators may limit hare populations to lower densities than in the taiga (Dolbeer and Clark 1975; Wolff 1980; Koehler and Aubry 1994).

Based on only anecdotal evidence, Parker et al. (1983) discussed competition between bobcats and lynx on Cape Breton Island, Nova Scotia. Lynx were found to be common over much of the island prior to bobcat colonization. Concurrent with the colonization of the island by bobcats, lynx densities declined and their presence on the island became restricted to the highlands, the one area where bobcats did not become established.

Population Dynamics

Lynx populations in the contiguous United States occur at the southern periphery of a widely-distributed metapopulation whose core is located in the northern boreal forest of central Canada (McCord and Cardoza 1982; Quinn and Parker 1987; McKelvey et al 2000a). The boreal forest of central Canada is vast and extends into Alaska. Lynx in the contiguous United States are at

the southern margins, or periphery, of its range. Here, the southernmost extent of the boreal forest that supports lynx occurs in the in the Northeast, western Great Lakes, northern and southern Rockies, and northern Cascades (Ruediger et al. 2000).

The center of North American lynx range is in north-central Canada. Lynx occur in mesic coniferous forests that have cold, snowy winters and provide a prey base of snowshoe hare (Ruggiero et al. 2000). These forests are generally described as boreal forests. Boreal forests provide optimal habitat for snowshoe hares. In North America, the distribution of lynx is nearly coincident with that of snowshoe hares (Bittner and Rongstad 1982; McCord and Cardoza 1982). Lynx survivorship, productivity and population dynamics are closely related to snowshoe hare density in all parts of its range. In the extensive boreal forests of Canada, snowshoe hares reach peak densities of roughly four to six hares per hectare (or 1.6 to 2.4 per acre) and decline to about 0.1 to 1 per hectare (0.04 to 0.4 per acre) during cyclic lows (Krebs et al. 1995, Slough and Mowat 1996, Hodges 2000a). A minimum density of snowshoe hares (greater than 0.5 hares per hectare or 1.2 hares per acre) (Ruggiero et al. 2000) distributed across a large landscape is necessary to support survival of lynx kittens and recruitment into and maintenance of a lynx population.

In Canada and Alaska, lynx populations undergo extreme fluctuations in response to the cycling of snowshoe hare, enlarging or dispersing from their home ranges and ceasing the recruitment of young into the population after hare populations decline (Mowat et al. 2000). However, in the contiguous United States, the boreal forest transitions into other vegetation communities and becomes more patchily distributed. As a result, the southern boreal forests generally support lower snowshoe hare densities, hare populations do not appear to be as highly cyclic as snowshoe hares further north, and lynx densities are lower compared to the northern boreal forest. Although snowshoe hare populations in the southern portion of the range (i.e., in the contiguous United States) may fluctuate, they do not show strong, regular population cycles as in the north (Hodges 2000a). In the contiguous United States, the degree to which local lynx population fluctuations are influenced by local snowshoe hare population dynamics is unclear.

In the contiguous United States, the boreal forest transitions into other vegetation communities and becomes more naturally patchily distributed (fragmented) and provides much less productive hare habitat. Thus, lynx populations here are naturally limited by the low availability of snowshoe hares, as suggested by large home range size, high kitten mortality due to starvation, and greater reliance on alternate prey. These characteristics appear to be similar to those exhibited by lynx populations in Canada and Alaska during the low phase of the population cycle (Quinn and Parker 1987, Koehler 1990, Aubry et al. 2000). This similarity to the lynx populations in Canada and Alaska during the low phase is likely due to the inherently patchy distribution of lynx and hare habitat in the contiguous United States and correspondingly lower densities of hares.

Lynx population dynamics may emanate from the core in Canada to the southern periphery in the contiguous United States, as evidenced by a lagged correlation of lynx trap records and observations in the United States (related to cyclic highs in lynx populations in Canada) (McKelvey et al. 2000b; Mowat et al. 2000). In Canada, the Hudson Bay Company maintained

fairly accurate annual lynx pelt data across the range of lynx, which reflect dramatic population cycles. In the Great Lakes Geographic Area, population dynamics in recent decades appear to be strongly driven by immigration from Canada (McKelvey et al. 2000b). However, in other areas and time periods it is not known to what extent the correlation is due to immigration from Canada, population responses to the same factors controlling northern populations, or a combination of the two.

A lack of accurate historic data limits our understanding of lynx population dynamics in the contiguous United States and precludes drawing definitive conclusions about lynx population trends. Historically, formal surveys designed specifically to detect lynx were rarely conducted. Many reports of lynx (e.g., visual observations, snow tracks) have been collected incidentally to other activities, but cannot be used to infer population trends. Long-term trapping data have been used to estimate population trends for various species. In the United States however, trapping returns are strongly influenced by trapper effort, which varies between years and, therefore, may not accurately reflect population trends. Another important problem to note is that trapping records of many States did not differentiate between bobcats and lynx, referring to both as "lynxcats." Overall, the available data are too incomplete to infer much beyond simple occurrence and distribution of lynx in the contiguous United States (McKelvey et al. 2000b).

Lynx are highly mobile and have a propensity to disperse long distances, particularly when prey becomes scarce (Mowat et al. 2000). Lynx also make long distance exploratory movements outside their home ranges (Aubry et al. 2000; Moen et al. 2004). Areas or habitats used by lynx during dispersal or exploratory movements are poorly understood at this time. Dispersing lynx may colonize suitable but unoccupied habitats, augment existing resident populations, or disperse to unsuitable or marginal habitats where they cannot survive. Numerous lynx mortality records exist from anomalous habitats or habitats where no records support evidence (either current or historical) of a reproducing population (McKelvey et al. 2000a). Many of these records correspond to post-population peaks in Canada, with some lag time for immigration (McKelvey et al. 2000a). We find no evidence of lynx populations becoming established in such areas.

We suspect that some areas in the contiguous United States naturally act as "sources" of lynx (recruitment is greater than mortality) that are able to disperse and potentially colonize other patches (McKelvey et al. 2000a). Other areas may function as "sinks" (mortality is greater than recruitment) where lynx are lost from the overall population. Sink habitats are most likely those places on the periphery of the southern boreal forest where habitat becomes more fragmented and more distant from larger lynx populations. Fluctuations in prey populations may cause some habitat patches to change from being sinks to sources, and vice versa. The ability of naturally dynamic habitat to support lynx populations may change as the habitat undergoes natural succession following natural or manmade disturbances (i.e., fire, insects, clearcutting).

Individual lynx maintain large home ranges (reported as generally ranging between 31 to 216 km^2 [12 to 83 mi^2]) (Koehler 1990; Aubry et al. 2000; Squires and Laurion 2000; Vashon et al. 2005a, Shenk 2009). Thus, a lynx population can only persist in a large boreal forested landscape that contains appropriate forest types, snow depths and high snowshoe hare densities.

In the Northeast, lynx were most likely to occur in areas that support deep snow (greater than 268 centimeters [106 inches] annual snowfall) associated with regenerating boreal forests in landscapes 100 square kilometers (40 square miles) or greater in area (Hoving et al. 2005). We assume areas with smaller patches of boreal forest are unlikely to provide a sufficient amount of habitat suitable to support a lynx population.

Lynx populations in the contiguous United States seem to be influenced by lynx population dynamics in Canada (Thiel 1987; McKelvey et al. 2000a, c). Many of these populations in Canada are directly interconnected to U.S. populations, and are likely a source of emigration into contiguous United States lynx populations. Therefore, we assume that retaining connectivity with larger lynx populations in Canada is important to ensuring long-term persistence of lynx populations in the U.S. We assume that, regionally, lynx within the contiguous United States and adjacent Canadian provinces interact as metapopulations and, therefore, assessments of population viability must be made at this larger scale and not solely based on populations within the contiguous United States.

Status and Distribution

The historic and present range of the lynx north of the contiguous United States includes Alaska and that part of Canada that extends from the Yukon and Northwest Territories south across the United States border and east to New Brunswick and Nova Scotia. In the contiguous United States, lynx historically occurred in the Cascades Range of Washington and Oregon; the Rocky Mountain Range in Montana, Wyoming, Idaho, eastern Washington, eastern Oregon, northern Utah, and Colorado; the western Great Lakes Region; and the northeastern United States region from Maine southwest to New York (McCord and Cardoza 1982; Quinn and Parker 1987). A thorough discussion and interpretation of lynx records through time is found in the Service's final rule (March 24, 2000, 65 FR 16052) and clarification of our findings (July 2003; 68 FR 40076).

The distribution of lynx in North America is closely associated with the distribution of North American boreal forest (Agee 2000). In Canada and Alaska, lynx inhabit the classic boreal forest ecosystem known as the taiga (McCord and Cardoza 1982; Quinn and Parker 1987; Agee 2000; McKelvey et al. 2000b). The range of lynx extends south from the classic boreal forest zone into the subalpine forest of the western United States, and the boreal/hardwood forest ecotone in the eastern United States (Agee 2000; McKelvey et al. 2000b). Forests with boreal features (Agee 2000) extend south into the contiguous United States along the Cascade and Rocky Mountain Ranges in the west, the western Great Lakes Region, and along the Appalachian Mountain Range of the northeastern United States. Within these general forest types, lynx are most likely to persist in areas that receive deep snow (Ruggiero et al. 2000). Lynx are rare or absent from the wet coastal forests of Alaska and Canada (Mowat et al. 2000).

At its southern margins in the contiguous United States, forests with boreal features, or southern boreal forests, become naturally fragmented as they transition into other vegetation types. Southern boreal forest habitat patches are small relative to the extensive northern boreal forest of Canada and Alaska, which constitutes the majority of lynx range. Many southern boreal forest

habitat patches within the contiguous United States cannot support resident populations of lynx and their primary prey species.

The complexities of lynx life-history and population dynamics, combined with a general lack of reliable population data for the contiguous United States, make it difficult to ascertain the past or present population status of lynx in the contiguous United States. It is difficult to determine with certainty whether reports of lynx in many States were (1) animals dispersing from northern populations that were effectively lost because they did not join or establish resident populations, (2) animals that were a part of a resident population that persisted for many generations, or (3) a mixture of both resident and dispersing animals.

The final rule determining threatened status for the lynx in the contiguous United States summarized lynx status and distribution across four regions that are separated from each other by ecological barriers consisting of spans of area lacking lynx habitat (March 24, 2000, 65 FR 16052). These distinct regions are the Northeast, the Great Lakes, the Northern Rocky Mountains/Cascades, and the Southern Rocky Mountains. While these regions are ecologically unique and discrete, the lynx is associated with only the southern boreal forest in each and, with the exception of the Southern Rocky Mountains Region, each area is geographically connected to the much larger population of lynx in Canada.

The following summarizes status and distribution information of the lynx DPS in the contiguous United States:

Northeast Region (Maine, New Hampshire, Vermont, New York)—Based on an analysis of cover types and elevation zones containing most of the lynx occurrences, McKelvey et al. (2000b) determined that, at the broad scale, most lynx occurrence records in the Northeast were found within the "Mixed Forest-Coniferous Forest-Tundra" cover type at elevations ranging from 250 to 750 meters (820 to 2,460 feet). This habitat type in the northeast United States occurs along the northern Appalachian Mountain range from southeastern Quebec, western New Brunswick, and western Maine, south through northern New Hampshire. This habitat type becomes naturally more fragmented and begins to diminish to the south and west, with a disjunct segment running north-south through Vermont, an extensive patch of habitat in the Adirondacks of northern New York, and with a few more distant and isolated patches in Pennsylvania (see Figure 8.23 in McKelvey et al. 2000b).

In the northeast, information on the presence of lynx was limited at the time of listing in 2000. In 1999, 6 lynx were radio-collared in northern Maine (March 24, 2000; 65 FR 16052). As of 2004, Maine Department of Inland Fisheries and Wildlife had radio-collared 43 lynx and documented 30 litters (Vashon et al. 2005b). Records show lynx to currently be distributed throughout northern Maine (November 9, 2005; 70 FR 68294). Lynx in Maine currently have high productivity; 91 percent of available adult females older than 2 years produced litters averaging 2.83 kittens (Vashon et al. 2005b). This area is the only area in the northeastern region of the lynx's range within the contiguous United States that currently supports breeding lynx populations and likely acts as a source or provides connectivity for peripheral portions of the lynx's range in the Northeast.

The preponderance of lynx habitat in this region occurs on private lands in the State of Maine. Federal agencies manage a minor amount of lynx habitat in this region. The final rule for critical habitat summarizes a number of private land conservation efforts for lynx in the region (November 9, 2006, 71 FR 66009).

Great Lakes Region (Minnesota, Wisconsin, Michigan)—The majority of lynx occurrence records in the Great Lakes Region is associated with the "mixed deciduous-coniferous forest" type (McKelvey et al. 2000b). Within this general forest type, the highest frequency of lynx occurrences were in the *Acer saccharum* (sugar maple), *Tilia* spp. (basswood), *Pinus banksiana* (jack pine), *P. strobus* (white pine), and *P. resinosa* (red pine) forest types (McKelvey et al. 2000b). These types are found primarily in northeastern Minnesota, northern Wisconsin, and the western portion of Michigan's Upper Peninsula.

Mixed deciduous-coniferous forest covers an extensive area in this region, but much of this area is considered marginal habitat for lynx because it is a transitional forest type at the edge of the snowshoe hare range. Habitat at the edge of hare range supports lower hare densities (Buehler and Keith 1982) that may not be sufficient to support lynx reproduction. Snow depths within appropriate habitat that allow lynx a competitive advantage over other carnivores (i.e., coyotes) occur only in limited areas in northeastern Minnesota, extreme northern Wisconsin, and Michigan's Upper Peninsula.

At the time of listing, we were unsure of whether the Great Lakes Region supported resident populations of lynx or if lynx documented in these areas were simply dispersing from Canada (March 24, 2000; 65 FR 16052) (McKelvey et al. 2000b). Since that time, numerous lynx have been verified from northeastern Minnesota through DNA analysis, radio- and GPS-collared animals, and documentation of reproduction (November 9, 2005; 70 FR 68294). Northeastern Minnesota is the only area in the Great Lakes region for which we have evidence of recent lynx reproduction; as such, it likely acts as a source or provides connectivity for more peripheral portions of the lynx's range in this region.

The Forest Service in Minnesota manages a preponderance of lynx habitat in this region. All National Forests in the region have amended or revised their Plans, and so addressed in part, on National Forest lands, the primary factor threatening the lynx: inadequacy of existing regulatory mechanisms, specifically the lack of guidance for conservation of lynx in National Forest Plans and BLM Plans. These include the Chippewa, Superior, Hiawatha, and Ottawa National Forests. Voyageurs National Park in Minnesota was designated as lynx critical habitat in 2006. This designation will ensure that lynx habitat within the park will be managed to conserve lynx.

The final rule for critical habitat summarizes other private land conservation efforts for lynx in the region (November 9, 2006, 71 FR 66009).

Northern Rocky Mountain/Cascades Region (Washington, Oregon, Idaho, Montana, northwestern Wyoming, Utah)—In this region, the majority of lynx occurrences are associated at a broad scale with the "Rocky Mountain Conifer Forest;" within this type, most of the

occurrences are in moist Douglas-fir (*Pseudotsuga menziesii*) and western spruce/fir forests (McKelvey et al. 2000b). Most of the lynx occurrences are in the 1,500-2,000 meters (4,920-6,560 feet) elevation class (McKelvey et al. 2000b). These habitats are found in the Rocky Mountains of Montana, Idaho, eastern Washington, and Utah, the Wallowa Mountains and Blue Mountains of southeast Washington and northeastern Oregon, and the Cascade Mountains in Washington and Oregon. The majority of verified lynx occurrences in the United States and the confirmed presence of resident populations are from this region. The boreal forest of Washington, Montana, and Idaho is contiguous with that in adjacent British Columbia and Alberta, Canada.

Northwestern Montana and the north Cascades in Washington currently have resident lynx populations, and strong evidence exists to support the presence of resident lynx distributed throughout much of the forest types considered lynx habitat in Montana and Washington (November 9, 2005; 70 FR 68294). Resident lynx populations exist in contiguous habitats in Idaho, Montana and northwestern Wyoming in the Greater Yellowstone Area (e.g., Murphy et al. 2004). Lynx have probably always occurred only intermittently in peripheral areas of Oregon and Utah, although the historical or current presence of resident populations in either of these States has not been confirmed.

The North Cascades, Yellowstone, and Glacier National Parks manage substantial amounts of lynx habitat in this region. Lynx occur in all three National Parks. Through National Park Service management, lynx habitat is generally managed in ways that promote natural ecological processes, which benefits lynx. Glacier National Park provides a large expanse of lynx habitat that is contiguous with lynx habitat in Canada. Of the three Parks, Glacier and North Cascades were determined to meet the habitat criteria requirements for critical habitat, and were designated critical habitat in 2006. This designation will further ensure that lynx habitat within the Parks will be managed to conserve lynx.

The BLM Spokane District in Washington manages lynx habitat and its Resource Management Plan was modified in 2003 to incorporate the provisions of the LCAS. On November 30, 2006, the Service completed consultation with the BLM for the revision of their Coeur d'Alene Resource Management Plan in which lynx were addressed. The Missoula BLM district has also amended their plan to abide by the standards and guides in the LCAS. The Cottonwood BLM in southern Idaho is in the process of amending their plan for lynx.

The Forest Service manages the preponderance of lynx habitat in this region. Through the Northern Rockies Lynx Amendment, 18 National Forests in the region addressed the primary factor threatening the lynx on National Forest lands: inadequacy of existing regulatory mechanisms, specifically the lack of guidance for conservation of lynx in National Forest Plans and BLM Plans. The Boise, Payette, and Sawtooth National Forests of Idaho have amended or revised their Plans to address this factor, as have the Uinta and Wasatch-Cache National Forests in Utah. Region 6 of the Forest Service in Washington intends to address this factor through Forest Plan revision, which has started for the Okanogan-Wenatchee and Colville (all occupied by lynx), and the Malheur, Wallowa-Whitman, Umatilla (unoccupied) National Forests. The Mount Baker National Forest Plan is not yet in revision.

The final rule for critical habitat summarizes other private land conservation efforts for lynx in the region (November 9, 2006, 71 FR 66009). See also the discussion in this biological opinion, under *Cumulative Effects*.

Southern Rocky Mountains Region (Colorado, southeastern Wyoming)—Colorado represents the extreme southern edge of the range of the lynx. A majority of the lynx occurrence records in Colorado and southeastern Wyoming were associated with the "Rocky Mountain Conifer Forest" type. The occurrences in the Southern Rockies were generally at higher elevations (8,000-12,000 feet) than were all other occurrences in the West (Ruediger et al. 2000).

The southern boreal forest of Colorado and southeastern Wyoming is isolated from boreal forest in Utah and northwestern Wyoming by the Green River Valley and the Wyoming basin (Findley and Anderson 1956 in McKelvey et al. 2000b). We believe that these areas likely reduce opportunities for genetic interchange with the Northern Rocky Mountains/Cascades Region and Canada (Halfpenny et al. 1982; Koehler and Aubry 1994). However, although habitats in the Southern Rockies are far from source populations and more isolated, it is still possible that dispersers could arrive in the Southern Rocky Mountains during highs in the population cycle. A number of lynx from the reintroduced population in Colorado have recently dispersed great distances, with occurrences located in Kansas, Nevada, South Dakota, Arizona, Idaho, Nebraska, Montana, Wyoming and New Mexico (T. Shenk, pers. comm. 2007 *in* USFWS 2007). Thirty-three different individuals were located in Wyoming, seven in Montana and six in Nebraska. Such information indicates that dispersing lynx are able to traverse long distances across extremely variable terrain.

A resident lynx population likely occurred historically in the Southern Rocky Mountains Region, based on the records of lynx in Colorado and the persistence of contiguous habitat in southeastern Wyoming with the Colorado habitat. This resident population may have been extirpated, which led the Colorado Division of Wildlife (CDOW) to undertake a reintroduction effort. The CDOW released 218 adult lynx released between 1999 and 2006. (See *Environmental Baseline, Status of the Species within the Action Area* for more information on the reintroduction on lynx into Colorado).

Two-hundred eighteen lynx were released during the CDOW's reintroduction program. There are 122 known mortalities as of June 2010 (T. Shenk, CDOW, pers. comm. 2011). The Colorado Division of Wildlife is no longer actively monitoring lynx within the state; therefore, accurate population numbers are not known. One-hundred forty-one kittens have been born in Colorado (J. Ivan, CDOW, pers. comm. 2011), but survival of kittens is currently unknown.

The Service issued a biological opinion on the effects of the Southern Rocky Mountains Lynx Amendment on the Distinct Population Segment (DPS) of Canada lynx in the contiguous United States (USFWS 2008). The status of the DPS presented in the biological opinion reflects the current status of lynx within the DPS and is incorporated here by reference and considered part of the environmental baseline for this action.

Reports from other locations—During the early 1960s, concurrent with an unprecedented cyclic high in Canada, lynx moved into the Great Plains and the Midwest Region of the United States (Gunderson 1978; Mech 1980; DeStefano 1987). These records are outside of the southern boreal forests where most lynx occurrences are found (McKelvey et al. 2000b). We consider lynx observations in Nevada, North Dakota, South Dakota, Iowa, Nebraska, Indiana, Ohio, and Virginia to be individuals dispersing subsequent to periods of cyclic high lynx numbers in Canada (Hall and Kelson 1959; Burt 1954 in Brocke 1982; McKelvey et al. 2000b). We do not consider these States to be within the contiguous United States range of lynx (65 FR 16052, March 24, 2000).

Recovery Outline

We developed a recovery outline for lynx in the contiguous United States (USFWS 2005). The outline serves as an interim strategy to guide recovery efforts until a final recovery plan is completed. The lynx recovery outline presents our current understandings of historical and current lynx distribution, ecology, and population dynamics.

The outline introduces concepts regarding the relative importance of different geographic areas to the persistence of lynx in the contiguous United States, identifying areas as either core, provisional core, secondary or peripheral based on lynx records over time and evidence of reproduction. The recovery outline provides four preliminary recovery objectives, which are accompanied by recovery actions needed to attain objectives. Recovery Action 6.2 states: Identify the risk to lynx populations posed by forest management techniques and human-induced mortality from factors such as roads, trapping and hunting. These factors are to be addressed as necessary to ensure the long-term persistence of lynx populations in core areas. A discussion of how the proposed action relates to the recovery outline can be found later in this document, under the *Effects of the Action* section.

In addition to determining whether an area is occupied by lynx, the Service examined lynx habitat and designated areas according to their known or projected quality and importance in lynx recovery. The areas with the strongest long-term evidence of the persistence of lynx populations within the contiguous United States are defined as "core areas." Core areas have both persistent verified records of lynx occurrence over time and recent evidence of reproduction. Six core areas along with a provisional core area within the Southern Rockies (Colorado and southern Wyoming) were identified within the contiguous United States. The provisional core area in the Southern Rockies was identified because it contains a reintroduced population. Reproduction has been documented in this introduced population; however, it is too early to determine whether a self-sustaining lynx population will result. "Focusing lynx conservation efforts on these core areas will ensure the continued persistence of lynx in the contiguous U.S by addressing fundamental principles of conservation biology."

The recovery outline continues, "At this time, the role of areas outside of core areas in sustaining lynx populations in the contiguous United States is unclear. The fluctuating nature of lynx population dynamics and the ability of lynx to disperse long distances have resulted in many individual occurrence records outside of core areas, without accompanying evidence of historic or

current presence of lynx populations." Areas classified as "secondary areas" are those with historical records of lynx presence with no record of reproduction; or areas with historical records and no recent surveys to document the presence of lynx and/or reproduction. If future surveys document presence and reproduction in a secondary area, the area could be considered for elevation to core. We hypothesize that secondary areas may contribute to lynx persistence by providing habitat to support lynx during dispersal movements or other periods, allowing animals to then return to "core areas." In "peripheral areas," the majority of historical lynx records is sporadic and generally corresponds to periods following cyclic lynx population highs in Canada.

Conservation Needs of the Canada Lynx

Conservation needs are the methods and procedures which are necessary to bring a listed species to a point where the species no longer needs the protection of the Endangered Species Act (Endangered Species Consultation Handbook 1998). For purposes of this document, conservation needs are considered to be synonymous with the species' survival and recovery needs.

On September 12, 2005, the Service released a Recovery Outline for the contiguous United States DPS of the Canada lynx (USFWS 2005). The recovery outline is intended to provide the Service's interim guidance on recovery efforts until a draft recovery plan has been completed. The outline provides a general overview of the available information on the DPS, and provides preliminary recovery objectives and actions based on our understanding of current and historical lynx occurrence and lynx population dynamics in the contiguous United States. Within the Recovery Outline, the Southern Rockies Geographic Area (Colorado and southern Wyoming) is identified as a provisional core area.

The Forest Service and the Bureau of Land Management (BLM) signed 4-year Conservation Agreements with the Service in 2000. The Forest Service amended their Forest plans within portions of the Northern Rock Mountain Geographic area, and within all Forests within the Southern Rocky Mountain Geographic area, to provide for the conservation of lynx. The BLM agreement expired and their management plans have not been amended to include conservation measures for lynx. However, the BLM continues to follow conservation guidance provided by the Lynx Conservation Assessment and Strategy (Ruediger et al. 2000).

Threats in Colorado

In the Southern Rockies, urban expansion and development have further fragmented an already patchy distribution of lynx habitat. Valley floor development continually erodes the amount of non-forest habitats. The expansion of homes and some municipal facilities up mountain slopes, into forests of aspen, lodgepole pine, and to a lesser degree spruce-fir, adds to the fragmentation of a naturally fragmented landscape. The cumulative effect of private land development and expansion of recreational facilities in and adjacent to lynx habitat may reduce the ability of lynx to move throughout their home range, or interact with other individuals in the larger subpopulation (Ruediger et al. 2000).

As ski areas are developed, they add to the overall fragmentation of the landscape in the Southern Rockies. If these developed areas occur jointly with (back to back ski areas) or abut the expansion occurring on private land, then there is a higher likelihood that lynx will have a more difficult time moving across these portions of the Southern Rockies landscape. Although lynx have been documented inhabiting ski areas in Canada (Roe et al. 1999), most observations have been within forest cover and away from base area developments and parking facilities (Roe et al. 1999). As noted by Buskirk et al. (2000), lynx and snowshoe hare habitats are more prone to a metapopulation structure in western forests due to fragmented landscapes and heterogeneous distribution of topographic, climatic, and floristic conditions. This condition is exacerbated by the presumably greater human-caused fragmentation of lynx habitat in the south (Buskirk et al. 2000). What little is known about lynx populations in the contiguous United States indicates that the subpopulations are not large. Until more is known about the current distribution and size of these small subpopulations, it is unwise to assume they can be reduced or further isolated without increasing the risk of loss of viability (McKelvey et al. 2000a).

Roads and highways lead to increased fragmentation in an already naturally fragmented habitat resulting in restricted habitat use, impaired home range effectiveness, inhibited local and dispersal movements, and roadkill. Lynx use may be further impaired along highways by adjacent human developments, including, but not limited to, suburban development (USFWS 2000, 2003b). Rare carnivore populations may be particularly susceptible to the effects of highways due to the large movement requirements of individuals and the natural low recruitment rate of juveniles into the breeding population (Ruediger 1996).

Fourteen lynx reintroduced by the State of Colorado have been killed attempting to cross highways, as well as an additional Colorado-born lynx. Roe and Poole (2004) observed that lynx highway mortality rates are decreasing with time despite an increasing number of lynx in the Colorado population. They speculate that this could be related to lynx becoming more resident and sedentary, as opposed to dispersing/exploratory movements in an unfamiliar landscape, and to the CDOW's improved release technique that contributed to the high initial highway mortality rate. Based on results of the reintroduction attempts in New York and New Hampshire (Brocke et al. 1990, 1993), the CDOW anticipated that some highway lynx mortality could occur (Seidel et al. 1998). In Colorado, 4 lynx are known to have been killed on I-70, 3 on highway 550, and 1 each on Highways 17, 160, and 9. Five of the 14 lynx carcasses were recovered in 2005. Additionally, four roadkill mortalities were reported from adjacent states (Kansas, New Mexico, and Wyoming) and another in Iowa.

Preble's meadow jumping mouse

The Preble's meadow jumping mouse is a member of the family Dipodidae (jumping mice) with four living genera, two of which, *Zapus* and *Napaeozapus*, are found in North America (Hall 1981). The three living species within the genus *Zapus* are *Z. hudsonius* (the meadow jumping mouse), *Z. princeps* (the western jumping mouse), and *Z. trinotatus* (the Pacific jumping mouse). Edward A. Preble (1899) first documented the meadow jumping mouse from Colorado. Krutzsch (1954) described Preble's as a separate subspecies of meadow jumping mouse limited to Colorado and

Wyoming. Preble's is now recognized as one of twelve subspecies of meadow jumping mouse (Hafner et al. 1981).

The Preble's meadow jumping mouse is a small rodent with an extremely long tail, large hind feet and long hind legs. The tail is bicolored, lightly-furred and typically twice as long as the body. The large hind feet can be one-third again as large as those of other mice of similar size. Preble's has a distinct, dark, broad stripe on its back that runs from head to tail and is bordered on either side by grey to orange-brown fur. The hair on the back of all jumping mice appears coarse compared to other mice. The underside hair is white and much finer in texture. Total length of adult Preble's mice is approximately 7 to 10 inches and tail length is 4 to 6 inches (Krutzsch 1954, Fitzgerald et. al. 1994). The average weight of 120 adult Preble's mice captured early in their active season (prior to June 18) was 0.6 ounces; included were 10 pregnant females weighing more than 0.8 ounces (Meaney et al., 2002).

The Service added the Preble's meadow jumping mouse to the List of Endangered and Threatened Wildlife in 50 CFR 17.11 as a threatened species on May 13, 1998 (63 FR 26517). The Service revised designated critical habitat for Preble's in 50 CFR Part 17 on December 15, 2010 (75 FR 78429). Critical habitat for Preble's includes approximately 411 miles (662 km) of rivers and streams and 34,935 acres (14,138 ha) of lands in Colorado. Lands designated as critical habitat are under Federal, State, local government, and private ownership. No lands designated as critical habitat are under Tribal ownership.

Primary constituent elements are physical and biological features essential to the conservation of the species and that may require special management considerations and protection. For Preble's, primary constituent elements include those habitat components essential for the biological needs of reproducing, rearing of young, foraging, sheltering, hibernation, dispersal, and genetic exchange. The primary constituent elements for Preble's are a pattern of dense riparian vegetation consisting of grasses, forbs, and shrubs, and open water; adjacent floodplains and vegetated uplands with limited human disturbance; areas that provide connectivity between and within populations, and; dynamic geomorphological and hydrological processes that create and maintain river and stream channels, floodplains, and floodplain benches, and promote patterns of vegetation favorable to Preble's.

Designated critical habitat units include only river and stream reaches, and adjacent floodplains and uplands, that are within the known geographic and elevational range of the Preble's, have the primary constituent elements present, and, based on the best scientific data available, are believed to currently support Preble's.

We considered several qualitative criteria to judge the current status and probable persistence of Preble's populations in the selection and designation of specific areas as critical habitat. These include: the quality, continuity, and extent of habitat components present; the state of natural hydrological processes that maintain and rejuvenate suitable habitat components; the presence of lands devoted to conservation, either public lands such as parks, wildlife management areas, and dedicated open space, or private lands under conservation easements; and the landscape context of the site, including the overall degree of current human disturbance and presence, and likelihood of future development based on local planning and zoning.

Activities with the potential for altering the primary constituent elements are those that result in development or alteration of the landscape within a unit, including land clearing activities associated with construction for urban and industrial development; some agricultural activities; activities resulting in changes in the hydrology of a unit; activities that detrimentally alter natural processes in a unit, and; activities that could lead to the introduction, expansion, or increased density of exotic plant or animal species detrimental to Preble's and its habitat.

The Service used the Recovery Team's Draft Discussion Document of February 27, 2002 (Working Draft), and the concepts described within it as a source of the best scientific and commercial data available on Preble's, and also used it as a starting point for identifying areas that are essential for the conservation of Preble's. To recover Preble's to the point where it can be delisted, the Working Draft identifies the need for a specified number, size, and distribution of wild, self-sustaining Preble's populations across its known range.

The Working Draft identifies recovery criteria for two Recovery Units where Preble's occurs: the North Recovery Unit and the South Recovery Unit. The Recovery Units are roughly separated by the Denver Metropolitan area. The Working Draft uses 8-digit HUC boundaries to define subdrainages, and identifies 13 HUCs as occupied or potentially occupied. Of these, six are located in the North Recovery Unit, and seven are located in the South Recovery Unit. Further, the Working Draft defines large populations as maintaining 2,500 mice and usually including at least 50 miles of rivers and streams. Medium populations maintain 500 mice over at least 10 miles of rivers and streams, and small populations maintain 150 mice over 3 miles of stream. In addition, the Working Draft calls for one large and two medium populations in three separate HUCs, as well as three small populations within each of the remaining three HUCs within the North Recovery Unit, and one large population and two medium populations in three separate HUCs, as well as three small populations in each of the remaining four HUCs within the South Recovery Unit. We are currently in the process of updating the Working Draft.

Life History

Habitat

Typical habitat for Preble's meadow jumping mouse is composed of well-developed plains riparian vegetation with adjacent, relatively undisturbed grassland communities and a nearby water source. Well-developed plains riparian vegetation typically includes a dense combination of grasses, forbs, and shrubs; a taller shrub and tree canopy may be present (Bakeman 1997). When present, the shrub canopy is often willow, although other shrub species, including snowberry (*Symphoricarpos* spp.), chokecherry (*Prunus virginiana*), hawthorn (*Crataegus* spp.), Gambel's oak (*Quercus gambelli*), alder (*Alnus incana*), river birch (*Betula fontinalis*), skunkbrush *(Rhus trilobata*), wild plum (*Prunus americana*), lead plant (*Amorpha fruticosa*), dogwood *(Cornus sericea*) and others may also occur (Bakeman 1997, Shenk and Eussen 1998). Preble's have rarely been trapped in uplands adjacent to riparian areas (Dharman 2001). However, Preble's have been found feeding and resting in adjacent uplands (Shenk and Sivert 1999b, Schorr 2001) as far out as 328 feet beyond the 100-year floodplain (Ryon 1999, Tanya Shenk, Colorado Division of Wildlife, in litt., 2002). Preble's can also move

considerable distances along streams, as far as 1 mile in one evening (Ryon 1999, Shenk and Sivert 1999a). Adjacent uplands used by the Preble's meadow jumping mouse are extremely variable ranging from open grasslands to ponderosa pine (*Pinus ponderosa*) woodlands (Corn et al. 1995, Pague and Grunau 2000).

Riparian shrub cover, tree cover, and the amount of open water nearby are good predictors of Preble's densities (White and Shenk 2000). Estimates of abundance ranged from 6 to 110 mice per mile and averaged 53 mice per mile of stream. A comparison of habitats at capture locations on the Department of Energy's Rocky Flats Site in Jefferson County, Colorado, and the U.S. Air Force Academy in El Paso County, Colorado revealed that Academy sites had lower plant species richness at capture locations but considerably greater numbers of Preble's (Schorr 2001). However, the Academy sites also had higher densities of both grasses and shrubs. Preble's abundance is likely driven by the density of riparian vegetation rather than the diversity of plant species.

Preble's is a true hibernator, usually entering hibernation in September or October and emerging the following May, after a potential hibernation period of seven or eight months. Adults enter hibernation earliest because they accumulate the necessary fat stores sooner than young of the year. Similar to other subspecies of meadow jumping mouse, Preble's do not store food, but survive on fat stores accumulated prior to hibernation (Whitaker 1963). Apparent hibernacula (hibernation nests) of Preble's have been located both within and outside of the 100-year floodplain of streams (Shenk and Sivert 1999a, Ryon 2001, Schorr 2001). Those hibernating outside of the 100-year floodplain would likely be less vulnerable to flood-related mortality. Fifteen apparent Preble's hibernacula have been located through radio telemetry, all within 260 feet of a perennial streambed or intermittent tributary (Bakeman and Deans 1997, Shenk and Sivert 1999a, Schorr 2001).

Hibernacula have been located under willow, chokecherry, snowberry, skunkbrush, sumac (*Rhus* spp.), clematis (*Clematis* spp.), cottonwoods (*Populus* spp.), Gamble's oak, thistle (*Cirsium* spp.), and alyssum (*Alyssum* spp.) (Shenk and Sivert 1999a). At the Air Force Academy near Colorado Springs, 4 of 6 likely hibernacula found by radio-telemetry were located in close proximity to coyote willow (*Salix exigua*) (Schorr 2001). The one excavated hibernaculum at Rocky Flats south of Boulder, was found 30 feet above the streambed, in a dense patch of chokecherry and snowberry (Bakeman and Deans 1997). The nest was constructed of leaf litter 12 inches below the surface in coarse textured soil.

Preble's construct day nests composed of grasses, forbs, sedges, rushes, and other available plant material. They may be globular in shape or simply raised mats of litter, and are most commonly above ground but can also be below ground. They are typically found under debris at the base of shrubs and trees, or in open grasslands (Ryon 2001). An individual mouse can have multiple day nests in both riparian and grassland communities (Shenk and Sivert 1999a), and may abandon a nest after approximately a week of use (Ryon 2001).

Hydrologic regimes that support Preble's habitat range from large perennial rivers such as the South Platte River to small ephemeral drainages only 3 to 10 feet in width, as at Rocky Flats and in montane habitats. Flooding is a common and natural event in the riparian systems along the Front Range of Colorado. This periodic flooding helps create a dense vegetative community by

stimulating resprouting from willow shrubs and allows herbs and grasses to take advantage of newly-deposited soil.

Reproduction

Preble's usually have two litters per year, but there are records of three litters per year. An average of five young are born, but the size of a litter can range from two to eight young (Quimby 1951, Whitaker 1963). Preble's are long-lived for a small mammal, in comparison with many species of mice and voles that seldom live a full year. Along South Boulder Creek, Boulder County, Colorado, seven individuals originally captured as adults were still alive two years later, having attained at least three years of age (Meaney et al., 2002).

Predation

Preble's have a host of known predators including garter snakes (*Thamnophis* spp.), prairie rattlesnake (*Crotalus viridus*), bullfrog (*Rana catesbiana*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), house cat (*Felis catus*), long-tailed weasel (*Mustela frenata*), and Red-tailed Hawk (*Buteo jamaicensis*) (Shenk and Sivert 1999a, Schorr 2001). Other mortality factors of Preble's include drowning and vehicle collision (Schorr 2001, Shenk and Sivert 1999a). Mortality factors known for the meadow jumping mouse, such as starvation, exposure, disease, and insufficient fat stores for hibernation (Whitaker 1963) are also likely causes of death for Preble's.

Diet

While fecal analyses have provided the best data on Preble's diet to date, they overestimate the components of the diet that are less digestible. The diet shifts seasonally; it consists primarily of insects and fungus after emerging from hibernation, shifts to fungus, moss, seeds, and pollen during mid-summer (July-August), with insects again added in September (Shenk and Sivert 1999a). The shift in diet along with shifts in mouse movements suggests that Preble's may require specific seasonal diets, perhaps related to the physiological constraints imposed by hibernation (Shenk and Sivert 1999a).

Population Dynamics

Preble's annual survival rate is low. Preble's survival rates appear to be lower over the summer than over the winter. Over-summer survival rates ranged from 22 to 78 percent and over-winter survival rates ranged from 56 to 97 percent (Shenk and Sivert 1999b, Schorr 2001, Meaney et al. 2002). Additionally, fire is a natural component of the Colorado Front Range and Wyoming foothills and Preble's habitat naturally fluctuates with fire events. Within shrubland and forest, intensive fire may result in adverse impacts to Preble's populations. However, in a review of the effects of grassland fires on small mammals, Kaufman et al. (1990) found a positive effect of fire on the meadow jumping mouse in one study and no effect of fire on the species in another study.

Status and Distribution

The Preble's meadow jumping mouse is found along the foothills in southeastern Wyoming, southward along the eastern edge of the Front Range of Colorado to Colorado Springs, El Paso County (Hall 1981, Clark and Stromberg 1987, Fitzgerald et al. 1994). Knowledge about the current distribution of the Preble's comes from collected specimens, and live-trapping locations from both range-wide survey efforts and numerous site-specific survey efforts conducted in Wyoming and Colorado since the mid-1990s. Recently collected specimens are housed at the Denver Museum of Nature and Science (DMNS) and survey reports are filed with the Service's Field Offices in Colorado and Wyoming.

In Wyoming, capture locations of mice confirmed as Preble's, and locations of mice identified in the field as Preble's and released, extend in a band from the town of Douglas southward along the Laramie Range to the Colorado border, with captures east to eastern Platte County and Cheyenne, Laramie County. Recently, Preble's have been documented west of the Laramie Range in the Upper Laramie drainage. In Colorado, the distribution of Preble's forms a band along the Front Range from Wyoming southward to Colorado Springs, El Paso County, with eastern marginal captures in western Weld County, western Elbert County and north-central El Paso County.

Preble's is likely an Ice Age relict (Hafner et al. 1981, Fitzgerald et al. 1994). Once the glaciers receded from the Front Range of Colorado and the foothills of Wyoming and the climate became drier, Preble's was confined to the riparian (river) systems where moisture was more plentiful. The semi-arid climate in southeastern Wyoming and eastern Colorado limits the extent of riparian corridors and restricts the range of Preble's in this region. Preble's has not been found east of Cheyenne in Wyoming or on the extreme eastern plains in Colorado. The eastern boundary for the subspecies is likely defined by the dry shortgrass prairie, which may present a barrier to eastward expansion (Beauvais 2001).

The western boundary of Preble's range in both states appears related to elevations along the Laramie Range and Front Range. The Service has used 2,300 meters (7,600 feet) in elevation as the general upward limit of Preble's habitat in Colorado (USFWS 1998a). Recent morphological examination of specimens has confirmed Preble's to an elevation of approximately 7,600 feet in Colorado (Meaney et al. 2001) and to 7,750 feet in southeastern Wyoming (Cheri Jones, DMNS, in litt., 2001). In a modeling study of habitat associations in Wyoming, Keinath (2001) found suitable habitat predicted in the Laramie Basin and Snowy Range Mountains (west of known Preble's occurrence) but very little suitable habitat predicted on the plains of Goshen, Niobrara, and eastern Laramie counties (east of known Preble's occurrence).

Preble's is closely associated with riparian ecosystems that are linear in nature and represent a small percentage of the landscape. If Preble's habitat is destroyed or modified, populations in those areas may decline or be extirpated. The decline in the extent and quality of Preble's habitat is considered the main factor threatening the subspecies (USFWS 1998a, Hafner et al. 1998, Shenk 1998). Habitat alteration, degradation, loss, and fragmentation resulting from urban development, flood control, water development, intensive agricultural activities, and other human land uses have adversely affected Preble's populations. Habitat destruction may impact individual Preble's directly or by

destroying nest sites, food resources, and hibernation sites, by disrupting behavior, or by forming a barrier to movement.

Although there is little information on past distribution or abundance of Preble's, surveys have identified various locations where the subspecies was historically present but is now absent (Ryon 1996). Despite numerous surveys, Preble's has not recently been found in the Denver and Colorado Springs metropolitan areas and is believed to be extirpated from these areas as a result of extensive urban development. Since at least 1991, Preble's has not been found in Denver, Adams, and Arapahoe counties in Colorado. Its absence in these counties is likely due to urban development, which has altered, reduced, or eliminated riparian habitat (Compton and Hugie 1993, Ryon 1996).

The increasing presence of humans near Preble's habitats may result in increased level of predation that may pose a threat to Preble's. The striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), red fox, and the domestic and feral cat are found in greater densities in and around areas of human activity; all four of these species feed opportunistically on small mammals. Introduction of species such as the bullfrog into waters within Preble's range may result in additional predation. The fact that summer mortality is higher than overwinter mortality underscores the impact that predators can have on Preble's.

Threats

Conversion of native riparian ecosystems to commercial croplands and grazed rangelands was identified as the major threat to Preble's persistence in Wyoming (Clark and Stromberg 1987, Compton and Hugie 1993). Certain grazing and haying management scenarios maintain what appears to be good habitat for Preble's. However, intensive grazing and haying operations may negatively impact Preble's by removing food and shelter. While some Preble's populations coexist with livestock operations, overgrazing can decimate riparian communities on which Preble's depends. Similarly, haying operations (and the associated water development) that allow significant riparian vegetation to remain in place appear to be compatible with persistence of Preble's populations. In fact, the large populations of Preble's occur in grazed and hayed areas along Cottonwood Creek, Chugwater Creek, and Horse Creek in Wyoming.

Recreational trail systems frequently parallel or intersect riparian communities and thus are common throughout Preble's range. Trail development can alter natural communities and may impact Preble's by modifying nest sites, food resources, and hibernation sites; fragmenting its habitat; and increasing predation. Humans and pets using these trails may alter behavior patterns of Preble's and cause a decrease in survival and reproductive success.

Habitat fragmentation limits the extent and abundance of Preble's. In general, as animal populations become fragmented and isolated, it becomes more difficult for them to persist. Small, isolated patches of habitat are unable to support as many Preble's mice as larger patches of habitat. When threats to persistence are similar, larger populations are more secure from extirpation than smaller ones.

The structure and function of riparian ecosystems are determined by the hydrology of the waterway. Water development and management may facilitate development of lush riparian vegetation by maintaining more moisture in the riparian areas for longer periods of time, particularly in times of drought. However, changes in timing and abundance of water may also alter the channel structure, riparian vegetation, and the adjacent floodplain, in a manner that results in changes that are detrimental to the persistence of Preble's. Increased development and impervious surface within a drainage can result in more frequent and severe flood events and prevent the maintenance of riparian communities. Bank stabilization, channelization, and other measures to address flooding and storm water runoff have increased the rate of stream flow, straightened riparian channels, and narrowed riparian areas (Pague and Grunau 2000). Using riprap and other structural stabilization options to reduce erosion can destroy riparian vegetation, and prevent or prolong its reestablishment. These measures can alter the hydrologic processes and plant communities present to the point where Preble's populations can no longer persist.

Alluvial aggregate extraction may produce long-term changes to Preble's habitat by altering hydrology and removing riparian vegetation. In particular, such extraction removes and often precludes reestablishment of habitat components required by Preble's. Such mining impacts the deposits of alluvial sands and gravels that may be important hibernation locations for the Preble's.

Transportation and utility corridors frequently cross Preble's habitat and may negatively affect populations. As new roads are built and old roads are maintained, habitat can be destroyed or fragmented. Roads and bridges also may act as barriers to dispersal. Train and truck accidents within riparian areas may release spills of chemicals, fuels and other substances that may impact the mouse or its habitat. Sewer, water, communications, gas, and electric lines cross Preble's habitat. Their right-of-ways can contribute to habitat disturbance and fragmentation through new construction and periodic maintenance. However, construction-related impacts are often short term when adequate rehabilitation and reclamation actions are implemented.

Invasive, noxious plants can encroach upon a landscape and displace native plant species. This change reduces the abundance and diversity of native plants, and may negatively impact cover and food sources for Preble's. The control of noxious weeds may also impact Preble's where large-scale removal of vegetation occurs through chemical treatments and mechanical mowing operations.

Pesticides and herbicides are used within the range of Preble's. Inappropriate use of these chemicals may harm Preble's directly or when ingested by Preble's with food or water. Overall, an integrated pest management approach (use of biological, chemical, and mechanical control) may help reduce the threat of chemicals, but allow for the control of target species. Fire, particularly catastrophic fires, can alter habitat dramatically and change the structure and composition of the vegetation communities so that Preble's may no longer persist. In addition, precipitation falling in a burned area may degrade Preble's habitat by causing greater levels of erosion and sedimentation along creeks. Controlled use of fire may be one method to maintain appropriate riparian, floodplain, and upland vegetation within Preble's habitat. However, over the past several decades, as human presence has increased through Preble's range, significant effort has been made to suppress fires. Long periods of fire suppression may result in a build-up of fuel and result in a catastrophic fire.

On July 9, 2008, the Service determined that Preble's populations in Wyoming should be removed from protection under the Act, but concluded that Preble's populations in Colorado comprise a significant portion of its range requiring continued protection and that Colorado populations would remain listed.

On December 15, 2010, Critical Habitat was re-designated but does not include the project area.

Greenback cutthroat trout

The greenback cutthroat trout inhabits cold water streams and lakes with adequate stream spawning habitat present in the spring. The greenback cutthroat trout is the only trout endemic to the headwaters of the South Platte River and Arkansas River drainages. Although once abundant, their numbers declined in the late 1800s due to loss of habitat caused by mining and agriculture, over-harvest, and introduction of non-native trout species. The greenback cutthroat trout was extirpated from most of its native range by the early 1900s. In 1973, two small populations were confirmed that represented approximately 2,000 greenback cutthroat trout in 4.6 km of stream. The subspecies was listed as "endangered" under the Act in 1973, and downlisted to "threatened" in 1978. As a result of recovery efforts, captive broodstocks were established, non-natives were removed from suitable habitat, greenback cutthroat trout were reintroduced, stable populations were developed, and catch-and-released fisheries were initiated. Limiting factors include other spring spawning trout species that hybridize with greenback cutthroat trout (i.e., rainbow trout), and fall spawning species that compete with greenback cutthroat trout for food and space (i.e., brook trout, brown trout). Critical habitat has not been designated for the greenback cutthroat trout.

The original distribution of the subspecies is not precisely known due to its rapid decline in the 1800s. It is assumed that the original distribution included all mountain and foothill habitats of the two drainage systems, including drainages at lower elevations than it occupies today (Behnke and Zarn 1976). The subspecies may have extended as far east as present day Greeley, Colorado, during the mid-1800s (WNTI 2007).

Type A greenback cutthroat trout populations are those that are considered to be genetically pure (as defined at the time of the 1998 Recovery Plan). The greenback cutthroat trout will be considered recovered when the existence of 20 stable populations of pure (Type A) greenback cutthroat trout populations are documented representing a minimum of 50 ha (124 acres) of lakes and 50 km (31 miles) of streams. A greenback cutthroat trout population is considered stable when there is a minimum of 22 kilograms of fish per hectare of habitat through natural reproduction. The populations should consist of a minimum of 500 adults greater than 120 millimeters in total length, and represent a minimum of 2-year classes within a 5-year period (USFWS 1998b).

When the 1998 Recovery Plan was written, there were greenback cutthroat trout present within 179 ha (442 acres) of lakes and 164 km (102 miles) of stream habitat. Although many of these areas included low density or non-reproducing populations, 17 stable populations were located in the South Platte drainage and 3 stable populations in the Arkansas drainage (USFWS 1998b). Recovery criteria require at least five stable Type A populations to occur in the Arkansas River drainage. As of 2008, there were 167 ha of occupied lakes and 228 km of occupied streams. The drop in occupied

hectares of lakes from 1998 to 2008 is due to renovation of two reservoirs (65 ha), which are anticipated to be restocked with pure greenback cutthroat trout in the near future. This criterion was considered to have been met in the South Platte drainage, and was close to being met in the Arkansas River drainage, prior to questions arising regarding the genetic status of greenback cutthroat trout populations (see section below on *Genetic Variation*). The number of qualifying Type A populations and their distribution will need to be reassessed once a determination is made as to which populations qualify as Type A greenback cutthroat trout.

Habitat

Greenbacks, like other cutthroat trout, generally require clear, cold, well-oxygenated water (McGrath 2004). High sediment loads, pollution, and diversion of streams for agricultural or municipal purposes can all adversely affect greenback cutthroat trout habitat. In general, trout require different habitat types for different life stages: juvenile (protective cover and low velocity flow, as in side channels and small tributaries); spawning (riffles with clean gravels); over-winter (deep water with low velocity flow and protective cover); and adult (juxtaposition of slow water areas for resting and fast water areas for feeding, with protective cover from boulders, logs, overhanging vegetation or undercut banks) (Behnke 1992). Cutthroat trout use pools more often relative to riffles during the summer (Young et al. 1997). The heads of pools are used as foraging sites during the day because it gives trout the maximum energy return at minimum cost. During the winter, deep pools are important because fish require less energy expenditure, and the pools provide cover from predators and stable habitat when ice conditions vary (Harig and Fausch 2002, Young 2009).

Harig and Fausch (2002) developed a model, based on a comparative field study, that predicted cold summer water temperature, narrow stream width, and lack of deep pools limited translocation success of the greenback cutthroat trout. Field studies conducted on factors limiting cutthroat trout recruitment success into translocation streams in Rocky Mountain National Park and several National Forests, suggest that low water temperatures (averaging 7.8 °C or below in July) may have an adverse effect on greenback cutthroat trout fry (young fish) survival and recruitment (Coleman and Fausch 2007a, b). They also found that stream flows may influence recruitment and growth of cutthroat fry. Coleman and Fausch (2007a, b) found that streams that accumulate 900 to 1,200 °C-days cumulatively during the growing season afforded the best opportunity for cutthroat trout recruitment and translocation success.

A suite of broad-scale environmental parameters were derived for all streams within Colorado to help describe the relative habitat condition of occupied streams (Albeke 2008). The study found that most occupied greenback cutthroat trout streams are at high elevation (average 9,327 feet) and relatively small in size. The average length of a contiguously occupied stream segment is 2.37 km and the average occupied lake is 4.76 ha (Albeke 2008). More than 90 percent of the stream segments occupied by greenback cutthroat trout are less than 5 km in length, with an average length of 2.37 km (Albeke 2008).

Diet

Cutthroat trout are sight-feeding predators that consume both aquatic and terrestrial macroinvertebrates and zooplankton. During the summer months, their diet predominantly consists of terrestrial invertebrates. During the rest of the year, they feed on zooplankton and aquatic macroinvertebrates (Hilderbrand and Kershner 2004). Research has demonstrated that in forest streams, terrestrial macroinvertebrates falling into streams provide approximately 50 percent of the annual energy budget for stream-dwelling salmonids (Saunders and Fausch 2005). Without this terrestrial input, there is a marked decrease in growth and abundance (Saunders and Fausch 2005).

Recruitment

Cutthroat trout spawn in the spring during or after the peak flow from snowmelt. Spawning can begin as early as April and end as late as July, depending on elevation. The timing of spawning is closely associated with temperature. In local cutthroat streams, spawning begins when stream temperatures reach 5°C (Coleman and Fausch 2006).

Abundance of spawning gravels is also necessary for successful spawning to occur. Typically spawning gravels range in size from 10-30 mm (Young 2009). Females deposit eggs from 10-25 cm deep in the spawning gravels. The composition of the substrate, particularly the proportion of fine particles, has been linked to the survival from deposition to fry emergence. Local velocity and depth is important for redd development, with velocities of 1.3-2 cubic feet per second and water depths of four to thirty inches being preferred. Many greenback cutthroat trout redds are in the shallow tails of pools where appropriate sized particles are deposited.

Fry emerge from redds after 570-600 Celsius degree-days have accumulated (Coleman and Fausch 2006). Cutthroat fry are generally less than 30 mm after emergence. They are weak swimmers, which confines them to small, shallow, sheltered backwaters with near zero velocities. Coleman and Fausch (2006) found that nearly all of the backwater habitats for fry are confined to channel margins.

Fragmentation

There is general concern within the scientific community that populations of greenback cutthroat trout are isolated or fragmented (Young and Guenther-Gloss 2004; Harig and Fausch 2002; McGrath 2004; Martin et al. 2005). Isolated populations of fish are susceptible to genetic drift and more vulnerable to effects of environmental stochasticity (e.g., fire, drought) (Young and Harig 2001; McGrath 2004). Fragmentation is increasing as natural barriers are maintained or artificial barriers are constructed to protect greenback cutthroat trout populations from non-native salmonids (USFWS 1998b), although without barriers, new and historic populations would not exist; only 12 populations occur in the absence of a total barrier that would provide protection from non-native fish competition (WNTI 2007). Harig and Fausch (2002) recommend that isolated habitats should be enlarged by moving barriers downstream. Many of the small stream lengths are tied to lake populations, and, therefore, are not as vulnerable to stochastic events, such as fires and drought, as are isolated streams

(Albeke 2008). Fragmentation and isolation effects were not considered in depth in the 1998 Recovery Plan (USFWS 1998b).

Competition

The primary reason for the historic decline of the greenback cutthroat trout was the introduction of non-native salmonid fish species (Behnke 1992). The 1998 Recovery Plan states that, "... no action had more long-term impacts on the endemic trout subspecies than the introduction of non-native salmonids, which hybridized and competed with native fishes" (USFWS 1998b). Non-native trout, most commonly brook trout, occurred within approximately 25 percent of greenback cutthroat trout population sites examined by McGrath (2004). Other non-native salmonids considered a threat include rainbow trout, brown trout, and Yellowstone cutthroat trout.

Non-native fish species pose a threat to the greenback cutthroat trout for several reasons. The greenback cutthroat trout hybridizes with several introduced fish species, such as the rainbow trout, while other species like the brook trout are competitors. Both of these species also prey on young greenback cutthroat trout. Brown trout prey on all sizes of greenback cutthroat. Brook trout (a fall-spawning, cold hardy char) apparently outcompete the greenback cutthroat trout for common food sources early in life in most stream habitats. Brook trout spawn in the fall, while greenback cutthroat trout spawn in the late spring or early summer (McGrath 2004). Because brook trout spawn in the fall, they hatch earlier in the year than greenback cutthroat trout, and so the young are larger and better able to compete for resources than the greenback cutthroat trout that hatch later in the summer (USFWS 1998b). Peterson et al. (2004) found that age-0 Colorado River cutthroat trout survival was 13 times greater, and age-1 survival 1.5 times greater, when brook trout were removed. However, McGrath and Lewis (2007) found that prey consumed by greenback cutthroat trout and brook trout differed significantly at five of six sites where the species were sympatric.

Adult brook trout also have been observed attacking and showing aggression toward greenback cutthroat trout (McGrath 2004), but adult greenback cutthroat trout and brook trout do coexist in some stream habitats where immigration of adult greenback cutthroat trout occurs. McGrath and Lewis (2007) only found one greenback cutthroat trout while investigating the stomach contents of 323 brook trout. Peterson et al. (2004) found no difference in adult Colorado River cutthroat survival when brook trout were removed. Observational data suggest the competition dynamic appears to be different in lake habitats, and greenback cutthroat trout can compete successfully with brook trout in some lake habitats under restricted harvest regulations.

Although non-native salmonid species continue to present a threat to greenback cutthroat trout populations, management activities, primarily through the construction and maintenance of barriers, have ensured that few populations co-exist with such species.

Genetic Variation

When the greenback cutthroat trout was listed in the 1970s, morphology and meristic analysis was a prominent genetic determinant based on phenotypic expression, which included spotting patterns, number of scales, coloration, number of basiobranchial teeth, etc. (Policky et al. 2003). Morphology

and meristics were used to rank fish populations with a letter ranging from A (pure) to C (obvious hybrid) (USFWS 1998b). The 1998 Recovery Plan mainly utilized morphology for determining the purity of greenback cutthroat trout populations, but protein electrophoresis and mitochondrial transfer DNA (mtDNA) also were used to make recommendations on keeping the South Platte and Arkansas River drainages stocks separate.

More recently, techniques for genetic analysis have focused on mtDNA and nuclear DNA (nDNA). Since 2006, a number of genetic studies have been undertaken to try to determine the genetic relationships between greenback, Colorado River, and Rio Grande cutthroat trout (*Onchorhynchus clarki virginalis*) (Mitton et al. 2006, Metcalf et al. 2007, Metcalf 2007, Rogers 2008). Mitton et al. (2006) found all three subspecies to be closely related, and did not believe that any of them warranted subspecific designation. Metcalf et al. (2007) used molecular markers from the mitochondrial and nuclear genomes to analyze individuals from greenback and Colorado River cutthroat trout. Their studies revealed two divergent lineages within the ranges of greenback and Colorado River cutthroat trout consisting of 10 unique haplotypes, which they determined corresponded with the two described subspecies. These lineages are known as GB (greenback) and CR (Colorado River). Subsequent sampling and analysis found that of 45 assumed Colorado River cutthroat populations on the west side of the Continental Divide, 12 populations were assigned to lineage GB. In addition, of 12 assumed greenback cutthroat trout populations present on the east side of the Continental Divide, 11 populations were assigned to the CR lineage (Rogers 2008). Since publication of Rogers (2008), further sampling has identified additional lineage GB populations on the west slope of Colorado and in eastern Utah (B. Rosenlund, U.S. Fish and Wildlife Service, pers. comm., 2009). The current Rio Grande lineage populations seem to fit well within the Rio Grande drainage.

Prior to the acquisition of recent genetics data, it was believed that existing populations exceeded the recovery goal, with approximately 166.7 ha of lakes and 227.7 km of stream habitat occupied. Given the genetic uncertainty of greenback cutthroat trout populations, we are unable to determine at this time how many recovery populations currently exist. Although new genetics information has called into question the status of the greenback cutthroat trout populations and whether or not the recovery goals have been met, this issue should not have an effect on the long-term conservation of the subspecies because greenback cutthroat trout have a high recovery potential through the demonstrated ability to be successfully reintroduced into the wild in habitats where non-native fish have been removed. Implementation of recovery activities over the last 25 years has shown that greenback cutthroat trout habitats can be restored and enhanced, and that stable populations of fish can be successfully re-established in these habitats.

Ute ladies'-tresses orchid

The Ute ladies'-tresses orchid (*Spiranthes diluvialis*) was first described as a species in 1984 by Dr. Charles J. Sheviak from a population discovered near Golden, Colorado (Sheviak 1984). The Ute ladies'-tresses orchids are perennial orchids from the family Orchidaceae. The orchid first appears above ground as a rosette of thickened grass-like leaves that is very difficult to distinguish from other vegetation. Its leaves are up to 1.5 cm wide and 28 cm long; the longest leaves are near the base. The usually solitary flowering stem is 20 to 50 cm tall, terminating in a spike of 3 to 15 white

or ivory flowers. Prior to 1992, extant populations of the Ute ladies'-tresses orchid in Colorado were known only in Jefferson and Boulder counties, within the Clear Creek and St. Vrain River watersheds. The largest populations in the region occur in the South Boulder Creek and St. Vrain River watersheds. Since that time, they have also been found in Garfield County along the Roaring Fork River, and in Larimer County in the Cache la Poudre River watershed.

Orchid habitats must consist of sufficient hydrology to keep soils moist at the surface throughout the growing season. Soils are generally silty-loam often underlain with cobble and gravel. The habitat settings are early to mid-successional riparian habitats (i.e., well established soils and vegetation) along perennial streams and rivers such as moist stream edges, high flow channels, old oxbows, vegetated point bars, and other fluvial features (USFWS 1992, Fertig 1994; USFWS 1995; Fertig 2000). The orchid may also occur in settings that mimic one of the above habitats, such as moist borrow pits, roadside ditches, reservoir edges, and berms (Ward and Naumann 1998).

Perennial graminoids and forbs and low plant cover dominate habitats occupied by Ute ladies'-tresses orchid. A few populations in eastern Utah and Colorado are found in riparian woodlands, but generally the species seems intolerant of shade, preferring open, grass, sedge, and forb-dominated sites. Where colonies occur in more wooded areas, plants are usually found on the edges of small openings and along trails (Ward and Naumann 1998). The orchid is intolerant of crowding and competition. The orchid may persist for some time in the grassy understory of woody riparian shrublands, but does not appear to thrive under these conditions (Ward and Naumann 1998).

Life history and Population dynamics

Flowering of Ute ladies'-tresses orchids generally occurs from mid-July through August, at which point location, identification, and population size estimates are typically determined. However, in some locations the plant may bloom in early July or may still be in flower as late as early October. Some individuals remain underground or do not flower each year (Arft 1995; Riedel 1992).

Because of the unique anatomy of orchid flowers, only certain insects can accomplish pollination. Reproduction of the orchid is strictly sexual, with bumblebees (*Bombus* spp.) and anthophorans (*Anthophora* spp.) (Sipes and Tepedino 1995; Sipes et. al. 1993) as the primary pollinators. These insects visit the orchids for the nectar and pollination is incidental. The number of seeds of the orchid varies greatly between plants. Each orchid fruit can have several hundred or up to 10,000 seeds but generally average around 2,000 (Sipes and Tepedino 1995). These seeds may be dispersed by water or wind (Wells 1981).

Status and Distribution

Ute ladies'-tresses orchids were federally listed as threatened on January 17, 1992 (57 FR 2048) throughout its entire range. No critical habitat has been designated for the species. To date, no recovery plan has been approved for this species. However, a draft recovery plan has been written (USFWS 1995).

Populations of orchids are known from three broad general areas of the interior western United States: near the base of the eastern slope of the Rocky Mountains in southeastern Wyoming and adjacent Nebraska and north-central and central Colorado; in the Upper Colorado River Basin, particularly in the Uinta Basin; and in the Bonneville Basin along the Wasatch Front and westward in the eastern Great Basin, in north-central and western Utah, extreme eastern Nevada, and southeastern Idaho, and central Washington.

At the time of its listing, the total known population size of Ute ladies'-tresses orchid was fewer than 6,000 individuals from 11 populations occurring in Colorado, Utah, and Nevada (57 FR 2048). Several populations on the Wasatch Front, Utah; Great Basin, Utah and Nevada; and the Front Range of Colorado were believed to be extirpated due to activities associated with frontier settlement (urbanization, clearing land for agriculture, water diversion, etc.). Most known populations contained fewer than 1,000 plants when counted in 1990 and 1991. Eastern Utah populations were typically small in size. Since 1993, *S. diluvialis* has been discovered in southeastern Wyoming, southwestern Montana, western Nebraska, southern Idaho, and central Washington (Fertig et al. 2005). Populations are now known to occur in 38 watersheds at elevations ranging from 220 to 558 m (720 to 1,830 feet) in Washington to 2,134 m (7,000 feet) in northern Utah (Fertig et al. 2005). Recovery-driven inventory efforts indicate that the number of existing and historic populations is 61, of which 53 are considered extant. Of all extant populations, 60 percent contain over 100 plants and 21 percent have greater than 1,000 individuals.

Population numbers, based on counts of flowering individuals, fluctuate greatly ranging from 23 percent to 79 percent (Ward and Naumann 1998). This is because a varying proportion of the population may either be dormant underground or in a vegetative (non-flowering) state, thus not easily discerned during population monitoring. Therefore, the number of flowering adults does not give an accurate population size or structure. Monitoring of both flowering and vegetative plants by Arft (1995) indicated that population size may be fairly stable even though the number of flowering individuals demonstrates high variability. The life span of individuals is unknown, but plants studied over a nine-year period were used to estimate a life expectancy of more than 50 years (USFWS 1995).

ENVIRONMENTAL BASELINE

The environmental baseline is defined as the past and present effects of all Federal, State, or private actions and other human activities in the action area, the anticipated effects of all proposed Federal actions in the action area that have already undergone formal or early section 7 consultation, and the effects of State or private actions that are contemporaneous with the consultation in progress.

The I-70 Mountain Corridor and adjacent areas are located, in part, within both the Arapaho-Roosevelt and the White River National Forests. These Forest lands contain various life zones and habitats. Elevations within the project corridor range from a low of approximately 6,000 feet at the eastern end of the Corridor to a high of approximately 11,050 feet at the Eisenhower-Johnson Memorial Tunnels, located at the Continental Divide. The project corridor crosses four

major life zones (foothills, montane, subalpine, and alpine) defined by changes in climate with elevation increases, which, in turn, are reflected by the broad changes in vegetation communities.

Other prominent natural features of the project corridor include extensive rocky cliff areas and talus fields, especially around Georgetown and Idaho Springs and within Glenwood Canyon. I-70 follows valley bottoms throughout much of the length of the project and is, therefore, located in close proximity to portions of major creeks and rivers such as Clear Creek, Straight Creek, Gore Creek, and the Eagle River, as well as their riparian zones.

In addition to the natural features described above, the project corridor and surrounding area contain various human-created features that influence the structure and function of the natural environment. Highways, roads, towns, single-home sites, and recreational developments influence which areas are available for native plants and wildlife. Current and historic human activities within the project corridor have been instrumental in creating the current distribution of habitats and wildlife species in the corridor. Important anthropogenic factors include predator control, alteration of the fire regime, mining, agricultural development, livestock grazing, land development, road construction, and recreational development. Secondary impacts from these activities include non-native plant invasions, degraded water quality, and human intrusion into wildlife habitats.

Although mining, logging, and grazing historically have had the greatest influence on the area, human settlements currently have the greatest effect on the natural systems in the project corridor. Because development tends to be concentrated in the valley bottoms, some of the most notable effects include loss of high-quality riparian, wetland, and floodplain habitats, as well as habitat fragmentation that includes reduced access to these habitats.

Canada lynx

Status of the Canada Lynx Within the Action Area

Two hundred and eighteen lynx were released during the State's reintroduction program. One-hundred and forty-one kittens have been born in Colorado (J. Ivan, CDOW, pers. comm. February 2011). Surveys conducted in 2007 and 2008 indicated that no young were born; however, reproduction was again documented in 2009 and 2010. The CDOW believes the lack of reproduction in 2007 and 2008 may be due to a natural, cyclical downturn in the snowshoe hare population (CDOW 2010). As of June 2010, there were 122 known mortalities from the original reintroduced population of 218 individuals. At 6.9 percent, highway mortality ranks as one of the highest human-caused mortality factors for the Colorado lynx reintroduction overall, second only to animals illegally shot, and the highest human-caused mortality factor since release protocols were adjusted that reduced the deaths caused by starvation after the first year of the reintroduction effort. Shenk (2007) observed that only 3 lynx have died of starvation since the final release protocol was implemented, one each in 2000, 2001, and 2008.

Factors Affecting the Environment of the Canada Lynx Within the Action Area

The Southern Rockies are naturally fragmented, and the highways, roads, towns, suburban development, and recreational developments that occur all along I-70 have caused further fragmentation. These developments in and near lynx habitat have also eroded the lynx's ability to move throughout a home range or disperse or interact with other individuals. Although these features may constrain lynx movements, that does not mean that lynx will not cross them, because they do. However, movements through these features are not preferred because it predisposes animals to risk factors (predation, poaching, highway mortality; Ruediger et al. 2000) in habitats that do not support their primary prey.

Any continuously forested corridor between mountain ranges supporting lynx habitat that is relatively free of human development has the potential to be an important landscape linkage. Characteristics of lynx movements through a landscape linkage include movement type and frequency; landscape familiarity/movement efficiency; dispersal distances, and; daily cruising distances. Lynx movements may be of four types: those associated with an established home range, including feeding, breeding and sheltering; those of transient or nomadic lynx that do not maintain home ranges; those of dispersing individuals; and those associated with extensive exploratory movements. Lynx Linkage Areas have been mapped along the corridor and are defined as, "Habitat that provides landscape connectivity between blocks of lynx habitat. Linkage areas occur both within and between geographic areas where blocks of lynx habitat are separated by intervening areas of non-lynx habitat such as basins, valleys, agricultural lands, or where lynx habitat naturally narrows between blocks. Connectivity provided by linkage areas can be degraded or severed by human infrastructure such as high-use highways, subdivisions or other developments." (Ruediger et al., 2000). Because of the patchy, discontinuous distribution of lynx habitat in the Southern Rockies Ecosystem, maintaining landscape-level habitat connectivity may be important to the Southern Rockies' contribution to survival and recovery of the species.

I-70 bisects the Herman Gulch, Loveland Pass, Officer's Gulch, Vail Pass, Dowd Junction, and Castle Peak Landscape Linkages. At least one LIZ overlaps with each of these Landscape Linkages. For example, the Castle Peak Landscape Linkage encompasses portions of LIZs 3 and 4 (Eagle to Wolcott and Wolcott to Avon); the Dowd Junction Landscape Linkage includes LIZ 5 (Dowd Canyon); the Vail Pass Landscape Linkage includes portions of LIZs 6 and 7 (West Vail Pass and East Vail Pass to Copper Mountain); the Officer's Gulch Landscape Linkage includes a portion of LIZ 8 (Officer's Gulch/Owl Canyon); the Loveland Pass Landscape Linkage encompasses LIZ 9 (Laskey Gulch and Hamilton Gulch/Dead Coon Gulch); and the Loveland Pass Landscape Linkage includes LIZ 10 (Herman Gulch/Bakerville).

The Herman Gulch linkage straddles I-70 for approximately 4 miles between the Herman Gulch area and Bakerville. It connects lynx habitat on both sides of the highway and is needed to maintain existing connectivity. The Loveland Pass linkage provides for north-south movements near I-70 at the Continental Divide, Peru Creek, Loveland Pass, Laskey Gulch, and Jones Gulch. It includes portions of the White River and Arapaho-Roosevelt National Forests. Some portions of the linkage are developed not only with I-70, but also with ski areas and towns. The Officer's

Gulch linkage is an area of north-south connection for the Tenmile Range and Leadville with the Eagle's Nest Wilderness. It is the best remaining crossing area between Copper Mountain and Frisco, based on terrain, habitat, and lack of development. The Vail Pass linkage area provides for movement from approximately Timber Creek to Guller Creek. The area crosses I-70 and has high winter recreational use. The area mapped for this linkage is the best remaining place for animals to cross I-70 in the Vail area, based on terrain features, habitat, and lack of development. The Dowd Junction linkage area is a north-south connection with an existing underpass and fencing. At Dowd Junction, there is an intersection of highway, interstate, and two drainages. The CDOW has identified this linkage as an important crossing area for deer, elk, and mountain lions. Residential and commercial development occurs to both the north and south of this linkage area. The Castle Peak linkage provides for movement across shrub-steppe habitats, connecting the Flattops east to Castle Peak; it contains mixed land ownership.

On a broader analysis level, the Canada Lynx Conservation Assessment and Strategy (LCAS) specifies that project planning should be tiered to evaluate the effects of actions on lynx habitat within designated Lynx Analysis Units (LAU) within the Southern Rockies Ecosystem (Ruediger et al. 2000). LAUs serve as baseline landscape units that enable tracking of long-term trends in the landscape. They are intended to reflect an average female lynx home range in size and in landscape, and generally exceed 25,000 acres in size. The action area crosses the Quartzite, Eagle Valley, Holy Cross, Camp Hale, Ten Mile, Snake River, Blue River, and Clear Creek LAUs. All of the LAUs other than Clear Creek, which is on the Arapaho-Roosevelt National Forest, are within the White River National Forest. No project activities will occur in the Quartzite LAU, which is east of Glenwood Springs. LAUs adjacent to the action area will not be directly affected; however, landscape connectivity will be.

I-70

As Colorado's only east-west interstate highway, I-70 is very heavily traveled, especially through the mountains. It carries tourists, commuters, day-trippers, cross-country truckers, and other interstate travelers. The PEIS reported current and projected traffic volumes for days with "typical" traffic. To calculate these representative volumes, peak volumes, which did not include those days with the worst holiday traffic, were averaged for Summer Thursday and Summer Sunday. Traffic counts for 2008 for a Summer Thursday and a Summer Sunday are shown in Table 1 below.

Table 1. 2008 Traffic counts (in number of vehicles) for a typical Summer Thursday and Summer Sunday along the I-70 Mountain Corridor.

Location	**Summer Thursday**	**Summer Sunday**
East of Eagle	29,847	28,567
Dowd Canyon	43,959	40,394
Vail Pass	26,176	28,127
Eisenhower-Johnson Tunnel	36,242	49,846

Studies indicate that traffic volumes greater than 4,000 vehicles per day pose a serious threat to lynx mortality and habitat fragmentation (Ruediger et al. 2000). Home ranges may be reduced or truncated by a busy road. In addition, connectivity could be nearly severed, resulting in reduced genetic exchange across populations. Despite this, lynx have successfully crossed the highway at several locations including near Bakerville, near Copper Mountain, and the Vail Pass summit. Because the lynx reintroduction is no longer occurring, crossing attempts are likely to decrease as lynx become accustomed to their surroundings.

Population and employment growth along the I-70 corridor in the Denver metropolitan area as well as nationwide, have been increasing traffic volumes on I-70 for more than 15 years, and it is expected to continue to increase. According to traffic model projections (M. Pavlik, FHWA, pers. comm. January, 2011), if no improvements to I-70 are made, travel in 2035 will be constrained by congestion and some people would not make a trip because travel time is too long. If the proposed action is implemented, more people will travel the I-70 mountain corridor using transit, but the number of vehicle trips modeled is similar to the scenario where no improvements are made. Projected traffic counts for 2035 for a Summer Thursday and a Summer Sunday are shown in the table below. Although at some locations and some days projected traffic volumes for the proposed action are lower than for the no action scenario, in all cases volumes are higher than they currently are, and these high traffic volumes present a significant barrier to wildlife movement across I-70.

Table 2. Projected 2035 traffic counts (in number of vehicles) for a typical Summer Thursday and Summer Sunday along the I-70 Mountain Corridor for both the no action and proposed action scenarios.

	Summer Thursday		Summer Sunday	
Location	**No Action**	**Proposed Action**	**No Action**	**Proposed Action**
East of Eagle	47,366	86,373	73,691	69,590
Dowd Canyon	88,370	100,702	75,804	73,033
Vail Pass	92,434	54,027	58,349	58,444
Eisenhower-Johnson Tunnel	66,388	66,078	70,676	79,426

In addition to traffic volume, barriers may also be in the form of guardrails, glare screens, and Jersey and Texas barriers, both in the median and along the roadside, and these occur all along the project corridor. These structures have been installed for safety reasons or to improve water quality in adjacent drainages. Along the entire 133-mile corridor, only 10 miles are free of some sort of barrier. Lynx habitat occurs approximately between mile markers 150 and 225, a reach of approximately 75 miles. Within this reach, about 18 miles have a barrier, 11.5 miles of which are natural, generally in the form of cliffs. In addition, approximately 37 miles of 8-foot tall wildlife fencing has been installed on the north and south side of the interstate, primarily in the western portion of the corridor (P. Singer, Center for Native Ecosystems, pers. comm., January 2011). Mapped wildlife fencing overlaps with short reaches of mapped cliffs; therefore, some double-counting of cliffs and fencing may be expected, thereby potentially overestimating the amount of barrier along the highway (P. Singer, Center for Native Ecosystems, February 2011).

Manmade barriers associated with I-70 occur in the median as well as along the roadside, and in many cases barriers occur in both locations within the same reach of the highway.

The relationship between traffic volume and carnivore roadkill probabilities is generally considered to be an increasing function: as traffic volume and other barriers increase, more carnivores attempting to cross highways are likely killed (Foster and Humphrey 1995, Ruediger 1996, Barnum 2000, Clevenger and Waltho 1999, Clevenger et al. 2002). However, along broad, divided and fenced, very high-volume and high-speed highways, roadkill rates may decline as animals are behaviorally inhibited from traffic/highway effects or are unable to access the highway (Clevenger et al. 2001, 2002). This concept is consistent with observed reactions of resident lynx in Canada's Bow Valley where lynx home ranges abutted the highway rather than straddled it (Apps pers. comm. June 17, 1998; 1999, cited in Thompson 2005). In 1998, the four-lane, high-speed Trans-Canada Highway supported an annual average daily traffic of over 14,600 vehicles, peaking at more than 30,000 vehicles per day in summer (Clevenger et al, 2002); these volumes are less than I-70's current volumes. In Apps' study, even unfenced sections of the Trans-Canada Highway were considered a significant filter, if not a total barrier, to home range and dispersal movements. Apps (2000) found that all of the lynx crossed all highways examined within their home ranges at less than random expectation (thereby decreasing roadkill probabilities) and concurred with Koehler and Aubry (1994) that highways within home ranges may influence home range selection just as dominant natural features can. This may be encouraging from a highway mortality perspective, but increases the concern about impaired habitat connectivity. A research study conducted by Colorado State University underscored these findings by determining that Colorado's lynx also use habitat adjacent to highways at less than random expectation (Crooks et al. 2008).

Clear Creek LAU

Residential and commercial development within the Clear Creek LAU is patchy. Recreational use of the LAU is moderate, with fishing, hiking, skiing, and snowshoeing likely being the most popular activities. Portions of the Loveland Pass Ski Area occur within the LAU's boundaries. The effects of these activities include habitat loss, habitat fragmentation, increased human presence, and snow compaction.

The Clear Creek LAU consists of 41,748 acres of mapped lynx habitat. Lynx habitat within the LAU that is in an unsuitable condition totals 16,283 acres, or 39 percent, due primarily to mountain pine beetle mortality. Denning habitat composes 21.0 percent of the lynx habitat within the LAU. The LAU unsuitable habitat statistic exceeds the SRLA standard VEG S1 of 30 percent.

The Herman Gulch and a portion of the Loveland Pass Landscape Linkages lie within the Clear Creek LAU. The Herman Gulch Landscape Linkage straddles I-70 for approximately four miles between the Herman Gulch area and Bakerville and connects primary habitat on both sides of I-70. This area has been continuously occupied by lynx for the past several years, and two individuals, one pregnant with two fetuses, have been roadkilled there. The Loveland Pass

Landscape Linkage provides for north-south movements near I-70 at the Continental Divide, Peru Creek, Loveland Pass, and Laskey and Jones gulches.

The LAUs below are located within the White River National Forest. Although functional lynx habitat within the White River National Forest has not yet been recalculated to account for tree mortality resulting from the mountain pine beetle epidemic, habitat in an unsuitable condition (i.e., stand initiation structural stage) may already exceed the 30 percent standard within LAUs along the I-70 corridor.

Snake River LAU

A large portion of the Loveland Pass Landscape Linkage falls within the Snake River LAU. This Landscape Linkage provides for north-south movements near I-70 at the Continental Divide, Peru Creek, Loveland Pass, and Laskey and Jones gulches. Some portions are highly developed with I-70, ski areas, and towns.

Ten Mile LAU

The Officer's Gulch Landscape Linkage and the eastern portion of the Vail Pass Landscape Linkage (from the top of the pass to Guller Creek) fall within the Ten Mile LAU. The Officer's Gulch Landscape Linkage provides a north-south connection between the Ten Mile Range and Leadville, with the Eagle's Nest wilderness. It is the best remaining area for wildlife crossing between Copper Mountain and Frisco based on terrain, habitat, and lack of development. The Stafford Creek area, just west of Guller Creek, is known to be used by lynx for crossing I-70.

Eagle Valley LAU

The Eagle Valley LAU has been heavily affected by recreational, residential, and commercial development. The Vail Ski Area, as well as the towns of Vail and Avon, occurs within the LAU. Dispersed recreation in the LAU is very heavy due to both the local population and destination visitors from the Front Range. Dispersed recreation includes mountain biking, hiking, skiing (resort and back country), snowshoeing, and snowmobiling on Vail Pass. Both sides of I-70 receive heavy hunting pressure for big game throughout the fall hunting seasons. These seasons begin in August and end in November.

I-70 effectively bisects the LAU, and virtually all development within the LAU is adjacent to the highway, creating a barrier for lynx movement across the Eagle River valley floor where it is topographically the most likely location for crossing. The entire bottom of the Eagle valley from East Vail to the west is privately-owned and is highly developed. Additional development is expected throughout the area. Only small slivers of this private land provide suitable lynx habitat.

The area north of I-70 from East Vail to the Forest boundary has been historically managed for timber harvest. These areas are primarily lodgepole pine and the regeneration has been from good to excellent throughout the area with some densely stocked stands in the Indian Creek area.

Existing stands of lodgepole pine and some of the advanced regeneration is being heavily infested by the mountain pine beetle with expected losses to be near 90 percent of mature trees. The beetles are hitting trees as small as 3-inch diameter at breast height and are also hitting trees much higher in elevation, up to 11,000 feet in some areas, than has been seen historically.

The western portion of the Vail Pass Landscape Linkage (from the top of Vail Pass to Timber Creek) as well as the Dowd Junction and Castle Peak Landscape Linkages occur within the Eagle Valley LAU. The Vail Pass Landscape Linkage provides the best remaining place to cross I-70 in the Vail area, based on terrain, habitat, and lack of development. Dowd Junction Landscape Linkage provides a north-south connection in West Vail and has an underpass and fencing. The underpass is located near the intersection of I-70 and US24; two drainages intersect here, as well. It is an important crossing area for deer, elk, and mountain lion. There is residential and commercial development north and south of the linkage. The Castle Peak Landscape Linkage provides for movement across shrub-steppe habitats between the Flatops eastward to Castle Peak. Land is this linkage is of mixed ownership. The State Bridge Landscape Linkage provides for movement across shrub-steppe habitats from the Gore Range to Sheephorn. It, too, is under mixed land ownership.

Holy Cross LAU

Although the proposed project will not directly affect the Holy Cross LAU, it is likely to affect lynx access to and use of the LAU. The Holy Cross LAU consists primarily of U.S. Forest Service lands and the Holy Cross Wilderness Area. The Homestake Creek drainage, which runs southwest to northeast, bisects the LAU. The eastern boundary of the LAU is US24 which parallels the Eagle River north of Camp Hale. Much of the western side of the LAU is dominated by alpine habitats (classified as non-habitat for lynx). Much of the forested habitats within the LAU are composed of lodgepole pine stands. Many of the stands were logged during the turn of the century for mine timbers and construction materials for the nearby mines and towns of Red Cliff, Minturn, and Leadville, as well as the U.S. Army's large Camp Hale complex. The LAU consists of 59,939 acres of lynx habitat. The remainder of U.S. Forest Service lands are considered non-habitat for lynx. An additional 2,831 acres of private lands fall within this LAU; however, there is little information regarding the extent of lynx habitat on those lands. The proposed project will not directly affect this LAU.

Camp Hale LAU

The Camp Hale LAU will also not be directly affected by the proposed project, but the project will likely affect lynx access to and use of the LAU. This LAU is located adjacent to the Holy Cross LAU. The Camp Hale LAU is heavily affected by recreation, especially during winter. Aside from private lands within the LAU (12.1 percent), the Vail and Ski Cooper ski areas occur within this LAU. Additionally, there are several designated and non-designated winter "play" areas within the LAU such as the Vail Pass Winter Recreation Area, Vance's Cabin, and the Chicago Ridge Ski Area. Much of the designated "play" area is included in the Vail Pass Winter Recreation Area which encompasses 39,185 acres on Federal lands and 1,073 on private lands. In total, nearly 80 percent of this LAU falls within either a ski area allocation, or is considered a

winter use area. Snow compaction is prevalent within the LAU. However, the U.S. Forest Service estimates that there are only 0.88 miles of compacted snow routes per square mile within the LAU. The 0.88 mile/square mile figure does not include the ski area allocations at the Vail Ski Area or Ski Cooper. The proposed project will not directly affect this LAU.

Other Consultations

Ski resort expansions are planned for Breckenridge, Keystone, Vail, and Winter Park and will be consulted on. These may modify the baseline before Tier 2. Additional unidentified maintenance activities and private residential and commercial developments may also occur.

In August 2007, the Service completed consultation and issued biological opinion number ES/GJ-6-CO-99-F-033-CP086 to the Environmental Protection Agency (EPA) to enter into an Administrative Order on Consent with Ginn Battle North, LLC (GBN). Upon entering into the Administrative Order on Consent, EPA will enforce remedial enhancements and retrofits to the existing remedy at the Eagle Mine Superfund Site which are necessary to clean up the North Property and allow for human reuse and for GBN's proposed residential, commercial, and recreational development. Remedial activities are expected to be completed within approximately three years. The biological opinion addressed only the remedial activities and not any subsequent private actions that may occur as a result of the remedial activities.

Traffic volume generated by the proposed remedial activities will result in approximately 300 vehicle trips per day along I-70 between Dowd Junction and US24. The actual traffic count for 2009 at Dowd Junction were 36,700 annual average daily traffic; adding the anticipated traffic from the EPA project increases the baseline traffic volume marginally to 37,700. If GBN's proposed development is completed, the new traffic numbers will be incorporated at Tier 2. The current traffic volume is already a serious impact in terms of both mortality and habitat fragmentation. The biological opinion issued for the project anticipated take of one lynx individual within the 3-year project life.

Recreation

The project area provides recreational opportunities for several uses such as cross country skiing, back country skiing, alpine skiing, snowmobiling, snowshoeing, hiking, fishing, and camping/backpacking. Access to recreation resources heavily influences traffic patterns and congestion along I-70, and jobs related to tourism account for more than 40 percent of jobs in much of the corridor. Visitor use in 2000 for I-70 districts in the White River National Forest and Arapaho and Roosevelt National Forests were 8.3 million and 3.2 million recreation visitor days, respectively. The I-70 corridor provides primary access to 19 of the state's 27 ski areas. In 2001, skier visits in the White River National Forest were 6.8 million, and year 2000 skier visits in the Arapaho and Roosevelt National Forests were 1.8 million. Access to ski areas is considered to be the limiting factor in visitor use of the ski areas.

Although information on lynx and recreational activities is scarce, Ruggiero et al. (2000) concluded that dispersed recreation has not been shown to result in significant behavioral

disturbances to lynx, but also that a threshold of disturbance likely exists. In addition, the natural activity patterns of lynx (crepuscular to nocturnal) versus recreational activities (largely diurnal) provide an opportunity to maintain both uses in the same landscape. A key to providing temporal segregation of use is ensuring that effective diurnal security habitats are present and adequately distributed (Ruediger et al. 2000).

Preble's meadow jumping mouse

Status of the Preble's meadow jumping mouse Within the Action Area

In June 2004, one Preble's meadow jumping mouse individual was captured along Beaver Brook, just downstream of where it crosses under I-70 at Exit 248. Suitable habitat occurs on both sides of I-70. Beaver Brook is a perennial tributary of Clear Creek, with an elevation of approximately 7,500 feet at the capture location. In the summer of 2008, a section of Beaver Brook directly downstream of the capture location was cleared of vegetation by the landowner. Re-seeding and erosion control occurred on the property in 2009. Reaches of Clear Creek with appropriate habitat have been surveyed for Preble's, but none have ever been found there. Another tributary, Elk Creek, is occupied by Preble's. Portions of Mount Vernon Creek parallel to I-70 were also trapped in 2004, and no Preble's were captured.

In the time since the listing of the Preble's, May 1998 through January 2011, we have conducted 143 formal consultations pursuant to section 7 of the Act and issued 21 incidental take permits pursuant to section 10(a)(1)(B) of the Act regarding Preble's in Colorado. Through these actions, we have exempted or permitted incidental take of Preble's through over 4,242 acres of permanent habitat loss and over 1,515 acres of temporary habitat loss.

Factors Affecting the Environment of the Preble's meadow jumping mouse Within the Action Area

Creeks and streams directly adjacent to I-70 have been moved and channelized in order to accommodate the highway, which has resulted in a loss of riparian vegetation and an alteration in hydrology. Adjacent development has further altered the timing and amount of flows which can lead to downcutting and loss of riparian habitat. Culverts that convey streams beneath I-70 oftentimes were not constructed to allow for wildlife passage, thus they fragment habitat for many riparian-dependent species such as Preble's. Highway winter maintenance activities such as sand and de-icer application, have likely altered the water chemistry of adjacent creeks. Nearby vegetation has potentially been affected, as well, through mowing, burying with sand, or spraying with de-icers. In addition, much of the property along I-70 is grazed, which, if not properly managed, can devastate Preble's riparian habitat.

Greenback cutthroat trout

Status of the Greenback cutthroat trout Within the Action Area

In 2004, USFWS biologists discovered a population of trout in Dry Gulch, a small creek feeding into Clear Creek near the Eisenhower-Johnson Memorial Tunnels, which were determined to be greenback cutthroat trout. The barrier formed by a steep cascade in Dry Gulch probably diminishes gene flow from Clear Creek. No pure greenback cutthroat trout have been verified in the main stem of Clear Creek. Additionally, no other populations of cutthroat trout are currently known to occur along the I-70 mountain corridor.

As discussed earlier, genetic sampling and analysis of cutthroat trout populations on both sides of the Continental Divide have indicated that divergent evolutionary lineages do not separate geographically as expected. Additionally, we believe that assigning existing populations to specific subspecies based upon genetic markers found in a few existing reference populations may be subjective at this time. The actual distribution of these markers per subspecies may possibly only be resolved by analyzing the few preserved cutthroat trout museum samples collected in the 1800s. Collection and analysis of these samples is ongoing. This project is technically difficult, complicated by few samples, poor storage/preservation, and years of handling by museum staff.

Factors Affecting the Environment of the Greenback cutthroat trout Within the Action Area

The loss of high-quality trout stream habitat through logging, livestock over-grazing, water diversions, mining, and municipal and industrial pollution are considered contributing factors to the historical decline of the range of the greenback cutthroat trout (USFWS 2009). Fire and fire management, highway maintenance activities, and competition from stocked sport trout may also affect the species in the action area.

Several types of activities may negatively impact greenback cutthroat trout habitat through removal of riparian habitat which shades streams and lowers water temperatures, and through vegetation removal and trampling of streambanks, which cause bank erosion, producing stream sedimentation. Logging, grazing, road and trail construction and use, and recreational vehicle use near streams have the potential to cause a negative chain reaction by contributing to bank destabilization, which causes an increase in erosion, sediment deposition, and in turn a threat of elevated water temperatures and higher turbidity in lower elevation habitats. In addition to the direct effects of vegetation removal and trampling, these types of land management activities also can reduce the input of terrestrial insects, which comprise about half of the diet of trout populations, into the aquatic environment (Saunders and Fausch 2007).

There is general concern within the scientific community that populations of greenback cutthroat trout remain isolated or fragmented (Young and Guenther-Gloss 2004; Harig and Fausch 2002; McGrath 2004; Martin et al. 2005). Fragmentation is increasing because natural or artificial barriers are constructed or maintained to protect greenback cutthroat trout populations from nonnative salmonids (USFWS 1998b). Without barriers, new and historic populations would not

exist because barriers protect the subspecies from invasion by nonnative species. However, isolated populations of fish are susceptible to genetic drift and more vulnerable to effects of environmental stochasticity (e.g., fire, drought) (Young and Harig 2001; McGrath 2004). Harig and Fausch (2002) recommend that isolated habitats should be enlarged by moving barriers downstream.

Winter maintenance of I-70 involves the use of chemical de-icers as well as traction sand. Excess sand can reach drainages adjacent to the highway where it can fill in winter pool habitat, or suffocate eggs and invertebrates. CDOT is currently taking measures to reduce the amount of sand that reaches drainages by either reducing the amount that is applied, or by capturing it in drains or ponds before it reaches streams or creeks. The effects of chemical de-icers on aquatic organisms, or how it is transported through the environment, are not as well understood. A literature review conducted by Wheeler et al. (2005) reports findings of 20- to 30-fold increases in a stream's conductivity during winter thaws in Pennsylvania. Though few studies address the effects of such shock loads on stream biota, salt concentrations high enough to be harmful to fish are considered rare. Highway surfaces also accumulate metal residue and petroleum which may also wash into roadside drainages. Wheeler et al. (2005) also report findings that the concentrations of metals in stream sediments are positively related to the volume of traffic and accumulate in proportion to the length of highway drained, suggesting that pollution will be most severe when large highways are drained by small streams.

The Colorado Division of Wildlife has stocked drainages in the I-70 mountain corridor for decades, and continues to stock many reaches today. Clear Creek was stocked with catchable (average length of 10 inches) rainbow trout between Idaho Springs and Empire between 1973 and 1998. Since then, they stocked that section with subcatchable (average length 6 inches) fish. The reaches of Clear Creek from the North Fork up to Idaho Springs and from Empire up to Georgetown Reservoir are not stocked. The reach of Clear Creek from Georgetown to the headwaters was stocked with catchable rainbows from 1973 to 1998, and with subcatchable trout from 1999 to 2004. Stocking in this reach was discontinued due to the presence of greenback cutthroat trout in the upper reaches of the mainstem of Clear Creek and in some tributaries (Paul Winkle, Colorado Division or Wildlife, pers. comm., January 2011). Straight Creek, which is on the west side of the Eisenhower-Johnson Memorial Tunnels, is not stocked at all but does contain a brook trout population. The reach of Tenmile Creek between Frisco and Copper Mountain is stocked annually with 2,000 10-inch rainbow trout. Tenmile Creek is not stocked however, from its confluence with West Tenmile to the summit of Vail Pass. West Tenmile has a population of brown trout through the Copper Mountain base area (J. Ewert, Colorado Division of Wildlife, pers. comm., January 2011). West of Vail Pass near the top, Black Lakes #1 and #2, are stocked with catchable rainbow trout. Black Gore Creek is not stocked. Gore Creek was stocked with brook trout and recreational cutthroat trout in the 1980s, though it is currently not stocked. The Eagle River has been and is currently being stocked with primarily subcatchable (approximately 3 to 5-inch) and some catchable (approximately 8 to 10-inch) rainbow trout from the confluence of the Colorado River to Gore Creek. The Colorado River is considered a wild trout stream from Glenwood Canyon upstream and will be stocked with hofer rainbow trout that are resistant to whirling disease, which has devastated the local wild population (K. Bakich, Colorado Division of Wildlife, pers. comm., January 2011).

Ute ladies'-tresses orchid

Status of the Ute ladies'-tresses orchid Within the Action Area

The nearest recently-verified population of the Ute ladies'-tresses orchid occurs along Clear Creek approximately 25 miles downstream of the creek's confluence with I-70. Additional populations on the west slope occur south of Glenwood Springs along the Roaring Fork River. Appropriate habitats for the orchid may occur within the project area on both sides of the Continental Divide, and these habitats may be occupied.

Factors Affecting the Environment of the Ute ladies'-tresses orchid Within the Action Area

The construction of I-70 has led to a constriction of floodplains and subsequent loss of riparian vegetation. Highway maintenance along habitat areas may involve mowing, and the use of sand and chemical deicers which may lead to sedimentation of streamside habitat and alteration of water chemistry. Safety improvements to highways such as shoulder or lane addition may encroach upon the floodplain and destroy habitat as well as natural flow and flooding regimes. Many of the streams in the action area are popular for recreational uses such as boating and fishing which can destroy plants and compact soils making it difficult for the orchids to survive or colonize.

EFFECTS OF ACTION

This Tier 1 biological opinion will analyze three separate categories of effects of the proposed I-70 Mountain Corridor project: the direct effects of construction activities; the effects of operation of the highway, and; the effects of maintenance on the wider roadway footprint.

Effects of Construction of the Proposed Project

Habitat Loss

Habitat loss due to project construction was determined by overlaying the proposed project on resource maps to quantify the area of new disturbance. Quantification of impacts included resources beyond the existing roadway and existing disturbed zone. This included the area within the project footprint, a 15-foot construction disturbance zone, and a 15-foot sensitivity zone, which is immediately adjacent to the construction disturbance zone. The 15-foot sensitivity zone is used to indicate impacts on resources that occur beyond the construction disturbance zone. These impacts will be a mix of short-term, temporary, and long-term. Some areas will be reclaimed and revegetated, while others may experience long-term changes in land form or require permanent stabilization, such as armouring of slopes. Finally, the 15-foot wide sensitivity zone outside the construction disturbance zone is not expected to experience any long-term impacts. Any disturbance in the sensitivity zone is incidental and short-term and most likely easily reclaimed and revegetated.

Both the Canada lynx and the Preble's meadow jumping mouse are expected to experience habitat loss due to construction of the proposed project. There are currently no known populations of the Ute ladies'-tresses orchid in or adjacent to the project footprint; therefore, no construction impacts are expected. Surveys of appropriate habitat will occur during Tier 2 analysis. Removal of greenback cutthroat trout habitat is also not expected at this time; Tier 2 analysis will revisit that expectation.

Impacts in lynx habitat due to project construction are expected to occur within five LAUs: Eagle Valley, Ten Mile, Blue River, Clear Creek, and Snake River. Although the proposed project will intersect the Holy Cross and Camp Hale LAUs, no impacts to habitat are anticipated because the project alternatives are in such close proximity to the existing highway such that new impacts on forested habitat are not expected. As noted above, the mountain pine beetle has killed much of the forested habitat along the project corridor. At this time, only lynx habitat within the Clear Creek LAU has been adjusted to reflect that change though it is likely that other LAUs have exceeded the maximum of 30 percent of habitat in an unsuitable condition. It is possible that impacts due to I-70's reconstruction will increase the amount of lynx habitat in an unsuitable condition along the corridor, or increase the amount of non-habitat. Habitat types and quantities will be recalculated and reanalyzed during Tier 2.

Table 3 shows the estimated maximum acres of impact on lynx habitat types for those LAUs that will be directly affected by the proposed project.

Table 3: Impacts on Lynx Habitat from the proposed action.

Habitat Type (total acres)	Footprint	Construction Disturbance	Sensitivity Zone	Total	Percent
Impacts within Eagle Valley LAU					
Winter Forage (18,394)	1.2	0.8	1.1	3.0	0.02
Denning (14,179)	0.4	0.5	0.7	1.6	0.02
Unsuitable (1,385)	0.0	0.0	0.0	0.0	0.00
Other (19,235)	0.7	1.2	1.7	3.6	0.02
Impacts within Ten Mile LAU					
Winter Forage (10,065)	0.0	0.1	0.3	0.4	0.00
Denning (5,200)	0.0	0.0	0.0	0.0	0.00
Unsuitable (348)	0.0	0.0	0.0	0.0	0.00
Other (10,885)	0.1	0.3	0.5	0.9	0.01

Table 3 (con't).

Habitat Type (total acres)	Footprint	Construction Disturbance	Sensitivity Zone	Total	Percent
Impacts within Blue River LAU					
Winter Forage (15,274)	0.0	0.0	0.1	0.1	0.00
Denning (18,435)	0.2	0.2	0.3	0.7	0.00
Unsuitable (2,983)	0.0	0.0	0.0	0.0	0.00
Other (33,861)	0.7	0.7	1.3	2.7	0.01
Impacts within Snake River LAU					
Winter Forage (17,501)	0.0	0.0	0.0	0.0	0.00
Denning (6,601)	0.0	0.0	0.0	0.0	0.00
Unsuitable (2,845)	0.0	0.0	0.0	0.0	0.00
Other (3,466)	0.0	0.1	0.3	0.4	0.01
Impacts within Clear Creek LAU					
Winter Forage (14,136)	0.1	0.7	1.5	2.3	0.02
Denning (8,746)	0.0	0.0	0.0	0.0	0.00
Unsuitable (16,283)	2.77	2.99	2.45	8.21	0.05
Other (2,583)	0.0	0.6	1.3	1.9	0.07

The proposed construction activities will affect Preble's and their habitat in the vicinity of milepost 248, near the Beaver Brook exit off of I-70. Direct impacts to habitat total 4.8 acres, including 2.6 acres of habitat loss within the project footprint; 1.1 acres of impact within the construction disturbance zone; and 1.1 acres of impact within the sensitivity zone. Impacts within the construction footprint are likely to be permanent, while impacts to the construction disturbance and sensitivity zones are likely to be temporary. Permanent and temporary habitat loss would deprive the mouse of forage material, would expose them to predation, disrupt or destroy hibernacula, and may inhibit dispersal through the culvert that conveys Beaver Brook under the highway by forcing mice to cross an exposed area when entering or exiting the culvert. Additionally, shrubs and bushes would potentially be removed from the upland surrounding the culvert, which may deprive Preble's of day roosts, hibernacula, and forage material, and potentially expose them to predation. In addition, mice could be killed by construction equipment or workers by either being crushed or smothered.

All temporarily affected habitat will be restored in accordance with CDOT specifications and in coordination with the appropriate land management agency. Any Preble's habitat permanently

removed due to project activities will be replaced at a 2:1 ratio. Habitat impacts will be refined and a restoration plan will be developed during Tier 2.

Light and Noise

Lights, noise, and human activity during construction could alter foraging, sheltering, and breeding activities of both the Canada lynx and the Preble's meadow jumping mouse. Even though these impacts are temporary, it is probable that these species will avoid the area if possible during these activities. Because lynx likely use the vicinity of the highway reconstruction project year round, construction activities could conceivably temporarily disturb or displace lynx occupying or traveling through the area. Lynx prey species could also avoid the area during construction. Disturbances to Preble's and their habitat may affect breeding behavior, dispersal ability, and susceptibility to predation. Such effects are difficult to quantify, but were considered during consultation.

Implementation of conservation measures will minimize the effects of lights and activity on these species. Applicable conservation measures include adhering to a 4 nights on, 3 nights off work schedule when night work is unavoidable in Canada lynx habitat. Using only the lighting necessary and focusing it on the work area will also lessen their impact on both species to some degree.

Sedimentation and Alterations in Hydrology

Highway construction will temporarily expose bare soil making it susceptible to entering creeks and streams. Such sedimentation may affect greenback cutthroat trout through direct mortality, by filling in winter pool habitat, or by suffocating eggs or prey. Temporary or permanent channelization of creeks and streams may be conducted during roadway construction, and may result in increased channel slope, reduced base flows, increased peak flows, altered substrate composition, and severed floodplain connections (Wheeler et al. 2005). The only currently known population of greenback cutthroat trout occurs in Dry Gulch, well upstream of I-70 and beyond the footprint of the proposed project, so is not expected to be directly affected by impacts of construction activities such as sedimentation or channelization.

Erosion control BMPs will be implemented to minimize or prevent sediment from reaching adjacent waterways. The distribution of greenback cutthroat trout in the I-70 mountain corridor will be revisited during Tier 2, and further analysis will be conducted if necessary.

Effects of Maintenance and Operation of the I-70 Mountain Corridor

Habitat Fragmentation and Roadkill

The proposed action will contribute to reduced connectivity throughout the southern Rockies through the construction of a wider footprint and additional barriers, which may negatively affect wildlife movement and decrease genetic exchange which in turn could have significant biological consequences such as decreased fitness.

The increase in barrier due to the wider highway footprint, cantilevers, guardrails, bridge rails, retaining walls, and ground nail walls is of great concern. Although lynx can easily negotiate some of these barriers, they may increase the amount of time that an animal becomes trapped on the highway, or cause confusion and panic, all of which could increase the likelihood of an animal being hit by a vehicle. These structures may also act as a deterrent to crossing and utilizing habitat on both sides of the highway. At this time, it is unknown where and what type of new barriers will be constructed, or how they will contribute to the barrier effect of the highway; however, it is expected that the advanced guideway system will require a 3-foot tall barrier to prevent oncoming traffic from colliding with the piers.

As described earlier, high-speed and high-volume traffic can act as a barrier to lynx movement, compounding the effect of the highway structure itself. Combined, barriers (traffic and structure) can result in lynx roadkills, fragment and restrict lynx habitat use, impair home range effectiveness, inhibit local and dispersing movements that may lead to reduced habitat connectivity, and the decline of some wildlife populations and species over time due to genetic isolation (Forman and Alexander 1998, USFWS 2000, 2003; Alexander et al. 2004; Clevenger et al. 2002; Forman et al. 2003).

Although lynx highway mortality rates are decreasing with time, they aren't likely to cease as young dispersing through unfamiliar landscapes may be more vulnerable to being hit by a vehicle than individuals with territories. Actual mortalities due to roadkill may be higher than counts indicate, and some estimate that undocumented deer roadkills range from two to six times those that are reported (Forman et al. 2003). The number of unreported roadkills for smaller animals may be even higher, because they are unlikely to cause vehicle damage or injure vehicle occupants.

The existing I-70, with typical traffic counts ranging between 28,127 and 49,846 vehicles per day, already presents a significant impediment to wildlife movement. Between Georgetown and Eagle, the approximate range of lynx along the corridor, these volumes are expected to increase considerably with implementation of the proposed action, to an estimated volume ranging between 54,027 and 100,702 vehicles per day in 2035. The effect of this incremental increase in traffic volume is the contribution to habitat fragmentation, which may affect the ability of lynx to forage, find mates for breeding or find sufficient cover for resting. Gibeau and Heuer (1996) concluded that lynx and other carnivores may avoid using adjacent habitat or become intimidated by highway traffic and may not cross. Additionally, the increased traffic will result in increased probability of vehicle collisions resulting in injury and/or death of individual lynx. It is expected that the implementation of conservation measures aimed at improving the permeability of the highway will offset these impacts.

CDOT will attempt to alleviate the impacts of increased traffic and other barriers on lynx by installing and maintaining crossings along the corridor. As described earlier, LIZs, or general areas of high crossing need, have been identified through the ALIVE process; however, precise numbers, locations and designs of these crossings will be determined during Tier 2 analysis. Implementation of the Minimum Program's Specific Highway Improvements will include improved permeability at LIZ 10 (Bakerville to the Eisenhower-Johnson Memorial Tunnels).

Implementation of the Minimum Program's Other Highway Improvements will include improved permeability at LIZ 4 (Wolcott curve safety), LIZ 5 (Dowd Canyon safety and capacity improvements), and LIZ 6a & b (west of Vail Pass auxiliary lanes). While implementation of the Minimum Program's AGS will increase the barrier effect of the highway along its entire length, it will also improve permeability in the areas of highest need; that is, at all LIZs, thereby improving the permeability of the mountain corridor on the whole.

Although the project will result in alteration and loss of Preble's habitat, the project will not cause permanent habitat fragmentation and loss of connectivity within and between populations in the project area once construction and restoration are complete. Habitat connectivity and mouse mobility will improve at the project site once all conservation measures are implemented.

Proposed conservation measures for the greenback cutthroat trout are focused on working with the CDOW and with the Service on determining which streams could benefit from constructing barriers, and which streams could benefit from improving connectivity under the highway. Implementation of conservation measures would improve greenback cutthroat trout population range by creating stream segments appropriate for reintroduction or improving connectivity along stream segments containing pure individuals.

Winter Maintenance

Changes in water quality or chemistry due to winter sanding, salting, and de-icing activities could affect greenback cutthroat trout in creeks adjacent to the highway. Increases in the use of de-icers will result from a wider highway footprint and could result in direct mortality due to water contamination or by decreasing the success of the spawn due to the suffocation of unhatched eggs. In addition, loss or impairment of habitat due to sedimentation may make feeding and breeding more difficult for trout. Proposed conservation measures will minimize the amount of sand and other de-icers used on the roadway, and on capturing road sand before it reaches creeks and streams. Currently, the only known viable greenback cutthroat trout population occurs upstream of I-70 by approximately 400 feet or more along Dry Gulch, which should preclude the potential for direct impacts. The maintenance of the stream barrier between Clear Creek and Dry Gulch is imperative in maintaining the pure strain of greenback cutthroat in Dry Gulch.

Current and planned measures to decrease the amount of traction sand used on the highway and subsequently reaching adjacent waterways will be implemented thus reducing their effects. In addition, the distribution of greenback cutthroat trout in the I-70 mountain corridor will be revisited during Tier 2.

Changes in water quality or chemistry due to annual herbicide roadside applications for controlling noxious weeds, as well as winter sanding, salting, and de-icing agents added to the roadways could affect downstream orchid populations. Herbicide, salt and de-icing agents would be expected to dilute enough to limit its effect on the orchid. However, an increase in sediment entering the river system due to construction activities could be expected to alter the

habitat of the orchid in downstream locations. An alteration of the habitat could lead to some mortality of individuals and limit the possibility of successful reproduction of others.

Cumulative Effects

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Population Growth

Activities or actions such as recreation, development, mining, and livestock grazing, that destroy, degrade, or fragment habitat can adversely affect the species considered in this consultation. Development on the corridor will continue to fragment and alter wildlife habitat. Additionally, more traffic and dispersed recreation would undoubtedly follow, causing further fragmentation.

Planned growth along the corridor without implementation of the proposed action is expected to affect approximately 275,000 acres of currently undeveloped land. Full implementation of the proposed action could increase this by 3 to 18 percent. The proposed action will require many years to implement, which should allow local communities to appropriately manage the indirect effects associated with that implementation. Components of the proposed action associated with implementation of the Minimum Program are expected to initially induce growth concentrated in urban areas surrounding transit centers in areas of existing or planned urban development, including Eagle, Avon, and Vail. Later phases of improvements associated with implementation of the Maximum Program will likely induce growth in both urban and rural areas in Eagle and Summit counties. Clear Creek County is not expected to experience as much growth as Summit and Eagle counties, partly because of topographic constraints.

Most of the lynx habitat within the corridor occurs on public lands, which should provide some protection from direct habitat loss due to development; however, growth induced by project completion could lead to an increase in uses of the project area during winter, resulting in the expansion of ski areas, snowshoeing, and snowmobile use, all of which compact snow and increase the frequency of human presence. Increased snow compaction affords other carnivores (such as coyotes or mountain lions) the ability to access deep snow areas where lynx would otherwise retain a competitive advantage during the winter months. This increase in competition for resources may be detrimental to the lynx. Disturbance related to the road effect zone and habitat fragmentation due to the growth pressure from potential induced growth will also likely affect lynx. These impacts could potentially have population-wide effects, as well as affect individuals.

Any induced growth could result in more impervious surface which could lead to altered stream flows, downcutting of streams, and loss of riparian habitat that supports the Preble's meadow jumping mouse, greenback cutthroat trout, and Ute ladies'-tresses orchid. In addition, an increase in population could lead to an increase in social trails along creeks and streams, people

requiring fishing and boating access, and introduction of noxious weeds to riparian areas. Noxious weeds may out-compete the Ute ladies'-tresses orchid and the native vegetation that supports it as well as Preble's.

Climate Change

According to the Intergovernmental Panel on Climate Change (IPCC 2007c), "Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level." Average Northern Hemisphere temperatures during the second half of the 20th century were very likely higher than during any other 50-year period in the last 500 years and likely the highest in at least the past 1,300 years (IPCC 2007c). It is very likely that over the past 50 years, cold days, cold nights, and frosts have become less frequent over most land areas, and hot days and hot nights have become more frequent (IPCC 2007c). It is likely that heat waves have become more frequent over most land areas, and the frequency of heavy precipitation events has increased over most areas (IPCC 2007c).

The IPCC (2007c) predicts that changes in the global climate system during the 21st century are very likely to be larger than those observed during the 20th century. For the next two decades, a warming of about 0.2 °C per decade is projected (IPCC 2007c). Afterwards, temperature projections increasingly depend on specific emission scenarios (IPCC 2007c). Various emissions scenarios suggest that by the end of the 21st century, average global temperatures are expected to increase 0.6 to 4.0 °C with the greatest warming expected over land (IPCC 2007c). Localized projections suggest the southwest may experience the greatest temperature increase of any area in the lower 48 States (IPCC 2007c). The IPCC predicts that it is very likely hot extremes, heat waves, and heavy precipitation will increase in frequency (IPCC 2007c). There also is high confidence that many semi-arid areas like the western United States will suffer a decrease in water resources due to climate change (IPCC 2007c). Milly et al. (2005) project a 10 to 30 percent decrease in precipitation in mid-latitude western North America by the year 2050 based on an ensemble of 12 climate models.

Canada lynx

Climate change is reducing snowpack in western North American mountains (Knowles et al. 2006) and shifting the distribution of boreal forest northward (IPCC 2007b, Sturm et al. 2001) and up mountain slopes (Danby and Hik 2007, IPCC 2007b). Consequently, climate change is altering the geographic location and extent of potential lynx habitat, threatening the long-term viability of lynx in the contiguous United States.

Suitable snow cover providing lynx habitat reaches south along the Rocky Mountains into Colorado under current conditions, but retreats north under the future scenarios. The projected loss of suitable snow area in the lower 48 states ranges from 46 percent to 84 percent (Gonzalez et al. 2007).

Overall, it appears reasonable to assume that lynx and lynx habitat will be affected negatively by climate change. However, we lack sufficient certainty to predict more specifically how climate

change will affect lynx populations. In addition, the best scientific data available today do not allow us to draw a causal connection between greenhouse gas emissions from a given source and effects posed to listed species or their habitats, nor are there sufficient data to establish that such impacts are reasonably certain to occur.

Preble's meadow jumping mouse

Potential impacts to Preble's from predicted future climate changes are somewhat uncertain. A trend of warming in the mountains of western North America is expected to decrease snowpack, hasten spring runoff, and reduce summer flows (IPCC 2007b). Stream-flow reductions or seasonal changes in flow due to climate change will probably cause a greater disruption in those watersheds with a high level of human development (Hurd et al. 1999). The two major river basins that support Preble's in Colorado have heightened vulnerability to the effects of climate change due to the degree of human development, natural variability in stream-flow, ratio of precipitation lost to evapotranspiration, and groundwater depletion (Hurd et al. 1999). Conflicts between human needs for water and maintenance of existing wetland and riparian habitats could be heightened. While fewer cold days and nights could result in increased plant biomass yield in colder environments, increased summer heat may increase the frequency and intensity of wildfires, and areas affected by drought may increase (IPCC 2007b). Overall, it appears reasonable to assume that Preble's will be affected negatively by climate change, and that changes in stream flows and resultant effects on riparian habitats may be a key factor. Adverse impacts seem more likely in those drainages where human demand for water resources is greatest; however, we lack sufficient certainty to predict more specifically how climate change will affect Preble's populations.

Greenback cutthroat trout

Because it is only a recently emerging issue, warming temperatures associated with current climate change theories were not specifically discussed in the Greenback Recovery Plan (1998). Although few documents produced in the 1990s discussed the threats of warming temperatures, the task of monitoring populations is generally outlined in Recovery Plan tasks 1.1 and 2.6 (USFWS 1998b). As part of the monitoring protocol, one of eight study sites in the Service's report on Fishery Resources Status and Trends, Global Climate Change Component (USFWS 1993) was in greenback habitat. The goal of this program was to determine the effects of global climate change on fishes in selected regions of the United States. As such, water temperatures and spawning dates for high elevation greenback populations were collected at eight sites as baseline data for this study (USFWS 1993). Temperature monitoring has continued, and has been expanded to most greenback populations within Rocky Mountain National Park. Coleman and Fausch (2007a) monitored six headwater streams containing greenback populations in Rocky Mountain National Park and the Arapaho-Roosevelt National Forest. Their results showed that recruitment of native cutthroat trout in Colorado is limited by cold water temperatures that reduce growth and recruitment. Based on these results, we can hypothesize that, at least for the short-term, an increase in water temperature could be beneficial for greenback reproduction and recruitment. The recovery program has a good baseline dataset for water temperature and the potential to identify population changes within sub-

alpine habitats in the future, which will allow evaluation of the effects of changing water temperatures on greenback populations.

Recent studies have indicated that global warming has the potential to adversely affect river systems that support greenback (Defenders of Wildlife 2002; Ficke et al. 2007). In general, threats from climate change could affect fish populations through reduction of precipitation, increase in fire, and increase in stream temperature. Higher temperatures in lentic systems (lakes) also could increase evaporation and result in lowered lake levels (Ficke et al. 2007). Defenders of Wildlife and The Natural Resources Defense Council performed a 2002 study that modeled the effects of increased air and water temperatures in trout habitat. The report suggests that species of trout and salmon could lose 5 to 17 percent of their existing habitat by the year 2030, 14 to 34 percent by 2060, and 21 to 42 percent by 2090 (Defenders of Wildlife 2002). Although relative impacts to the greenback are unknown, these studies suggest that native cutthroat trout may experience a significant decline in habitat within the next 25 years due to climate change, with highest concern for trout populations in southern and southwestern States. Subspecies such as the greenback, that already occur at high elevations in small tributaries, and are at the eastern edge of cutthroat trout range, may be less able to disperse into new habitats.

However, a slight increase in water temperature also could be beneficial in extending the growing season and increasing fish production in high elevation greenback streams, where spawning and incubation are delayed due to current cold temperatures, as described by Coleman and Fausch (2005). A general temperature increase also could decrease fish production at lower elevations due to decreased levels of dissolved oxygen and may allow invasion of non-native species and pathogens, such as whirling disease, into higher elevation habitats. While it appears reasonable to assume that greenbacks may be affected, we lack sufficient certainty to know how climate change will affect the subspecies. In general, climate change would likely put the most pressure on the subspecies at the lower elevation and easternmost extent of its range, due to a combination of less moisture and higher temperatures.

Ute ladies'-tresses orchid

Climate change predictions call for an increase in frequency of high temperature extremes, heat waves, and heavy precipitation (IPCC 2007a). Confidence is also high that many semi-arid areas like the western United States will suffer a decrease in water resources due to climate change (IPCC 2007a). Milly et al. (2005) project a 10 to 30 percent decrease in precipitation in mid-latitude western North America by the year 2050 based on an ensemble of 12 climate models. These predictions coupled with an increase in population and subsequent demand for water lead to a potential loss of the riparian areas upon which the Ute ladies'-tresses orchid depends. It seems reasonable to expect that the Ute ladies'-tresses orchid will be negatively affected by climate change, but we lack sufficient certainty to predict more specifically how climate change will affect the species.

CONCLUSION

Jeopardize the continued existence of, is defined as, to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR § 402.02).

Recovery calls for improvement in the status of listed species to the point at which listing is no longer appropriate under the criteria set out in section 4(a)(1) of the Act (50 CFR § 402.02).

Canada lynx

After reviewing the current status of the affected species, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Canada lynx. Although Critical Habitat has been designated for the Canada lynx, habitats within Colorado were not included. Therefore the proposed action will not affect Critical Habitat.

As described above, the project will have a negative influence on habitat connectivity across I-70 although this connectivity is already compromised due to the presence of the highway. Take is possible from the wider roadway template and increase in barriers. Habitat modifications of this type may adversely affect individuals in the project area by restricting movement within a home range and may adversely affect individuals in the action area by hindering or preventing dispersal through the area, thus affecting movement across the landscape for dispersal of young and breeding. The introduction of a wider highway footprint as well as more and taller barriers could lead to decreased visibility (both for lynx and for drivers), and an increased amount of time on the highway and confusion during crossing attempts and thus to an increased potential for roadkill. Although the project will likely adversely affect the lynx and its habitat, the proposed action and conservation measures will avoid the likelihood of jeopardy to the species.

Preble's meadow jumping mouse

After reviewing the current status of the affected species, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Preble's meadow jumping mouse. Although Critical Habitat has been designated for the species, none occurs in the project area.

The area to be impacted represents a small portion of the potential Preble's habitat present within the Clear Creek watershed. Based on the amount and nature of project impacts, the project will have temporary but not significant long term effects on the ability of Preble's to travel upstream or downstream along the creek corridor within the project areas, or on the creeks' hydrologic regimes, including their ability to support riparian vegetation. Given the conservation measures proposed, over time temporarily disturbed Preble's habitat should return to a condition as good

as that which is currently present, and its maintenance as good habitat will be assured. Implementation of conservation measures should improve habitat connectivity under I-70.

Greenback cutthroat trout

After reviewing the current status of the affected species, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the greenback cutthroat trout. The only currently known population within the I-70 Mountain Corridor is located upstream of the highway so will not be affected by sedimentation or winter maintenance activities. This population also occurs outside of the new footprint of the highway so will not be directly affected by construction. At this time, it is not known if additional populations occur within the project corridor. Critical Habitat has not been designated for the greenback cutthroat trout; therefore, none will be affected.

Implementation of conservation measures aimed at furthering recovery of the greenback cutthroat trout may increase their distribution and survival. Proposed conservation measures include constructing barriers to separate competing trout species, and maintaining connectivity within a greenback stream. Additional conservation measures include the use of water quality BMPs to prevent sedimentation from entering streams during construction, and implementation of measures to reduce the use of de-icers and to capture road sand. Information regarding the known distribution of the greenback cutthroat trout will be reanalyzed during Tier 2, which may increase the expected impacts to the fish and its habitat.

Ute ladies'-tresses orchid

After reviewing the current status of the affected species, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Ute ladies'-tresses orchid. Critical Habitat has not been designated for the Ute ladies'-tresses orchid; therefore, none will be affected.

We currently do not believe that any populations of the Ute ladies'-tresses orchid occur within the project area; therefore, the plant will not be directly affected. Surveys of appropriate habitat will be conducted during Tier 2 and if any plants are detected, reanalysis of effects may become necessary.

INCIDENTAL TAKE STATEMENT

Sections 7(b)(4) and 7(o)(2) of the Act do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the Act prohibits the removal of federally listed endangered plants or the malicious damage of such plants on areas under federal jurisdiction, or the destruction of listed plants on non-federal areas in violation of state law or regulation.

Section 9 of the Act and Federal regulations pursuant to 4(d) of the Act prohibit the take of endangered and threatened animals, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by FHWA so that they become binding conditions of any project approval issued to CDOT for the exemption in section 7(o)(2) to apply. The FHWA has the continuing duty to regulate the activity covered by this incidental take statement. If the FHWA fails (1) to assume and implement the terms and conditions or (2) fails to require CDOT to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the project approval, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, CDOT must report the progress of the action or its impact on the species to the Service as specified in the incidental take statement.

AMOUNT OR EXTENT OF TAKE

Canada lynx

The Service anticipates that take of Canada lynx will result from the proposed action. The anticipated take is perceived as harassment through the project's contribution to the curtailment of freedom of movement (fragmentation) of lynx across the highway for the purposes of feeding, breeding and sheltering for lynx that may be using the I-70 corridor as part of their existing home range. The Service also anticipates that the incremental increase in traffic volume that will result from the proposed action will increase the likelihood of take through vehicle collisions resulting in injury and/or death. With implementation of conservation measures, the level of take is likely to be reduced. Reduction of harassment however, is not quantifiable at this time.

Traffic volume along the corridor is expected to increase with or without completion of the proposed action, although the increase in traffic is likely to be greater with project implementation than without. This increase in traffic will contribute to reduced permeability of the corridor, habitat fragmentation, and avoidance of the corridor. An unknown number of lynx may have incorporated I-70 as part of their home range; therefore, an unknown number of home ranges may be affected as described. In aggregate, the increased traffic volume will restrict lynx movement for foraging, sheltering and mating purposes. All lynx attempting to cross I-70 in the future are likely to be subject to harassment from the increased traffic volume.

The Service anticipates incidental take of individual lynx will be difficult to detect because lynx hit by vehicles may not be found if they are injured and move away from the highway before dying; therefore, we assume that for every one roadkilled lynx that is detected, one goes undetected. We anticipate that both resident and transient lynx may be injured or killed attempting to cross I-70. We recognize that the proposed action is not solely responsible for all traffic occurring on I-70; however, the proposed action is responsible for some portion of the increase in traffic volume and we anticipate that lynx mortalities will continue.

At current traffic levels, to date four lynx have died on the highway, all between 1999 and 2005, and the Service assumes that as many as eight lynx may have been killed along I-70 in the 11 years since the reintroduction began (an average of approximately 0.72 lynx/year), but are undocumented and unreported. We anticipate that lynx mortalities will continue and may be higher during years of high reproduction due to the presence of more dispersing young animals on the landscape which may be more vulnerable to being hit by a vehicle. Additional undetected mortalities may also occur. Traffic generated by the proposed action will contribute to this mortality and we anticipate the proposed action may result in the take of up to 30 lynx resulting from vehicle collisions over the course of the 40-year project life (0.72 lynx/year x 40 years). Although we believe that implementation of the conservation measures may reduce the level of anticipated take, we cannot determine the extent of the reduction.

In this biological opinion, the Service determined that the anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat, as there is none in the area.

Preble's meadow jumping mouse

The Service anticipates incidental take of Preble's through direct killing and by loss of food, cover, and other essential habitat elements. This take will be difficult to detect because of their small size and hibernation underground. However, the following level of take can be anticipated by the loss of food, cover, and other essential habitat elements. The Service anticipates that the proposed action will result in incidental take of Preble's through a maximum permanent and temporary loss of no more than 4.8 acres of Preble's habitat. Take due to habitat fragmentation is not expected due the implementation of conservation measures to improve connectivity along Beaver Brook under I-70.

Greenback cutthroat trout

At this time, the Service does not anticipate incidental take of greenback cutthroat trout due to the proposed project. However, given the uncertainty of the genetics of the species, the potential of discovering additional occupied streams, and the long-term nature of the proposed action, further analysis will be undertaken during Tier 2.

EFFECT OF THE TAKE

Canada lynx

Take resulting from the proposed action, including highway mortality, impaired landscape connectivity, reduced habitat effectiveness (adjacency to highway) contributing to the impairment of landscape connectivity, and other possible contributions (i.e., increased backcountry recreational use), would extend to, and could negatively affect the status of lynx in the Southern Rockies, but not the status of the contiguous United States DPS. Animals removed from the Southern Rockies population by highway mortality and otherwise inhibited from contributing to the Southern Rockies lynx population by reduced landscape connectivity, could extend the time period for this particular population's recovery. The proposed action is not likely to jeopardize the continued existence of the Canada lynx in the contiguous United States DPS. Because Colorado's habitat is somewhat isolated from source populations and because it is still too early to determine whether a self-sustaining lynx population will result from the reintroduction, the Service has determined that the take level anticipated over the life of the proposed action (40 years) will not significantly impair the Southern Rockies lynx population's contribution to the survival and recovery of the contiguous United States DPS. Implementation of the proposed conservation measures will reduce the likelihood of take by increasing the permeability of I-70.

Preble's meadow jumping mouse

In the accompanying biological opinion, the Service determined that the level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of its designated critical habitat. Implementation of the I-70 Mountain Corridor and its Conservation Measures will not appreciably reduce Preble's meadow jumping mouse in the Clear Creek drainage. Although habitat will be permanently lost to the highway footprint, proposed conservation measures are likely to improve connectivity along Beaver Brook thus facilitating genetic exchange across the highway, and improving population fitness.

Greenback cutthroat trout

In the accompanying biological opinion, the Service determined that no take is currently anticipated for the greenback cutthroat trout because the only currently known population within the project corridor occurs upstream of the proposed project and will not be affected by a wider project footprint. Should additional populations be found within the project corridor, proposed conservation measures will avoid the likelihood of jeopardy to the species.

REASONABLE AND PRUDENT MEASURES

The reasonable and prudent measures, and implementing terms and conditions are designed to minimize the effects of incidental take that might otherwise result from the action. In addition to the Conservation Measures already proposed as part of the project description, the Service believes that the following reasonable and prudent measure is necessary and appropriate to

minimize impacts of incidental take of the Canada lynx and the Preble's meadow jumping mouse:

1. FHWA/CDOT will monitor and report the progress of implementation of the proposed action.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the FHWA must comply with the following term and condition, which implements the reasonable and prudent measure described above and outline required reporting/monitoring. This term and condition is non-discretionary.

1. As individual projects are proposed under the programmatic consultation, FHWA will provide the Service with project-specific information that includes 1) a description of the proposed action, including specific proposed conservation measures, and the area to be affected, 2) the species that may be affected and their known proximity to the project area, 3) results of habitat assessments and species surveys, 4) an updated baseline of the specific project area, 5) a description of how the action may affect the species, 6) a determination of effects, 7) a cumulative total of incidental take that has occurred to date under the consultation, 8) a description of any additional actions or effects not considered in this programmatic consultation, and 9) a description of conservation measures or mitigation activities already implemented and their effectiveness.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

Ruediger et al. (2000) provides measures to address movement and dispersal of lynx across the landscape. One such measure is to develop plans to protect areas that provide habitat connectivity from actions or activities that may create barriers to movement. These barriers may result from an accumulation or incremental projects, such as the proposed action, as opposed to a single action. The Service also recommends that FHWA and CDOT work with local and federal agencies to pursue a unified land management direction through habitat conservation plans, conservation easements or agreement and land acquisitions to protect or improve the integrity of landscape linkages.

REINITIATION NOTICE

This concludes formal consultation on proposed Federal actions related to the construction of improvements to the I-70 Mountain Corridor between C-470 and Glenwood Springs, Colorado.

As required by 50 CFR 402.16, reinitiation of formal consultation is required if (1) the amount or extent of incidental take is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an adverse effect to the listed species or critical habitat that was not considered in this opinion, (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where incidental take exceeds the authorized, any operations causing such take must cease pending reinitiation. In addition, if the Term and Condition is not met, reinitiation of formal consultation will become necessary.

Colorado River Endangered Fishes

As also provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and under the following conditions.

a. The amount or extent of take specified in the incidental take statement for the Colorado River PBO is exceeded. The Service has determined that no incidental take, including harm, is anticipated to occur as a result of the depletions contemplated in this opinion because of the implementation of recovery actions. The implementation of the recovery actions contained in the Colorado River PBO will further decrease the likelihood of any take caused by depletion impacts.

b. New information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not considered in the Colorado River PBO. In preparing the Colorado River PBO, the Service describes the positive and negative effects of the action it anticipates and considered in the section of the opinion entitled "Effects of the Action." New information would include, but is not limited to, not achieving a "positive response" or a significant decline in population, as described in Appendix D of the Colorado River PBO. Significant decline shall mean a decline in excess of normal variations in population (Appendix D). The current population estimate of adult Colorado pikeminnow in the Colorado River is 600 individuals, with a confidence interval of ± 250. Therefore, with the criteria established in Appendix D, a negative population response would trigger reinitiation if the population declined to 350 adults. The Recovery Program has developed recovery goals for the four endangered fishes. If a population meets or exceeds the numeric goal for that species, it will be considered to exhibit a positive response. The Service retains the authority to determine whether a significant decline in population has occurred, but will consult with the Recovery Program's Biology Committee prior to making its determination. In the event of a significant population decline, the Service is to first rely on the Recovery Program to take actions to correct the decline. If nonflow recovery actions have not been implemented, the Service will assess the impacts of not completing these actions prior to reexamining any flow related issues.

New information would also include the lack of a positive population response by the year 2015 or when new depletions reach 50,000 acre-feet/year. According to the criteria outlined in Appendix D of the Colorado River PBO, a positive response would require the adult Colorado

pikeminnow population estimate to be 1,100 individuals (±250) in the Colorado River (Rifle, Colorado to the confluence with the Green River). When the population estimate increases above 1,100, a new population baseline is established at the higher population level.

c. The Recovery Action Plan actions listed as part of the proposed action in the Colorado River PBO are not implemented within the required time frames. This would be considered a change in the action subject to consultation; section 7 regulations (50 CFR 402.16 (c)) state that reinitiation of consultation is required if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion. The Recovery Action Plan is an adaptive management plan because additional information, changing priorities, and the development of the States' entitlement may require modification of the Recovery Action Plan. Therefore, the Recovery Action Plan is reviewed annually and updated and changed when necessary and the required time frames include changes in timing approved by means of the normal procedures of the Recovery Program, as explained in the description of the proposed action. In 2003 and every 2 years thereafter, for the life of the Recovery Program, the Service and Recovery Program will review implementation of the Recovery Action Plan actions to determine timely compliance with applicable schedules.

d. The Service lists new species or designates new or additional critical habitat, where the level or pattern of depletions covered under the Colorado River PBO may have an adverse impact on the newly listed species or habitat. If the species or habitat may be adversely affected by depletions, the Service will reinitiate consultation on the Colorado River PBO as required by its section 7 regulations. The Service will first determine whether the Recovery Program can avoid such impact or can be amended to avoid the likelihood of jeopardy and/or adverse modification of critical habitat for such depletion impacts. If the Recovery Program can avoid the likelihood of jeopardy and/or adverse modification of critical habitat no additional recovery actions for individual projects would be required, if the avoidance actions are already included in the Recovery Action Plan. If the Recovery Program is not likely to avoid the likelihood of jeopardy and/or adverse modification of critical habitat then the Service will reinitiate consultation and develop reasonable and prudent alternatives.

For purposes of any future reinitiation of consultation, depletions have been divided into two categories.

Category 1:

a) existing depletions, both Federal and non-Federal as described in the project description, from the Upper Colorado River Basin above the confluence with the Gunnison River that had actually occurred on or before September 30, 1995 (average annual depletion of approximately 1 million acre-feet/year);

b) depletions associated with the total 154,645 acre-feet/year volume of Green Mountain Reservoir, including power pool (which includes but is not limited to

all of the 20,000 acre-feet contract pool and historic user's pool), the Colorado Big Thompson replacement pool; and

c) depletions associated with Ruedi Reservoir including Round I sales of 7,850 acre-feet, Round II sales of 6,135 acre-feet/year as discussed in the Service's biological opinion to Reclamation dated May 26, 1995, and as amended on January 6, 1999, and the Fryingpan Arkansas Project replacement pool as governed by the operating principles for Ruedi Reservoir but excluding 21,650 acre-feet of the marketable yield.

Category 1 depletions shall remain as Category 1 depletions regardless of any subsequent change, exchange, or abandonment of the water rights resulting in such depletions. Category 1 depletions associated with existing facilities may be transferred to other facilities and remain in Category 1 so long as there is no increase in the amount of total depletions attributable to existing depletions. However, section 7 consultation is still required for Category 1 depletion projects when a new Federal action occurs which may affect endangered species except as provided by the criteria established for individual consultation under the umbrella of the Colorado River PBO. Reinitiation of this consultation will be required if the water users fail to provide 10,825 acre-feet/year on a permanent basis.

Category 2:

Category 2 is defined as all new depletions up to 120,000 acre-feet/year, this includes all depletions not included in Category 1 that occur after 1995 regardless of whether section 7 consultation has been completed. This category is further divided into two 60,000 acre-feet/year blocks of depletions.

The recovery actions are intended to avoid the likelihood of jeopardy and/or adverse modification of critical habitat and to result in a positive response as described in Appendix D of the Colorado River PBO for both 60,000 acre-feet blocks of depletions in Category 2. However, prior to depletions occurring in the second block, the Service will review the Recovery Program's progress and adequacy of the species response to the Recovery Action Plan actions. According to the criteria outlined in Appendix D, a positive response would require the adult Colorado pikeminnow population estimate to be maintained at approximately 1,100 individuals in the Colorado River (Rifle, Colorado to the confluence with the Green River), unless the criteria in Appendix D are changed because of new information. If the adult Colorado pikeminnow population is maintained at approximately 1,100 adults or whatever is determined to be the recovery goal in the Colorado River, a new population baseline would be established to determine a positive or negative population response.

When population estimates for wild adult humpback chub are finalized, they will also be used to determine population response. As outlined in Appendix D, Colorado pikeminnow and humpback chub population estimates will serve as surrogates for razorback sucker and bonytail to assess the status of their populations for 10 years. Recovery goals for all four species were

completed August 1, 2002. If a population meets or exceeds the numeric goal for that species, it will be considered to exhibit a positive response. However, short of reaching a specific recovery goal, trends in certain population indices provide an interim assessment of a species' progress toward recovery. This review will begin when actual depletion levels from the first depletion block reach 50,000 acre-feet/year or the year 2015, whichever comes first.

Calculation of actual depletions is to be accomplished using Cameo gage records and State Division of Water Resources data (Appendix B of the Colorado River PBO). The review will include a determination if all the recovery actions have been satisfactorily completed, that all ongoing recovery actions are continuing, and the status of the endangered fish species. If it is determined that the recovery actions have all been completed and the status of all four endangered fish species has improved (based on criteria in Appendix D), then the Service intends that the Colorado River PBO would remain in effect for new depletions up to 120,000 acre-feet/year (total of both 60,000 acre-feet blocks of Category 2 depletions).

Monitoring, as explained in Appendix D, will be ongoing to determine if a population estimate of 1,100 (± one confidence interval) adult Colorado pikeminnow is maintained. If it is not maintained, this would be considered new information and section 7 would have to be reinitiated. Population baselines will be adjusted as population estimates change. If the adult Colorado pikeminnow population estimates increase, a new population baseline will be established to determine a positive or negative population response. If the population estimate for Colorado pikeminnow in the year 2015 is greater than 1,100 adults, then the higher number will be used to establish a new population baseline. These numeric values may be revised as new information becomes available. Revisions will be made to Appendix D as needed.

If the 50,000 acre-foot or 2015 review indicates that either the recovery actions have not been completed or the status of all four fish species has not sufficiently improved, the Service intends to reinitiate consultation on the Recovery Program to specify additional measures to be taken by the Recovery Program to avoid the likelihood of jeopardy and/or adverse modification of critical habitat for depletions associated with the second 60,000 acre-feet/year block. Any additional measures will be evaluated every 5 years. If other measures are determined by the Service or the Recovery Program to be needed for recovery prior to the review, they can be added to the Recovery Action Plan according to standard procedures, outlined in that plan. If the Recovery Program is unable to complete those actions which the Service has determined to be required for the second 60,000 acre-feet/year, consultation on projects with a Federal nexus may be reinitiated in accordance with Endangered Species Act regulations and this opinion's reinitiation requirements. The Service may also reinitiate consultation on the Recovery Program if fish populations do not improve according to the criteria in Appendix D or if any positive response achieved prior to the 50,000 acre-foot or the year 2015 is not maintained. Once a positive response is achieved, failure to maintain it will be considered a negative response.

If the Service reinitiates consultation, it will first provide information on the status of the species and recommendations for improving population numbers to the Recovery Program. The Service will reinitiate consultation with individual projects only if the Recovery Program does not implement recovery actions to improve the status of the listed fish species. The Service will

reinitiate consultation first on Category 2 projects and second on Category 1 projects. The Service will only reinitiate consultations on Category 1 depletions if Category 2 depletion impacts are offset to the full extent of the capability of the covered projects as determined by the Service, and the likelihood of jeopardy to the listed fishes and/or adverse modification of critical habitat still cannot be avoided. The Service intends to reinitiate consultations simultaneously on all depletions within the applicable category.

If new information becomes available, if a new species becomes listed, if incidental take occurs, if the total average annual amount of water depleted by this project changes, or if any other project element changes which alters the operation of the project from that which is described in your correspondence and which may affect any endangered or threatened species in a manner or to an extent not considered in this biological opinion (see 50 CFR 402.16), formal section 7 consultation should be reinitiated. FHWA has agreed to condition its approval documents to retain jurisdiction should section 7 consultation need to be reinitiated.

If the Service can be of further assistance, please contact Alison Deans Michael of my staff at (303) 236-4758.

Sincerely,

Susan C. Linner
Colorado Field Supervisor

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Appendix B: USFWS IPaC List of Federally Protected Species

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Colorado Ecological Services Field Office
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http://www.fws.gov/platteriver

In Reply Refer To: December 19, 2018
Consultation Code: 06E24000-2019-SLI-0289
Event Code: 06E24000-2019-E-00988
Project Name: I-70 Floyd Hill to Veterans Memorial Tunnels

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered

species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Migratory Birds
- Wetlands

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Colorado Ecological Services Field Office
Denver Federal Center
P.O. Box 25486
Denver, CO 80225-0486
(303) 236-4773

Project Summary

Consultation Code: 06E24000-2019-SLI-0289

Event Code: 06E24000-2019-E-00988

Project Name: I-70 Floyd Hill to Veterans Memorial Tunnels

Project Type: TRANSPORTATION

Project Description: The purpose of the I-70 Floyd Hill to Veterans Memorial Tunnels Project (Project) is to improve travel time reliability, safety, and mobility, and address the deficient infrastructure on westbound I-70 through the Floyd Hill area of the I-70 Mountain Corridor. The Proposed Action addresses specific highway improvements defined in the ROD, including providing three-lane capacity for westbound I-70 from Floyd Hill to the Veterans Memorial Tunnels; a multimodal trail and frontage road between U.S. Highway 6 (US 6) and Idaho Springs; and physical and/or operational improvements to four interchanges—the Floyd Hill/Beaver Brook exit (Exit 248) near the top of Floyd Hill; the Floyd Hill/Hyland Hills exit (Exit 247); the junction with US 6 (Exit 244) near the base of Floyd Hill; and the Hidden Valley/Central City exit (Exit 243). The project would also improve curves through the corridor, consistent with the recommended 55 miles per hour (mph) design speed from the 2016 I-70 Mountain Corridor Design Speed Study.

The project is located on I-70 between milepost (MP) 248 (just east of the Floyd Hill/Beaver Brook interchange) and Exit 241 (Idaho Springs/ Colorado Boulevard, west of the Veterans Memorial Tunnels). It is mostly located within Clear Creek County with the eastern end located within Jefferson County.

The major elements included in the Proposed Action include:
• Adding a third westbound travel lane to the two-lane section of I-70 from the current three- to two-lane drop (approximately MP 246) through the Veterans Memorial Tunnels
• Constructing a new frontage road between US 6 and the Hidden Valley Interchange
• Improving interchanges and intersections throughout the Study Area
• Improving design speeds and stopping sight distance on horizontal curves
• Improving the multimodal trail (Clear Creek Greenway) between US 6 and the Veterans Memorial Tunnels
• Reducing animal-vehicle conflicts and improving wildlife connectivity with new and/or improved wildlife overpasses or underpasses

A detailed description of the Proposed Action and other design concepts considered can be found in the I-70 Floyd Hill to Veterans Memorial Tunnels: Alternatives Analysis Technical Report.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/39.730519637655725N105.42596528957012W

Counties: Clear Creek, CO | Jefferson, CO

Endangered Species Act Species

There is a total of 12 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 5 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Canada Lynx *Lynx canadensis* Population: Wherever Found in Contiguous U.S. There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3652	Threatened
North American Wolverine *Gulo gulo luscus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5123	Proposed Threatened
Preble's Meadow Jumping Mouse *Zapus hudsonius preblei* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/4090	Threatened

Birds

NAME	STATUS
Least Tern *Sterna antillarum*	Endangered

Population: interior pop.
No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska.

Species profile: https://ecos.fws.gov/ecp/species/8505

Mexican Spotted Owl *Strix occidentalis lucida*	Threatened

There is **final** critical habitat for this species. Your location is outside the critical habitat.
Species profile: https://ecos.fws.gov/ecp/species/8196

Piping Plover *Charadrius melodus*	Threatened

Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered.
There is **final** critical habitat for this species. Your location is outside the critical habitat.
This species only needs to be considered under the following conditions:
- Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska.

Species profile: https://ecos.fws.gov/ecp/species/6039

Whooping Crane *Grus americana*	Endangered

Population: Wherever found, except where listed as an experimental population
There is **final** critical habitat for this species. Your location is outside the critical habitat.
This species only needs to be considered under the following conditions:
- Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska.

Species profile: https://ecos.fws.gov/ecp/species/758

Fishes

NAME	STATUS
Greenback Cutthroat Trout *Oncorhynchus clarkii stomias*	Threatened

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/2775

Pallid Sturgeon *Scaphirhynchus albus*	Endangered

No critical habitat has been designated for this species.
This species only needs to be considered under the following conditions:
- Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska.

Species profile: https://ecos.fws.gov/ecp/species/7162

Flowering Plants

NAME	STATUS
Colorado Butterfly Plant *Gaura neomexicana var. coloradensis* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6110	Threatened
Ute Ladies'-tresses *Spiranthes diluvialis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2159	Threatened
Western Prairie Fringed Orchid *Platanthera praeclara* No critical habitat has been designated for this species. This species only needs to be considered under the following conditions: ▪ Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska. Species profile: https://ecos.fws.gov/ecp/species/1669	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31
Black Rosy-finch *Leucosticte atrata* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9460	Breeds Jun 15 to Aug 31

NAME	BREEDING SEASON
Brewer's Sparrow *Spizella breweri* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9291	Breeds May 15 to Aug 10
Brown-capped Rosy-finch *Leucosticte australis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Jun 15 to Sep 15
Lesser Yellowlegs *Tringa flavipes* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Olive-sided Flycatcher *Contopus cooperi* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3914	Breeds May 20 to Aug 31
Rufous Hummingbird *selasphorus rufus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8002	Breeds elsewhere
Veery *Catharus fuscescens salicicola* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds May 15 to Jul 15
Virginia's Warbler *Vermivora virginiae* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9441	Breeds May 1 to Jul 31
Willet *Tringa semipalmata* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere

Probability Of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ “Proper Interpretation and Use of Your Migratory Bird Report” before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

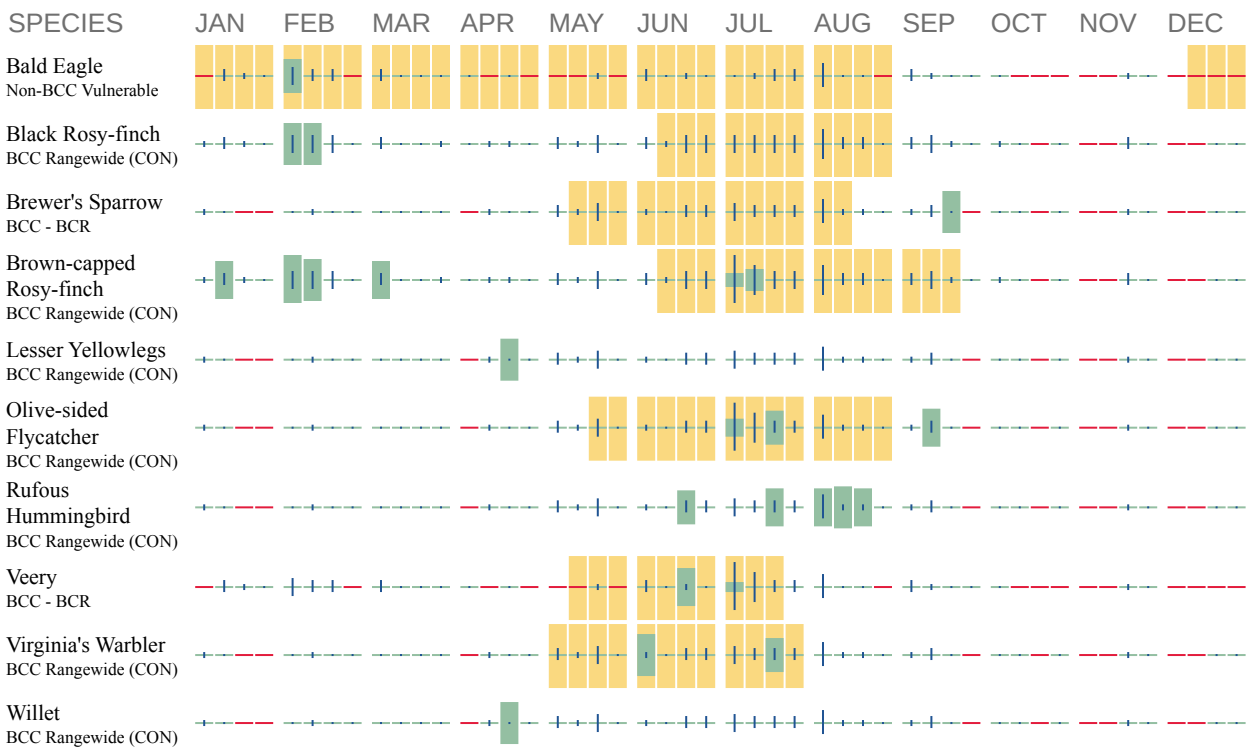
1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.
Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?
The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the E-bird Explore Data Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?
The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?
To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?
Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and

3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ “What does IPaC use to generate the migratory birds potentially occurring in my specified location”. Please be aware this report provides the “probability of presence” of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the “no data” indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ “Tell

me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Wetlands

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

FRESHWATER EMERGENT WETLAND

- PEM1C

FRESHWATER FORESTED/SHRUB WETLAND

- PSSC

FRESHWATER POND

- PUBG
- PUBF

RIVERINE

- R4SBC
- R5UBH

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Appendix C: Site Photographs

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Photo 1. Looking southwest from the south side of I-70 at the eastern end of the Study Area near the top of Floyd Hill at MP 247 during the summer of 2017.

Photo 2. Looking southwest from the south side of I-70 at the eastern end of the Study Area. An unnamed tributary to Beaver Brook is adjacent to the highway at this location near MP 246.5 during the summer of 2017.

Photo 3. Picture of the Beaver Brook channel and riparian corridor northeast of the I-70 Beaver Brook/Floyd Hill interchange looking east near MP 248 during the summer of 2018.

Photo 4. Picture of the Beaver Brook channel and riparian corridor northeast of the I-70 Beaver Brook/Floyd Hill interchange looking east at the property boundary for Adam's Acres buffalo ranch near MP 248 during the summer of 2018.

Photo 5. North of I-70, looking east from the culvert that connects Beaver Brook on either side of I-70. This area was undeveloped in 2004 (when the trapped-found PMJM was recorded). The photo was taken in June of 2018 and shows the Adams Acres building in the background on the right. The building, and adjacent holding pens that are not shown in the photo, have been built within the riparian corridor, thereby fragmenting potential Preble's habitat in the Study Area near MP 248.

Photo 6. Looking west from the east side of the Beaver Brook/Floyd Hill interchange bridge over I-70 during the summer of 2017.

Photo 7. Looking east from the west side of the Hyland Hills/Floyd Hill interchange bridge in the I-70 highway right of way (ROW) near MP 246.5 during the summer of 2017.

Photo 8. Looking south from the I-70 highway ROW, east of the Hyland Hills/Floyd Hill interchange. A large water quality pond is shown that drains into Beaver Brook to the east near MP 247 during the summer of 2017.

Photo 9. Picture of a Black-Billed Magpie observed in the Study Area adjacent to Clear Creek near MP 244.5 during the summer of 2017.

Photo 10. Evidence of a deer roadkill found adjacent to I-70 in the highway ROW near MP 247 during the summer of 2017.

Photo 11. Looking west. Example vegetation and topography found in/adjacent to the I-70 Corridor in the Study Area. The bottom of Floyd Hill is in the background near MP 244 during the summer of 2017.

Photo 12. Looking east from the bottom of Floyd Hill at the vegetation and topography leading to the top of Floyd Hill near MP 245 during the summer of 2017.

Photo 13. Example of slopes and drop-off of several gulches (Sawmill and Johnson) that intersect I-70 in the Study Area near MP 245 during the summer of 2018.

Photo 14. Evidence of deer that have movement patterns that parallel or intersect the highway. This track was photographed in the I-70 highway ROW near MP 245 during the summer of 2018.

Photo 15. Photo of a quaking aspen stand that is present on the north side of I-70 on the west side of Floyd Hill near MP 245.8 during the summer of 2018.

Photo 16. An example of Clear Creek and its narrow riparian corridor. Photo taken at the west end of the Study Area near MP 243 during the summer of 2018.

Photo 17. Photo looking east at the I-70/US 6 interchange, with Clear Creek on the left near MP 244.5 during the summer of 2017.

Photo 18. Picture looking east from the Valero Gas Station at the Hidden Valley/Central City interchange near MP 243 during the summer of 2017.

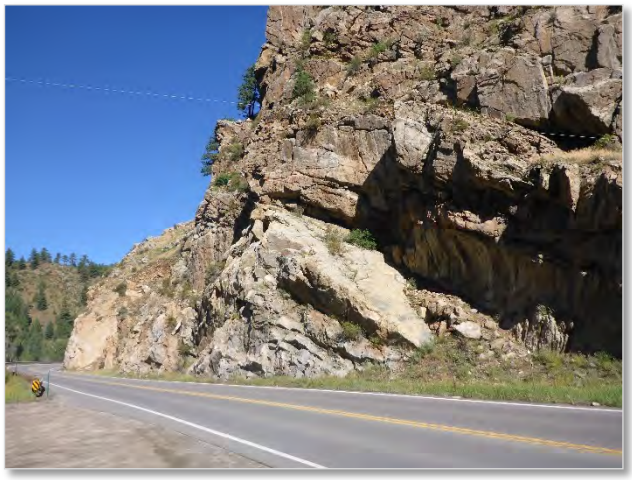

Photo 19. Picture looking west along the East Idaho Springs Road/I-70 Frontage Road, south of I-70 and the Veterans Memorial Tunnels near MP 242.3 during the summer of 2017. This ridge is a large rock outcrop in the Project Corridor.

Photo 20. Photo looking west along East Idaho Springs Road west of the Veterans Memorial Tunnels near MP 242 during the summer of 2017. Shows how close Clear Creek (middle) is to I-70 (right), the narrow riparian corridor, and the steep banks separating the highway and Clear Creek.

Photo 21. The downstream outlet of the Beaver Brook culvert under I-70 at the northeastern end of the Study Area, west of the Adams Acres property.

Photo 22. Looking inside of the Beaver Brook culvert under I-70. This culvert lacks natural sub-straight. While the top of the concrete is not designed as a formal rodent shelf, it can be used by various small wildlife species. Distance to inlet (~650 feet) with no lighting between acts as a barrier for wildlife to traverse.

Appendix D Interim Preble's Mouse Trapping Survey Results Report

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PREBLE'S MOUSE TRAPPING SURVEY RESULTS REPORT

I-70: Floyd Hill to Veterans Memorial Tunnels
Jefferson and Clear Creek Counties, Colorado
CDOT Project # 22716
Task Order 9

Prepared for

Atkins North America Inc.
7604 Technology Way, Suite 400
Denver, CO 80237

Prepared by

Atwell, LLC
143 Union Boulevard, Suite 700
Lakewood, CO 80228

August 11, 2020 (updated May 2021)

EXECUTIVE SUMMARY

The Colorado Department of Transportation (CDOT) has contracted Atkins North America Inc. (Atkins) as the prime consultant for developing the I-70 Floyd Hill to Veterans Memorial Tunnels Environmental Assessment (EA) to evaluate improvements for approximately 8 miles of the I-70 Mountain Corridor in Clear Creek and Jefferson counties, Colorado. In support of the EA, Atkins has contracted Atwell, LLC (Atwell) for expert support to determine the current occupation status of the Preble's meadow jumping mouse (*Zapus hudsonius preblei*) (Preble's mouse) in the eastern edge of the Project area along Beaver Brook at the top of Floyd Hill (Figure 1).

This survey was conducted within a reach of Beaver Brook and an unnamed tributary on both the north and south sides of I-70 near County Road 65, as shown on Figure 1. These areas were assumed to be occupied habitat for Preble's mouse based on a 2004 survey of the area and designated Critical Habitat for the Preble's mouse (USFWS 2010). The Preble's Mouse Recovery Plan designates the surveyed area as a part of the Clear Creek hydrologic unit (USFWS 2018). Therefore, a presence/absence trapping survey for Preble's mouse within this potential habitat along Beaver Brook and the unnamed tributary was conducted to understand the species' status in this area.

Atwell conducted nightly trapping surveys along transects in suitable Preble's habitat within the Project area (see Figure 1). One hundred and nineteen individual small mammals of three species were captured across all four transects over 644 trap nights. Fifty-four individuals were recaptured. *Zapus* individuals were captured (capture rate of 2.2 percent). However, it was impossible to determine morphologically whether these were Preble's mice, or the western jumping mouse (*Zapus princeps*). In addition to *Zapus,* two other species were captured: meadow vole (*Microtus pennsylvanicus*) and deer mice (*Peromyscus maniculatus*). These species were captured on all four transects. Deer mice were the most abundant species, with 93 individuals representing 78.2 percent of the unique individuals captured; combined with the meadow vole, these species account for 89.9 percent of unique individuals captured. *Zapus* spp. accounted for 10.1 percent of unique individuals captured.

The results of DNA testing on captured *Zapus* spp. are needed to confirm genetic affinity with the subspecies Preble's mouse listed under the Endangered Species Act (ESA) as Threatened, or with the congeneric the western jumping mouse (*Zapus princeps*). Due to work restrictions surrounding Covid-19 issues, the Molecular Ecology Lab in Fort Collins, Colorado was closed for a period and unable to perform DNA analysis of tissues samples collected from captured *Zapus* individuals until May 2021. The results of the genetics analyses conducted on the tissue sample from *Zapus* individuals captured during the 2020 Preble's mouse trapping survey confirmed the captured animals to be western jumping mouse (*Zapus princeps)*. No Preble's meadow jumping mice (*Zapus hudsonius preblei*) were captured during the survey.

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APPENDICES

1 INTRODUCTION

The Colorado Department of Transportation (CDOT) has contracted Atkins North America Inc. (Atkins) as the prime consultant for developing the I-70 Floyd Hill to Veterans Memorial Tunnels Environmental Assessment (EA) to evaluate improvements for approximately 8 miles of the I-70 Mountain Corridor in Clear Creek and Jefferson counties, Colorado. In support of the EA, Atkins has contracted Atwell, LLC (Atwell) for expert support to determine the current occupation status of the Preble's meadow jumping mouse (*Zapus hudsonius preblei*) (Preble's mouse) in the eastern edge of the Project area along Beaver Brook at the top of Floyd Hill (Figure 1).

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This report presents results of the Preble's mouse trapping survey conducted July 6 through July 9, 2020. The report provides a description of the methods, maps illustrating the extent of the trapping surveys, results of the survey, and conclusions.

2 PREBLE'S MOUSE TRAPPING SURVEY METHODS

Permits from both the U.S. Fish and Wildlife Service (USFWS) and Colorado Parks and Wildlife (CPW) were acquired for the Preble's mouse trapping survey. In addition, the CPW District Wildlife Manager was contacted prior to initiating the trapping survey. The survey and trapping methods were conducted in accordance with guidance from USFWS and following techniques described by the American Society of Mammalogists (USFWS 2004; Sikes 2016).

The survey area comprised a reach of Beaver Brook and an unnamed tributary illustrated in Figure 1. A site reconnaissance of the subject reaches of Beaver Brook was conducted during the last week of May 2020. The potential reaches were walked, and potential Preble's mouse habitat was evaluated and mapped for the purpose of siting the trapping survey transects, integrating accessibility due to landowner entrance permissions. The southernmost reach of the Beaver Brook mainstem was not available for trapping, due to lack of landowner permission. Trapping transects, as well as individual trap locations, were finalized during the first day of the trapping effort, based on microhabitat, terrain constraints, and creek bank locations. The trapping transect locations were geotagged through the Collector application of ArcGIS, as illustrated in Figure 1.

The trapping survey was conducted over a single week, beginning on June 6, 2020. Transects B, C, and D (total 726 meters in length) comprised 165 traps, surveyed over three nights (495 trap nights). Due to landowner constraints, Transect A (274 meters long) comprised 85 traps run for two nights (170 trap nights). A total of 665 trap nights were collected during this survey. This trapping density fulfills the USFWS standard requirement for Preble's mouse presence/absence surveys.

Small mammal, live-traps were placed 5 meters apart along the identified transects. Traps were baited with a sweet feed combination (molasses in rolled oats and filler grains). A small ball of polyester batting was placed inside each trap for bedding. Traps were placed in a stable position under vegetation as much as possible, to prevent overcooling and overheating of animals during the trapping period. Survey tape was used to mark all traps to ensure ease of sighting and to avoid missing a trap and potential damage to any captured animals.

Traps were checked in the early morning, starting at 6:30 a.m., to avoid overheating of any captured mammals. Traps were closed after checking each morning and reopened/baited the same day, in late afternoon.

All captured small mammals were identified to species, sex, and age, as able to determine. All data were recorded on data sheets in the field. Each captured individual received a hair clip on their back haunches for identification of recaptures in subsequent trap nights. If individuals were recaptured, they were released immediately after identifying the clipped hair.

Captured *Zapus* individuals were weighed, sexed, aged, and hair-clipped in unique location combinations (left haunch, right haunch, etc.), noted to facilitate identification, location, and movement of potential subsequent captures. A tissue sample was collected from each individual captured *Zapus.* The mouse was gently restrained, and sterilized surgical scissors were used to remove a small tissue sample from an ear flap. The tissue sample was then removed with sterile forceps and transferred to a sterile sampling bottle with preservative. Samples were kept iced/refrigerated until they were hand-delivered to the Molecular Ecology Lab in Fort Collins, Colorado, on July 10, 2020 following the completion of the trapping survey.

Arrangements were made for DNA analysis of any collected tissue samples with the following team:

Dr. Sara Oyler-McCance, Research Geneticist and Jennifer Fike, Geneticist/Lab Manager
Molecular Ecology Lab
USGS Fort Collins Science Center
2150 Centre Avenue, Building C
Fort Collins, CO 80526

Traps were collected at the end of the week's trapping effort. Care was taken to remove all traps, extra bait, bedding, and flagging tape from the survey area. Traps were washed in a 10-percent bleach solution and thoroughly rinsed/air dried prior to re-storage to avoid potential transfer of *Hantavirus* (Mills et al. 1995).

The USFWS Preble's mouse survey guidelines require that the Survey Field Data Compilation Form, including positive and negative trapping results, and injury or mortality documentation, to be submitted to the Colorado Natural Heritage Program upon receipt of the DNA testing and analysis (USFWS 2004). The form is attached in Appendix A and includes results of the DNA testing and analysis. Information will also be submitted to CPW and USFWS as part of informal consultations.

3 PREBLE'S MOUSE TRAPPING SURVEY RESULTS

Of the 665 total trap nights, 21 traps were found closed and empty, indicating that the traps were sprung over the trap night, but no small mammal captured. This reduced the total of effective trap nights to 644.

Twelve *Zapus* individuals were captured over the three nights, and two individuals were recaptured on the third night. It was notable that the *Zapus* individuals were not found in the A transect, where a *Zapus* individual was captured in 2004. All 2020 captures were along the B, C, and D transects. The trapping locations for all *Zapus* are included in Figure 1.
Transects B, C, and D were all located along the unnamed tributary to Beaver Brook west of County Road 65 on the south side of I-70, flowing west to east through a complex mosaic of wetland plant communities, to confluence with the brook mainstem. Large portions of these transects are within 50 meters of eastbound I-70 lanes. This wetland meadow complex is a wide corridor, dissected by numerous small rivulets and punctuated by large areas of saturated soils that support herbaceous wetland vegetation. Numerous historic stream channels occur throughout the wet meadow. In some areas, no stream channel is obvious, and water drainage appears to occur as sheet flow, or just under the soil surface.

Because optimal Preble's mouse habitat includes a shrub component, especially willows (*Salix* spp.) transects B, C, and D were located along drainage channels with a shrub cover component, even though these streams are not indicated as channels in the National Hydrology Dataset (NHD) shown in Figure 1. These reaches support intermixed stands of Geyer willow (*Salix geyeriana*) and mountain willow (*S. monticola*), interspersed with smaller amounts of sandbar willow *(S. exigua*). The understory in these areas include dense patches of herbaceous species such as golden banner (*Thermopsis rhombifolia*), horsetail (*Equisetum arvense*), and grasses such as bluegrasses (*Poa* spp.) and smooth brome (*Bromopsis inermis*). These herbaceous patches often extend into the surrounding wet meadow areas. Between thickets of willows, common

wetland herbaceous species dominate the wet meadow in extensive stands of cattails (*Typha* spp.), rushes (*Juncus* spp.), sedges (*Carex* spp.), and bulrushes (*Schoenoplectus* spp.). Noxious weeds are notably largely absent, although some small patches of Canada thistle (*Breea arvense*) and dames' rocket (*Hesperis matronalis*) were noted in the wet meadow and widely scattered diffuse knapweed (*Centaurea diffusa*) were observed.

One hundred and nineteen (119) individual small mammals of three species were captured across all four transects over 644 trap nights. Fifty-four individuals were recaptured over the entire trapping survey. With a total of 644 trap nights and 173 total captures, the overall capture rate was 26.9 percent. The capture rate for *Zapus*, with two individuals captured twice, was 2.2 percent. However, it was impossible to determine morphologically whether these were Preble's mice, or the western jumping mouse (*Zapus princeps*).

In addition to *Zapus* sp., two other small mammal species were captured: meadow vole (*Microtus pennsylvanicus*) and the deer mouse (*Peromyscus maniculatus*). These species were captured on all four transects. Deer mice were the most abundant species, with 93 individuals representing 78.2 percent of the unique individuals captured; combined with the meadow vole, the individuals account for 89.9 percent of unique individuals captured. *Zapus* accounted for 10.1 percent of unique individuals captured.

Table 1. Total individual captures and recaptures of small mammals on Beaver Brook and an unnamed tributary, Clear Creek and Jefferson Counties, Colorado. July 6 to July 9, 2020.

	Adult		Juvenile		Total				
Species	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Unknown**	**Total Unique Individuals**	**Total Recaptured Individuals**
Microtus pennsylvanicus meadow vole	8	3	1	1	9	4	1	14	0
Peromyscus maniculatus deer mouse	29	27	11	13	40	40	16	96	49
Zapus sp. Preble's Meadow Jumping Mouse or Western Jumping Mouse	3	8	0	0	3	8	1	12	2
Total								122	51

4 CONCLUSIONS

Twelve *Zapus* sp. individuals were captured over 644 trap nights in the Beaver Brook and an unnamed tributary survey Area of Interest. These areas were assumed to be occupied habitat for Preble's mouse based on a single *Zapus* sp. capture during a 2004 survey. This survey indicates that the relative abundance of *Zapus* sp. in the area is low, with a capture rate of 10.1 percent. Total small mammal species richness is moderate in this area.

The results of DNA testing for captured *Zapus* sp. is required to confirm genetic affinity with the *Zapus hudsonius preblei* subspecies listed under the Endangered Species Act (ESA) as Threatened, or with the congeneric, the western jumping mouse. Due to work restrictions surrounding Covid-19 issues, the Molecular Ecology Lab in Fort Collins, Colorado was temporarily closed at the time of the survey. however, frozen samples were provided and stored for testing when the lab reopened. Testing of these samples was conducted in May 2021, and all of the individuals analyzed were confirmed to be western jumping mice (*Zapus princeps*) and not Preble's meadow jumping mice (*Zapus hudsonius preblei*)

5 NEXT STEPS

Results of the testing were provided to the Colorado Natural Heritage Program and will be provided to the USFWS as part of the information Section 7 consultation with USFWS regarding the Floyd Hill Project.

6 REFERENCES

Mills, J.N., et al. 1995. Guidelines for working with rodents potentially infected with *Hantavirus*. Available: https://pdfs.semanticscholar.org/22de/3607f1e0963e8821549ad3397a7bdb6b9e6f.pdf

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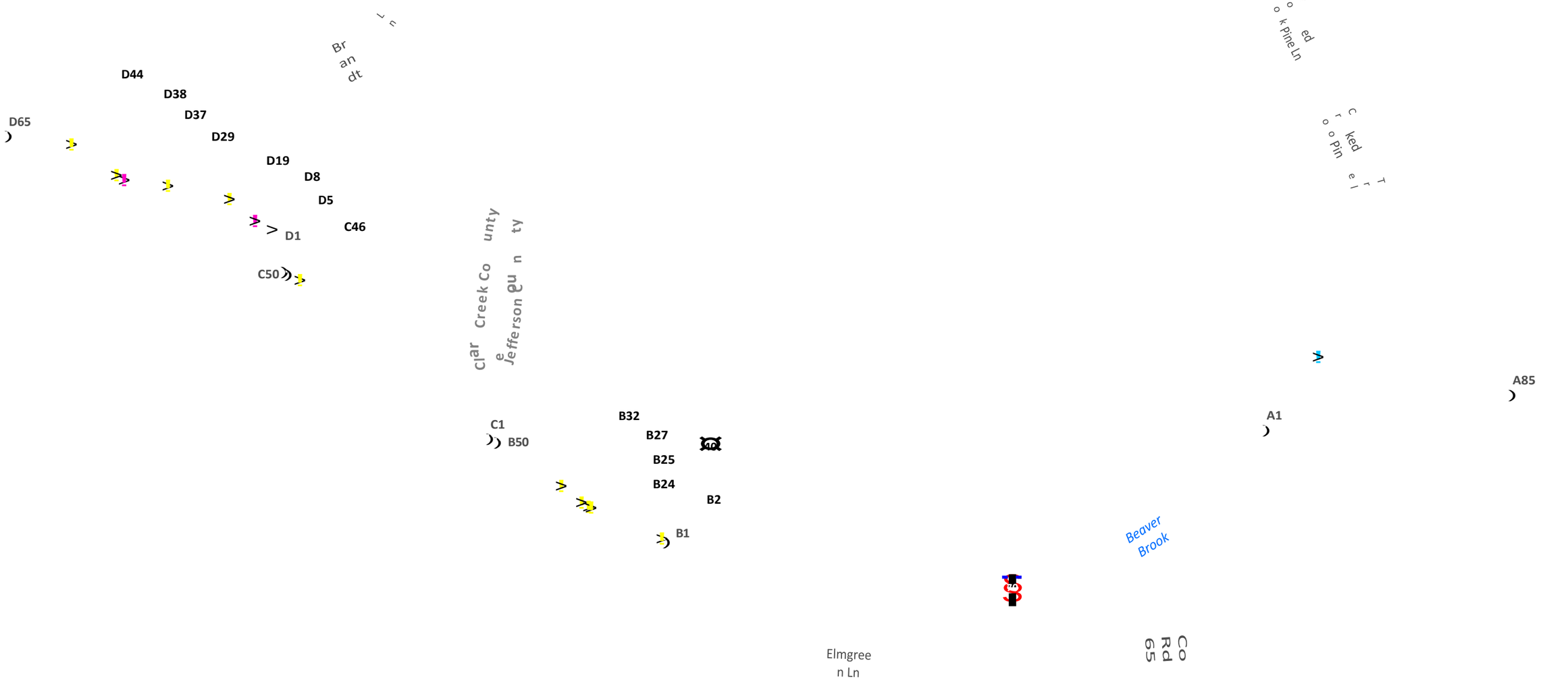
FIGURES



Floyd Hill Preble's Meadow Jumping Mouse Field Trapping Results
20003612

August 11, 2020

Preble's Mouse Trapping Survey Results

- Transect Endpoints
- Capture, 2020

Transects

A

B

Watercourse (NHD)

Waterbody (NHD)

Floyd Hill Area of Interest

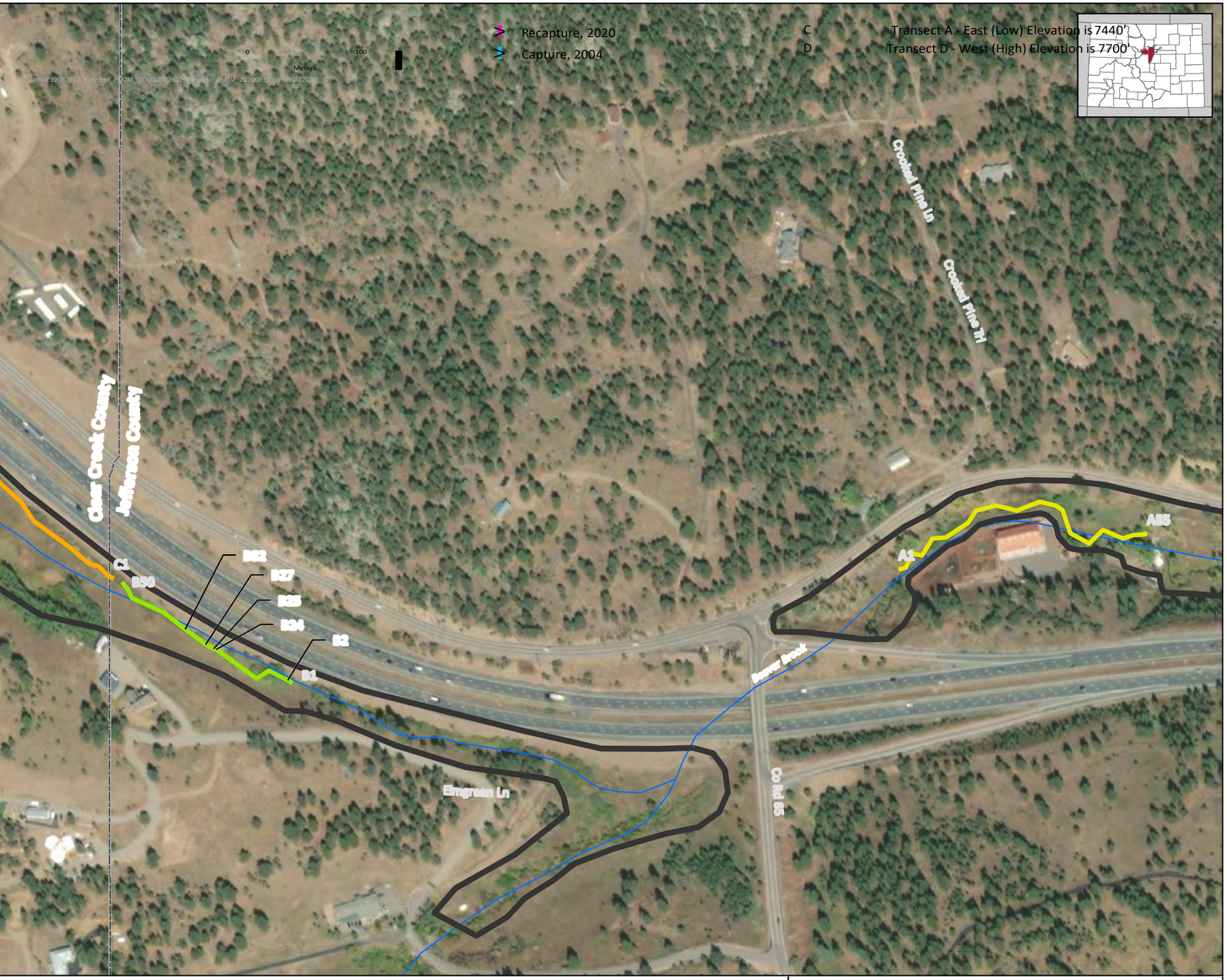
County

Figure 1

I-70: Floyd Hill to Veterans Memorial Tunnels

Preble's Meadow Jumping Mouse

Trapping Survey Results
Clear Creek and Jefferson Counties, Colorado



APPENDIX A

Preble's Meadow Jumping Mouse, *Zapus hudsonius preblei*

Survey Field Data Compilation Form

☒ TRAPPING SURVEY ☐ EVALUATED, NOT TRAPPED

Fill out both sections 1 and 2 if trapping survey, fill out section 1 only if habitat evaluation (ie. not trapped). Compilation forms needed for updated habitat evaluations and site disqualification requests.

SECTION 1

Surveyor:

Date of Site/Habitat Assessment July 6 to July 9, 2020

Organization/Company Atwell, LLC

Full Name(s) Carron Meaney,Maureen O'shea Stone, Chelsea Anderson, Carl Larriccia

Location:

Project Name (if applicable) Floyd Hill Trapping Survey

Project Description (nearby road intersection, type of impact, etc.) Potential expansion of I-70 corridor.

U.S.G.S. Quad Name Laporte County Jefferson/Clear Creek Elevation 5,494 feet

Township(s) 9 North Range(s) 70 West Section(s) 28

¼¼ Section(s) NWNE

UTM Coordinates, Zone 13 Northing 1506271 Easting 3073555

UTM Coordinate Datum NAD27 ☐ NAD83 ☐

Directions to Location Accessible by foot from the Bison Ranch on the north, and by Elm Green Lane on south.

Land Ownership Tim Hakes; Adams Trust; Spirit & Hope, LLC; FRF Properties 1903 LLC; Frel Albert and Mary Jane Irrevocable Trust; Floyd Hill Investments, LLC

Habitat:

General Habitat Description Foothills riparian community.

Dominant Overstory Plant Community Geyer willow (*Salix geyeriana*); mountain willow (*S. monticola*); sandbar willow (*S. exigua*)

Dominant Understory Plant Community *Carex* spp., *Bromopsis inermis*, *Thermopsis rhombifolia*, *Phalaris arundinacea*, and *Equisetum arvense*

Current Land Use

Drainage Name: Beaver Brook and unnamed tributary Type: Perennial Stream X

Ephemeral Stream _____ Pond/Lake _____ Ditch _____ Other _____

SECTION 2:

Z. h. preblei found ? Yes ☐ No ☒ Dates of Survey July 6 to July 9, 2020

Trapping Information:

Type of Traps Sherman Live Traps Type of Bait sweet horse feed

% Available (unsprung) 96% Number of Nights Trapped 3

Total Trapnights 644

Weather conditions prior to and during survey Hot and dry, little to no precipitation, rained on second day, 70-95 degrees Fahrenheit.

Associated Animal Species (especially urban predators, rats, house mice) *Microtus pennsylvanicus* and *Peromyscus maniculatus*

Sketch of surveyed area showing traplines, specific area disqualified (can be done on required U.S.G.S. map of site if appropriate).

see attached figure

Preble's Data:

Number of Preble's trapped or seen 0

Distance from water (m) Sex (m/f) Evidence of repro.* Weight (grams). Marked or tagged?

1.

2.

3.

4.

(Continue on separate sheet if needed)

* Reproduction evidence for males is descended testes, for females is enlarged nipples.

Evidence of disease, predation or injury none

(Submit injury/mortality form if appropriate)

Genetic Material Obtained? Yes X No ~~X~~ Forwarded to USGS

Specimen(s)? Yes X No ~~X~~ Forwarded to USGS

Additional Comments:

genetic samples identified by USGS lab as Zapus princeps, attached separately.

Revision/correction by Carron Meaney May 3, 2021

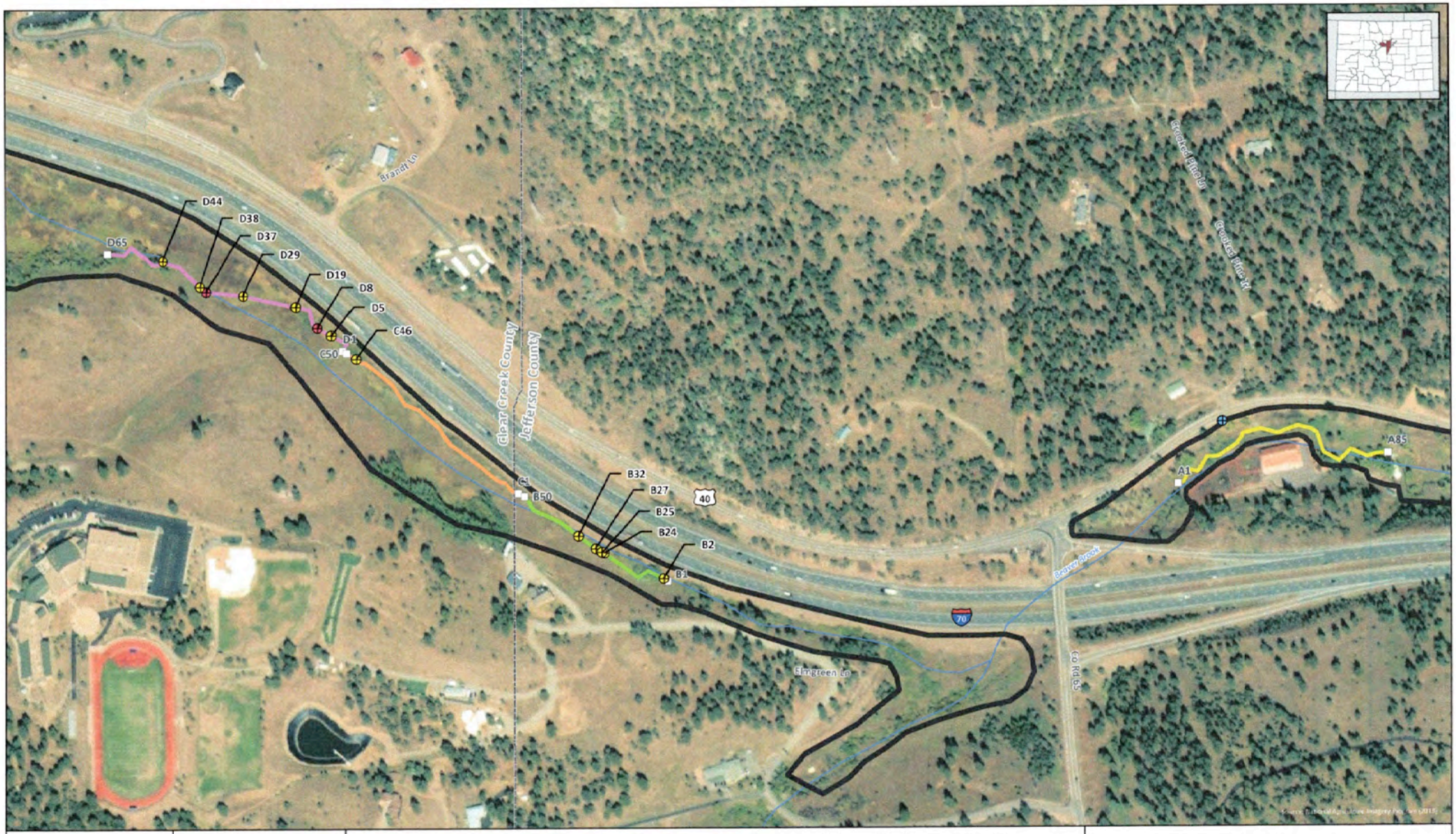


Figure 1
I-70: Floyd Hill to Veterans Memorial Tunnels
Preble's Meadow Jumping Mouse
Trapping Survey Results
Clear Creek and Jefferson Counties, Colorado

Sample Name	ZhuC120		ZhuC3		ZhuC6		ZhuD107		ZhuC129		ZhuD07		ZhuD109		ZhuD122		ZhuC104		ZhuC119		ZhuC12		ZhuC130		ZhuD108		CytB Sequence	BLAST to
CM01	158	166	220	220	117	129	0	0	215	227	0	0	161	169	332	336	211	223	252	252	100	108	288	288	226	230	GCTTCCATGTTC	Zapus princeps princeps
CM02	158	166	220	220	129	129	0	0	215	227	0	0	165	165	336	360	223	227	250	252	108	108	288	288	222	226	GACCCATATTTG	Zapus princeps princeps
CM03	158	166	220	220	117	129	0	0	215	227	0	0	141	165	336	336	227	227	250	250	108	112	288	288	226	226	CCTTTTCCTCAG1	Zapus princeps princeps
CM04	158	166	220	224	129	133	0	0	215	215	0	0	149	161	340	340	227	227	248	258	108	108	288	288	222	226	ATTCGAAAAAAA	Zapus princeps princeps
CM05	158	166	220	224	129	133	0	0	227	227	0	0	161	161	340	356	223	223	236	258	108	112	284	288	222	230	ACCCATTAATAA	Zapus princeps princeps
pos1_PJM40	152	156	242	246	103	123	242	242	226	230	154	162	145	153	257	261	255	255	230	235	108	108	256	256	210	218	CGAATCCTTCAT	Zapus hudsonius preblei
pos2_PJMh	166	166	220	224	117	117	0	0	211	215	0	0	149	157	332	340	211	211	250	258	104	108	288	288	222	242	ACACCCATTAAT	Zapus princeps princeps

Loci ZhuD07 and ZhuD107 do not amplify in Z. princeps and Z. trinotatus, but are polymorphic in all Z. hudsonius subspecies.

Locus ZhuC130 is polymorphic in Z. h. intermedius, Z. h. pallidus and Z. princeps but monomorphic (256 bp) in Z. h. preblei, Z. h. campestris and Z. trinotatus

ZhuC129 is monomorphic in Z. h. luteus