Recommendations for Enhancing Connectivity for Terrestrial and Aquatic Wildlife along the I-70 Mountain Corridor

CONTENTS

LIZ A: Dotsero

Mileposts: 130.9 – 131.3 *Early Enhancement Opportunities in LIZ?* No
LIZ Length: 0.5 miles

Target Species	*Species Movement Guilds*
Elk	Very High Openness Fauna
Mule Deer	Adaptive Ungulates

*Secondary Target Species**

Mountain Lion	Northern Leopard Frog

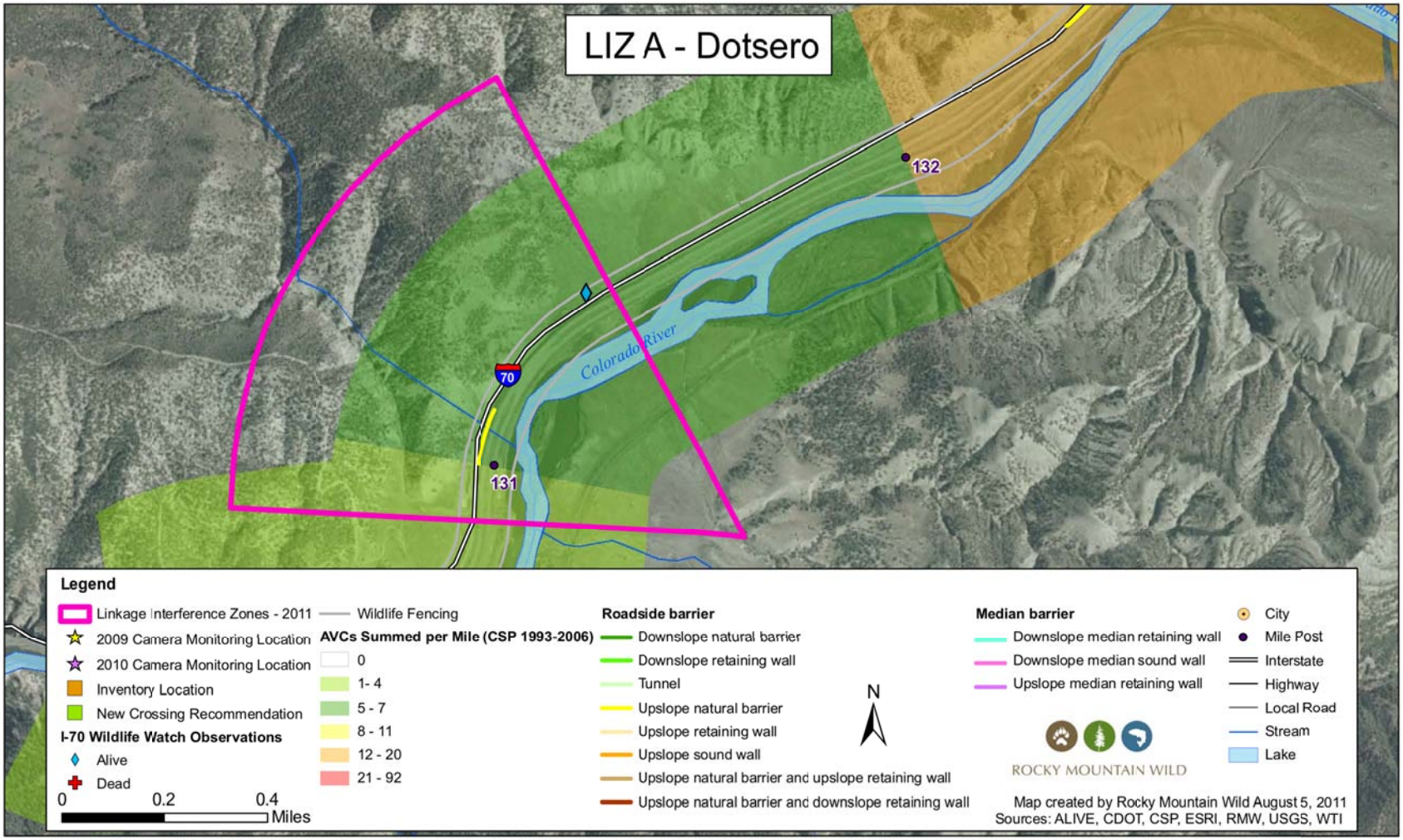
* Bighorn sheep removed as secondary target species because habitat is primarily north of interstate and domestic sheep are present south of the interstate. River otter occurs in the area, however as there are no aquatic crossings in this LIZ, otter movement is not a concern in the LIZ so long as they can move up and down the Colorado River corridor, which runs parallel to the interstate.

Animal-Vehicle Collisions: Moderate to Low

Status of Adjacent Lands: Public (BLM) lands and some private lands north of I-70; Land trust property along riparian corridor south of I-70.

Site Discussion: Level/Riparian. No structures inventoried. Game fencing on both sides of interstate throughout LIZ. I-70 parallels the north side of the Colorado River through this LIZ.

Connectivity Recommendations
Install a bridge underpass suitable for deer and elk passage and include features to accommodate amphibian and small mammal passage. Tie structure into existing wildlife fencing. When reconstructing interstate, install additional pipe culverts to accommodate passage for small and medium-sized mammals and amphibians. Because the road level is low relative to the river, which runs parallel, this recommendation requires raising the road bed to install a sufficiently-sized underpass or construct an overpass. Coordinate with BLM and land trust.


LIZ A - Dotsero
132
131
70
Colorado River
Legend
Linkage Interference Zones - 2011
2009 Camera Monitoring Location
2010 Camera Monitoring Location
Inventory Location
New Crossing Recommendation
I-70 Wildlife Watch Observations
Alive
Dead
0
0.2
0.4
Miles
Wildlife Fencing
AVCs Summed per Mile (CSP 1993-2006)
0
1- 4
5 - 7
8 - 11
12 - 20
21 - 92
Roadside barrier
Downslope natural barrier
Downslope retaining wall
Tunnel
Upslope natural barrier
Upslope retaining wall
Upslope sound wall
Upslope natural barrier and upslope retaining wall
Upslope natural barrier and downslope retaining wall
N
Median barrier
Downslope median retaining wall
Downslope median sound wall
Upslope median retaining wall
ROCKY MOUNTAIN WILD
City
Mile Post
Interstate
Highway
Local Road
Stream
Lake
Map created by Rocky Mountain Wild August 5, 2011
Sources: ALIVE, CDOT, CSP, ESRI, RMW, USGS, WTI

LIZ B: Wolcott West

Mileposts: 151.2 – 154.1 *Early Enhancement Opportunities in LIZ?* Yes
LIZ Length: 3.0 miles

Target Species	*Species Movement Guilds*
Canada Lynx	Adaptive High Mobility Fauna
Elk	Very High Openness Fauna
Mule Deer	Adaptive Ungulates

Secondary Target Species

Mountain Lion	Northern Leopard Frog
River Otter	

Animal-Vehicle Collisions: Ranges from Very High to Low

Status of Adjacent Lands: Mostly public (BLM), but eastern portion of LIZ is private (east of approximately MP 152.5).

Site Discussion: Level/Riparian - Moderately broad drainage. Steep slopes to north and south. Game fencing on both sides of interstate throughout LIZ.

Connectivity Recommendations
Tie new and existing structures into existing wildlife fencing and ensure fencing connects structures through median between EB and WB lanes. Where concrete median barriers are present, add median gaps to accommodate small mammals every quarter mile.

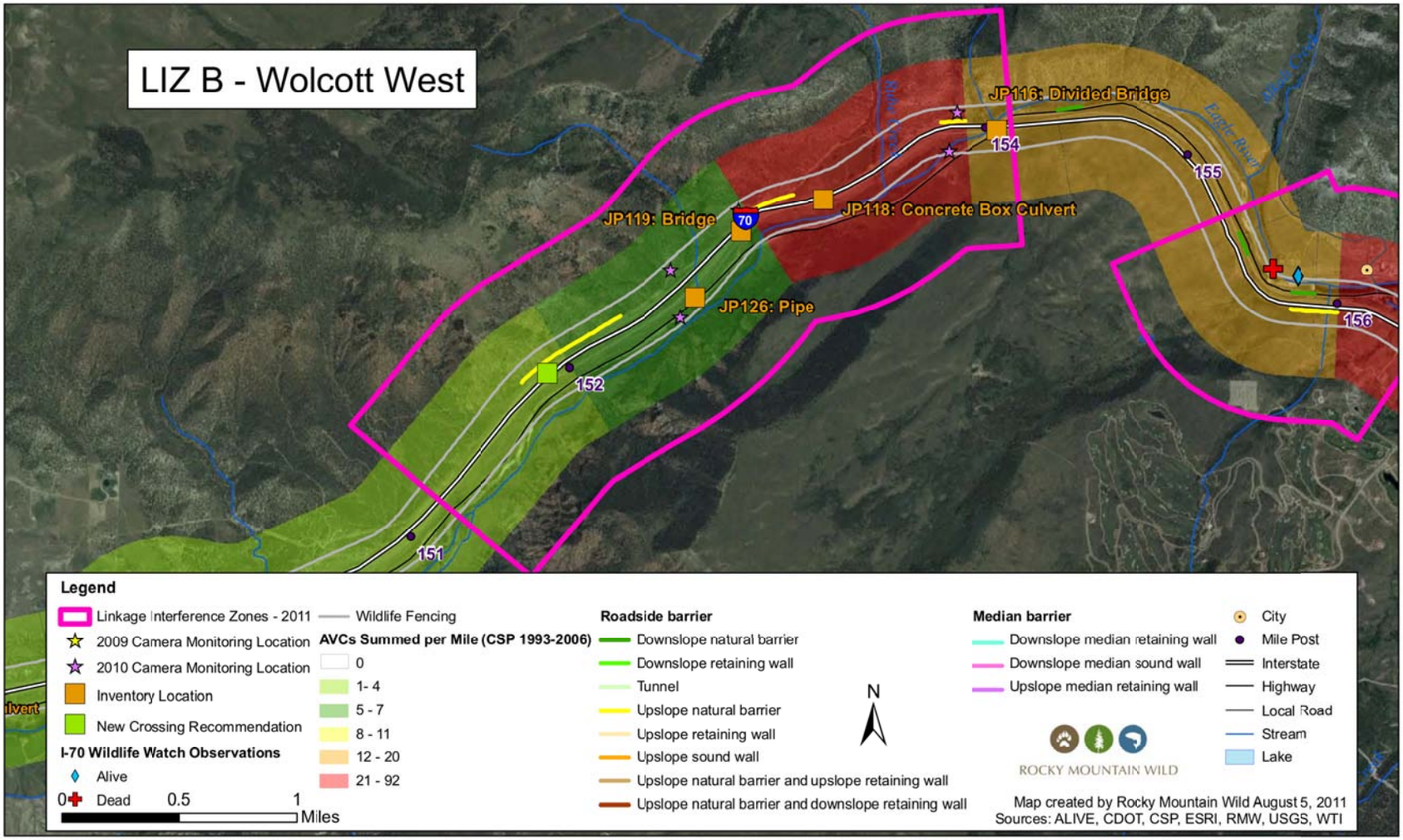
Site-Specific Recommendations

Loc. #	MP	Site Description	Recommendations	EEO*
n/a	151.2 - 152.5	No suitable crossing structures in this segment	Install at least one large bridge underpass suitable for lynx, deer and elk passage; include features to accommodate amphibian passage.	No
JP126†	152.6	Pipe. Wildlife fencing blocks structure entrances on both N & S sides.	Maintain pipe for small and medium-sized mammal passage. Replace concrete headwall at north entrance with soil and vegetation. Move wildlife fencing run over the top of the pipe rather than running in front of structure entrances. Add small mammal fencing to connect structures under EB and WB lanes through open median. Remove accumulated sediment limiting through-passage.	Yes

JP119	153.0	Divided bridge over private access road, tied into existing wildlife fencing along I -70. Monitoring station WB030 set up in 2010	Replace concrete bridge abutments with natural slopes; Replace existing cattle fencing with wildlife-friendly fencing. Revegetate approaches where feasible.	Yes
JP118	153.3	Long, narrow Concrete Box Culvert (8x8x225') with median skylight. Pipe culvert under frontage road at south entrance.	Culvert cannot be made functional for elk, but could be enhanced for deer and lynx; also too long for deer population-level movements. Widen culvert. Add features to prevent road debris/trash from entering through the median skylight (Note: the benefits of culvert skylights remain unconfirmed, although daylighting, in concept, is desirable). Add natural substrate and baffles to create a natural floor surface. Elk passage at this location require replacing culvert with a bridge structure.	No
JP116†	154.0	Divide bridge over Eagle River, 2-lane paved road (Hwy 6) and RR (not in use). Structure connects into wildlife fencing in both directions.	Maintain natural banks and vegetation cover on west side of river. Minimize human activity on north side of Eagle River to encourage wildlife use. Widen and improve dry pathway between river and Hwy 6 on east side of structure by moving guardrail closer to road and maintaining a dirt/gravel pathway through large boulders lining the river bank. Replace or cover gabian wall abutment with natural substrate.	Yes

*Early Enhancement Opportunity

†Indicates wildlife monitoring conducted at site


LIZ B - Wolcott West
JP116: Divided Bridge
JP118: Concrete Box Culvert
JP119: Bridge
JP126: Pipe
70
151
152
154
155
156
Eagle River
Legend
Linkage Interference Zones - 2011
2009 Camera Monitoring Location
2010 Camera Monitoring Location
Inventory Location
New Crossing Recommendation
I-70 Wildlife Watch Observations
Alive
Dead
0
0.5
1
Miles
Wildlife Fencing
AVCs Summed per Mile (CSP 1993-2006)
0
1- 4
5 - 7
8 - 11
12 - 20
21 - 92
Roadside barrier
Downslope natural barrier
Downslope retaining wall
Tunnel
Upslope natural barrier
Upslope retaining wall
Upslope sound wall
Upslope natural barrier and upslope retaining wall
Upslope natural barrier and downslope retaining wall
N
Median barrier
Downslope median retaining wall
Downslope median sound wall
Upslope median retaining wall
ROCKY MOUNTAIN WILD
City
Mile Post
Interstate
Highway
Local Road
Stream
Lake
Map created by Rocky Mountain Wild August 5, 2011
Sources: ALIVE, CDOT, CSP, ESRI, RMW, USGS, WTI

LIZ C: Wolcott

Mileposts: 155.3 – 156.3 *Early Enhancement Opportunities in LIZ?* No
LIZ Length: 1 mile

Target Species	*Species Movement Guilds*
Elk	Very High Openness Fauna
Mule Deer	Adaptive Ungulates

Secondary Target Species

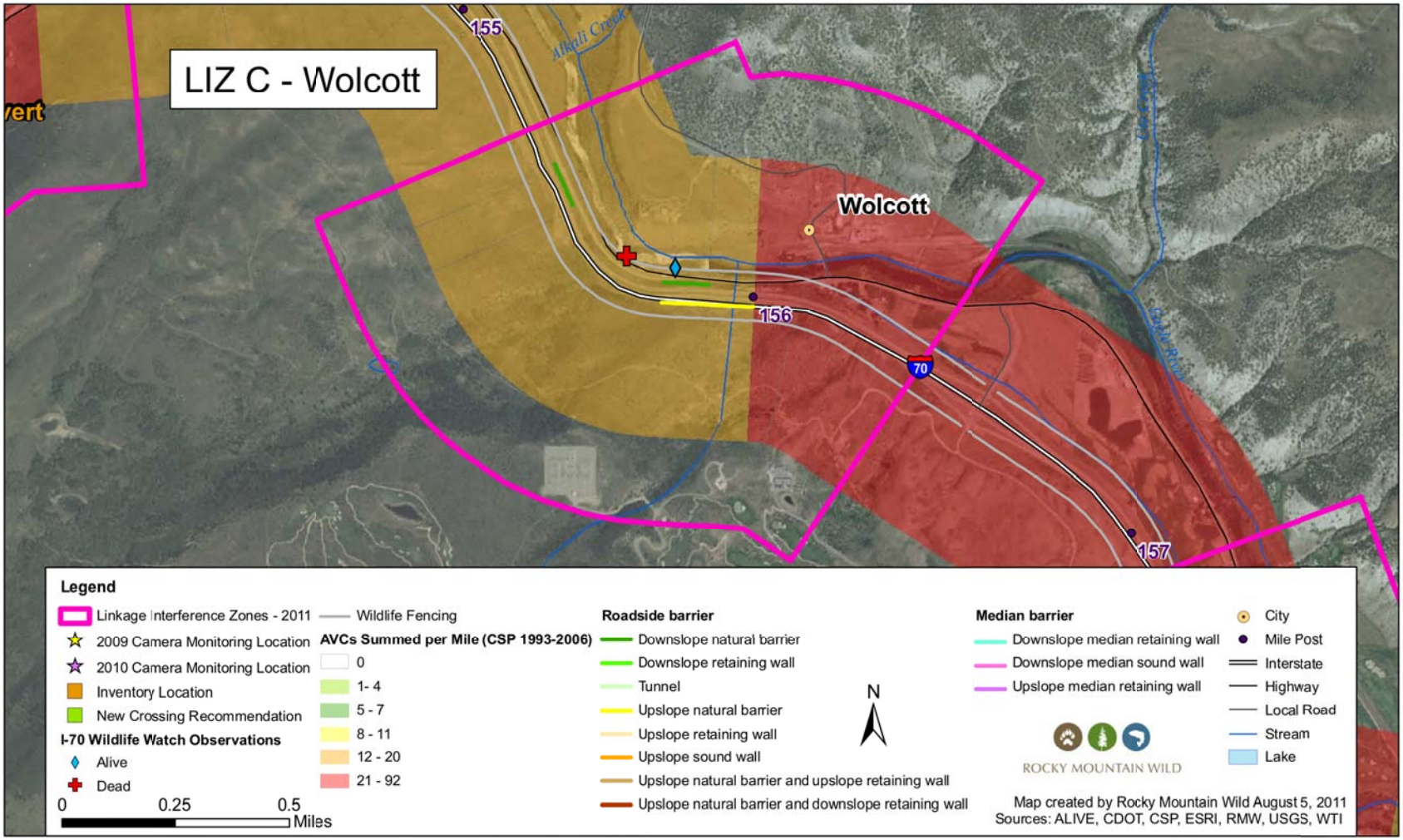
Black Bear	Canada Lynx
Moose	Mountain Lion
Northern Leopard Frog	River Otter

Animal-Vehicle Collisions: Ranges from High to Very High

Status of Adjacent Lands: Mostly private with some BLM lands around MP 155.9-156

Site Discussion: Topography adjacent to interstate is fairly level. No existing structures present in LIZ. Game fencing on both sides of interstate throughout LIZ.

Connectivity Recommendations
Install bridge underpass suitable for deer and elk passage, including features to accommodate amphibian and small mammal passage. Tie structure into existing wildlife fencing. When reconstructing interstate, install additional pipe culverts to accommodate passage for small and medium-sized mammals and amphibians.


LIZ C - Wolcott
155
156
157
70
Wolcott
Alkali Creek
Eagle River
Legend
Linkage Interference Zones - 2011
2009 Camera Monitoring Location
2010 Camera Monitoring Location
Inventory Location
New Crossing Recommendation
I-70 Wildlife Watch Observations
Alive
Dead
0 0.25 0.5 Miles
Wildlife Fencing
AVCs Summed per Mile (CSP 1993-2006)
0
1- 4
5 - 7
8 - 11
12 - 20
21 - 92
Roadside barrier
Downslope natural barrier
Downslope retaining wall
Tunnel
Upslope natural barrier
Upslope retaining wall
Upslope sound wall
Upslope natural barrier and upslope retaining wall
Upslope natural barrier and downslope retaining wall
N
Median barrier
Downslope median retaining wall
Downslope median sound wall
Upslope median retaining wall
ROCKY MOUNTAIN WILD
City
Mile Post
Interstate
Highway
Local Road
Stream
Lake
Map created by Rocky Mountain Wild August 5, 2011
Sources: ALIVE, CDOT, CSP, ESRI, RMW, USGS, WTI

LIZ D: Wolcott East

Mileposts: 157.1 – 159.6 *Early Enhancement Opportunities in LIZ?* Yes
LIZ Length: 2.6 miles

Target Species	*Species Movement Guilds*
Elk	Very High Openness Fauna
Mule Deer	Adaptive Ungulates

Secondary Target Species

Black Bear	Canada Lynx
Moose	Mountain Lion
Northern Leopard Frog	River Otter

Animal-Vehicle Collisions: Ranges from High to Very High

Status of Adjacent Lands: Mostly private

Site Discussion: Surrounding topography is level/sloped. Game fencing on both sides of interstate throughout LIZ.

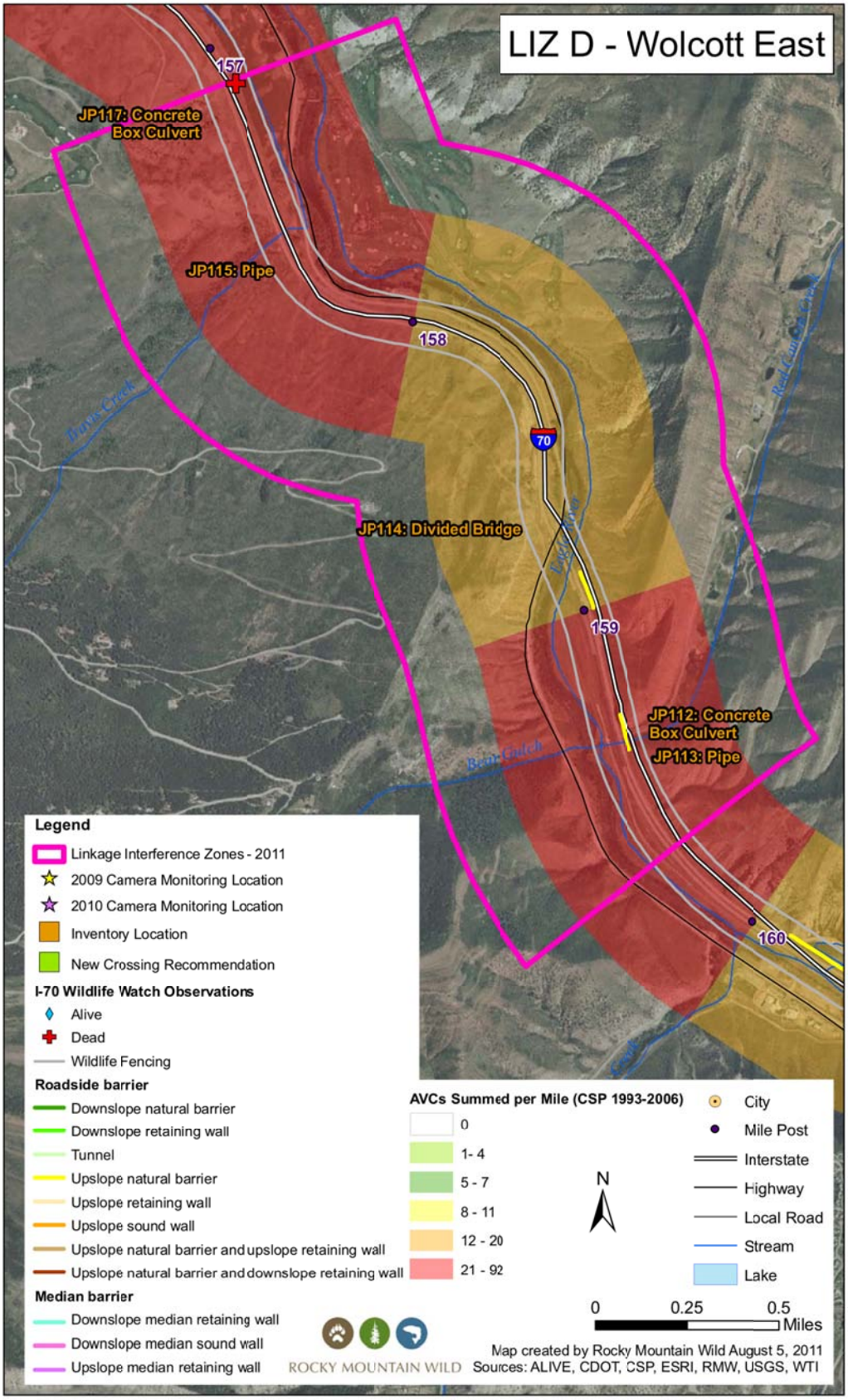
Connectivity Recommendations
Recommend a combination of new wildlife crossing structures and improvements to existing infrastructure. When reconstructing interstate, install additional pipe culverts to accommodate passage for amphibians and small and medium-sized mammals.

Site-Specific Recommendations				
Loc. #	**MP**	**Site Description**	**Recommendations**	**EEO***
n/a	157.1-158.0	Segment has no existing structures suitable for passage by primary target species. The meadow area north of the I-70 in this area is currently under review for development of major community center; proposal to move Hwy 6 closer to I-70, increasing the roadway barrier.	Install a bridge underpass suitable for deer and elk passage (replace CBC at MP 157.2 or install a new structure elsewhere). Include features to accommodate amphibian and small mammal passage. Tie structure into existing wildlife fencing. Coordinate with community to pursue a combination of land protection and cluster development away from a proposed wildlife crossing.	No

JP117	157.2	CBC with two paved drainage pipes feeding in from south side. Gated on north side. Trash/debris in culvert. Skylight in median. Adjacent escape ramp	Requires careful coordination with landowner(s) - may need to control livestock whil allowing wildlife passage.	No
JP115	157.6	Pipe culvert	Structure is not suitable for improvements to accommodate target species. Maintain for small animal movement, and possibly install small mammal shelf through culvert.	No
JP114	158.7	Large divided bridge spanning Hwy 6, Eagle River and RR. Bridge spans natural riverbanks on both sides of the river.	Replace concrete abutments with natural slopes. Connect existing wildlife fencing completely to structure so that there are no gaps. Maintain natural vegetation and riverbanks through structure. Traffic on Hwy 6 may preclude some wildlife movement, but large span offers large area for wildlife to traverse. Minimize human access on non-roaded side of river to encourage wildlife passage.	Yes
JP112	159.4	Concrete box culvert with paved road through it.	Structure is not suitable for improvements to accommodate target species. Integrate terrestrial and aquatic connectivity needs at this location by replacing the box culvert and pipe (aquatic site JP113) with a bridge spanning both the road and stream. Restore the riparian channel and construct year-round dry pathways through structure.	No

*Early Enhancement Opportunity

†Indicates wildlife monitoring conducted at site


LIZ D - Wolcott East
157
JP117: Concrete Box Culvert
JP115: Pipe
158
70
JP114: Divided Bridge
159
JP112: Concrete Box Culvert
JP113: Pipe
160
Legend
Linkage Interference Zones - 2011
2009 Camera Monitoring Location
2010 Camera Monitoring Location
Inventory Location
New Crossing Recommendation
I-70 Wildlife Watch Observations
Alive
Dead
Wildlife Fencing
Roadside barrier
Downslope natural barrier
Downslope retaining wall
Tunnel
Upslope natural barrier
Upslope retaining wall
Upslope sound wall
Upslope natural barrier and upslope retaining wall
Upslope natural barrier and downslope retaining wall
Median barrier
Downslope median retaining wall
Downslope median sound wall
Upslope median retaining wall
AVCs Summed per Mile (CSP 1993-2006)
0
1- 4
5 - 7
8 - 11
12 - 20
21 - 92
N
City
Mile Post
Interstate
Highway
Local Road
Stream
Lake
0
0.25
0.5
Miles
ROCKY MOUNTAIN WILD
Map created by Rocky Mountain Wild August 5, 2011
Sources: ALIVE, CDOT, CSP, ESRI, RMW, USGS, WTI

LIZ E: Dowds Junction

Mileposts: 169.4 – 172.8 *Early Enhancement Opportunities in LIZ?* Yes
LIZ Length: 3.5 miles

Target Species	*Species Movement Guilds*
Canada Lynx	Adaptive High Mobility Fauna
Elk	Very High Openness Fauna
Mule Deer	Adaptive Ungulates

Secondary Target Species

Black Bear	Canada Lynx
Moose	Mountain Lion
Northern Leopard Frog	River Otter

Animal-Vehicle Collisions: Range from Moderate to High

Status of Adjacent Lands: USFS, State Land Board, and CDOW with some private and city land at the east end of LIZ

Site Discussion: Steep slopes through eastern portion of LIZ. Gore Creek, which feeds into the Eagle River at the western end of the LIZ, runs parallel to the interstate through this segment. Game fencing on both sides of interstate through eastern half of the zone.

Connectivity Recommendations
The recommendations provided below relate to the current roadway alignment. Alternatively, if the interstate is tunneled around this location (from approximately MP 169.8 – 172.3), then recommend restoring native habitat through the LIZ and coordinate with the Forest Service to manage the as a wildlife corridor (and manage human activities accordingly).

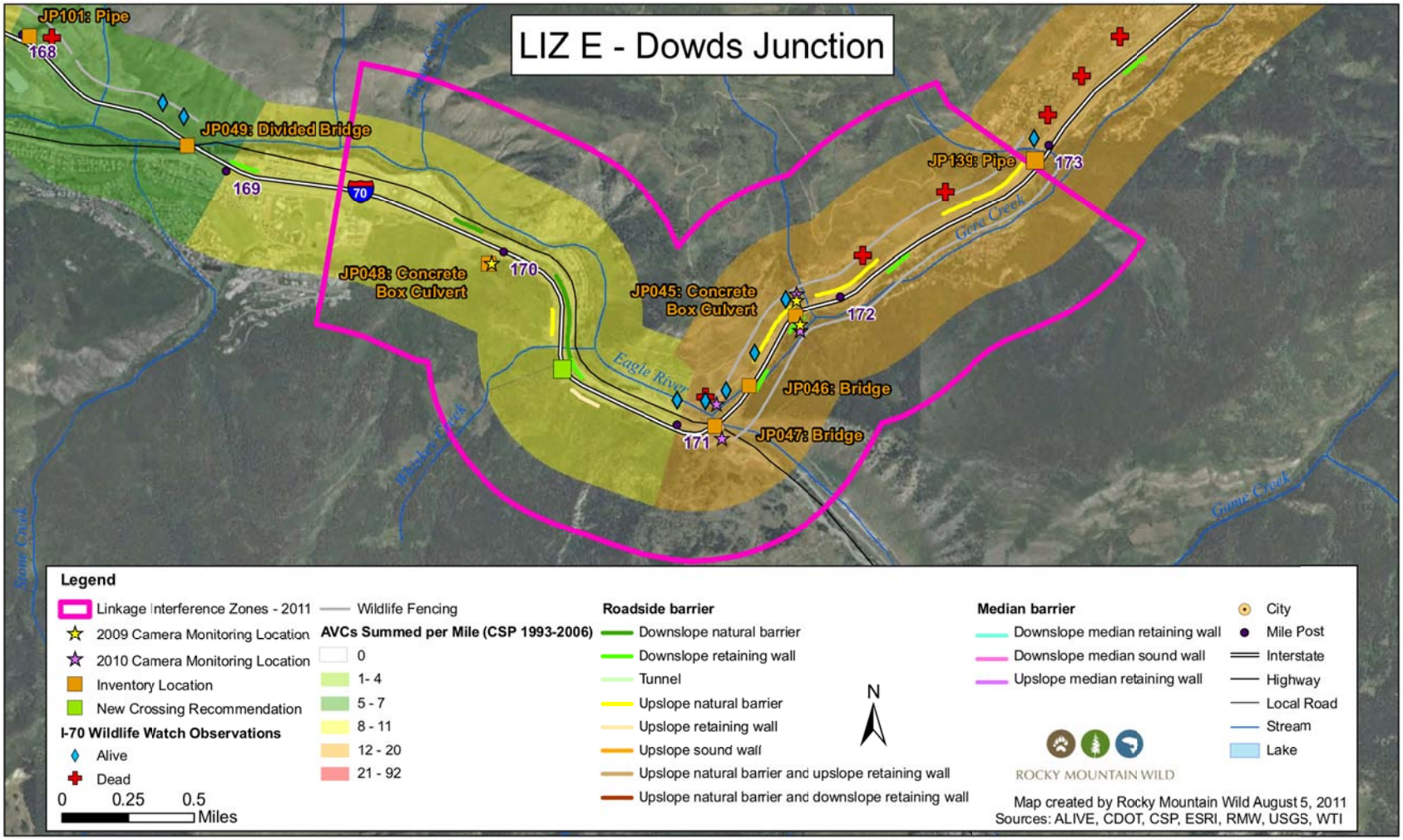
Site-Specific Recommendations				
Loc. #	**MP**	**Site Description**	**Recommendations**	**EEO***
JP048†	170	Concrete box culvert with motorized access to Whiskey Creek Trailhead on south side of I-70. Highway 6 passes immediately in front of north entrance.	Preferred Recommendation: Replace structure with large bridge underpass that would allow animals to cross safely under I-70 and Hwy 6. Create a new parking area away from the bridge to allow people to access the Whiskey Creek Trailhead. Restore habitat under bridge and at both approaches, leading all the way down to the Eagle River on the north side.	No

JP048†	170	Same as above.	Minimum Recommendation: Remove & restore dirt parking area in front of south entrance and prevent cars/trucks from driving through the structure. Divert trail users to park on the north end of the structure. Add sediment baffles and maintain sediment pathway through the structure. Restore vegetation around south side entrance and add wildlife crossing warning signs and rumble strips to Hwy 6 at the north entrance. Animals are naturally funneled below the hwy level at this location; fencing may not be necessary, although this question requires further investigation. In lieu of fencing, consider adding a concrete shoulder barrier to the north side of the highway, extending beyond where the drainage reaches the same level as the roadway.	Yes
n/a	170.5	Narrow drainage bisected by I-70	Add 10x10' box culvert for carnivores (2004 LIZ recommendation)	No
JP047†	171.1	Large bridge spanning 2-lane road, Eagle River and RR (no longer in use). Tied into wildlife fencing on east side; Hwy exit ramps immediately to west of structure. Traffic on Hwy 6 precludes some wildlife movement, but large span offers large area for wildlife to traverse on east side of river. Mule deer use of this structure has increased since the trains have stopped running. Frequent human activity also occurs on this side of the river.	Construct dry, flat pathways (>3' wide) through the riprap slopes on both sides of the river and connecting to the adjacent habitat. Restore natural stream banks through the structure and leading under the adjacent bridge to north.	Yes
JP046	171.3	Bridge over Gore Creek and bike path. Structure tied into existing wildlife fencing	Preferred Recommendation: Widen structure to restore natural stream banks through the structure.	No

JP046	171.3	Same as above	Minimum Recommendation: Construct dry, flat pathways (≥3' wide) through the riprap abutments on both sides of the river connecting to adjacent habitat.	Yes
JP045†	171.8	Concrete box culvert with median skylight; bikepath crosses overhead at south side entrance. Tied into wildlife fencing. Sediment baffles create a dirt pathway through the length of the structure. Structure is critical for seasonal mule deer migration, although it is a recognized bottleneck. Structure is too long and narrow for elk, although some individuals documented (successful passages and repels)	Replace structure with large bridge underpass (preferred) or large arch culvert to better accommodate target species. This is an excellent location for a large dedicated wildlife crossing connecting USFS lands. Restore natural habitat under bridge. If I-70 is ultimately tunneled under the Elk Mountains to the north, ideally this segment of roadway would be entirely removed and restored. Should it remain as an access road, a bridge underpass is recommended at this site to prevent bottlenecking of migratory movements.	No

*Early Enhancement Opportunity

†Indicates wildlife monitoring conducted at site


LIZ E - Dowds Junction
JP101: Pipe
168
JP049: Divided Bridge
169
70
JP048: Concrete Box Culvert
170
JP045: Concrete Box Culvert
172
JP139: Pipe
173
JP046: Bridge
JP047: Bridge
171
Eagle River
Gore Creek
Legend
Linkage Interference Zones - 2011
2009 Camera Monitoring Location
2010 Camera Monitoring Location
Inventory Location
New Crossing Recommendation
I-70 Wildlife Watch Observations
Alive
Dead
0 0.25 0.5 Miles
Wildlife Fencing
AVCs Summed per Mile (CSP 1993-2006)
0
1- 4
5 - 7
8 - 11
12 - 20
21 - 92
Roadside barrier
Downslope natural barrier
Downslope retaining wall
Tunnel
Upslope natural barrier
Upslope retaining wall
Upslope sound wall
Upslope natural barrier and upslope retaining wall
Upslope natural barrier and downslope retaining wall
N
Median barrier
Downslope median retaining wall
Downslope median sound wall
Upslope median retaining wall
ROCKY MOUNTAIN WILD
City
Mile Post
Interstate
Highway
Local Road
Stream
Lake
Map created by Rocky Mountain Wild August 5, 2011
Sources: ALIVE, CDOT, CSP, ESRI, RMW, USGS, WTI

LIZ F: Vail (East)

Mileposts: 176.8 – 180.1 *Early Enhancement Opportunities in LIZ?* Yes
LIZ Length: 3.4 miles

Target Species	*Species Movement Guilds*
Canada Lynx	Adaptive High Mobility Fauna

Secondary Target Species

Black Bear	Boreal Toad
Elk	Moose
Mountain Lion	Northern Leopard Frog

Animal-Vehicle Collisions: Ranges from Low to Very High

Status of Adjacent Lands: Mostly private, some city land (golf course)

Site Discussion: Topography around I-70 is sloped through LIZ. There are no structures suitable for target species passage in this LIZ.

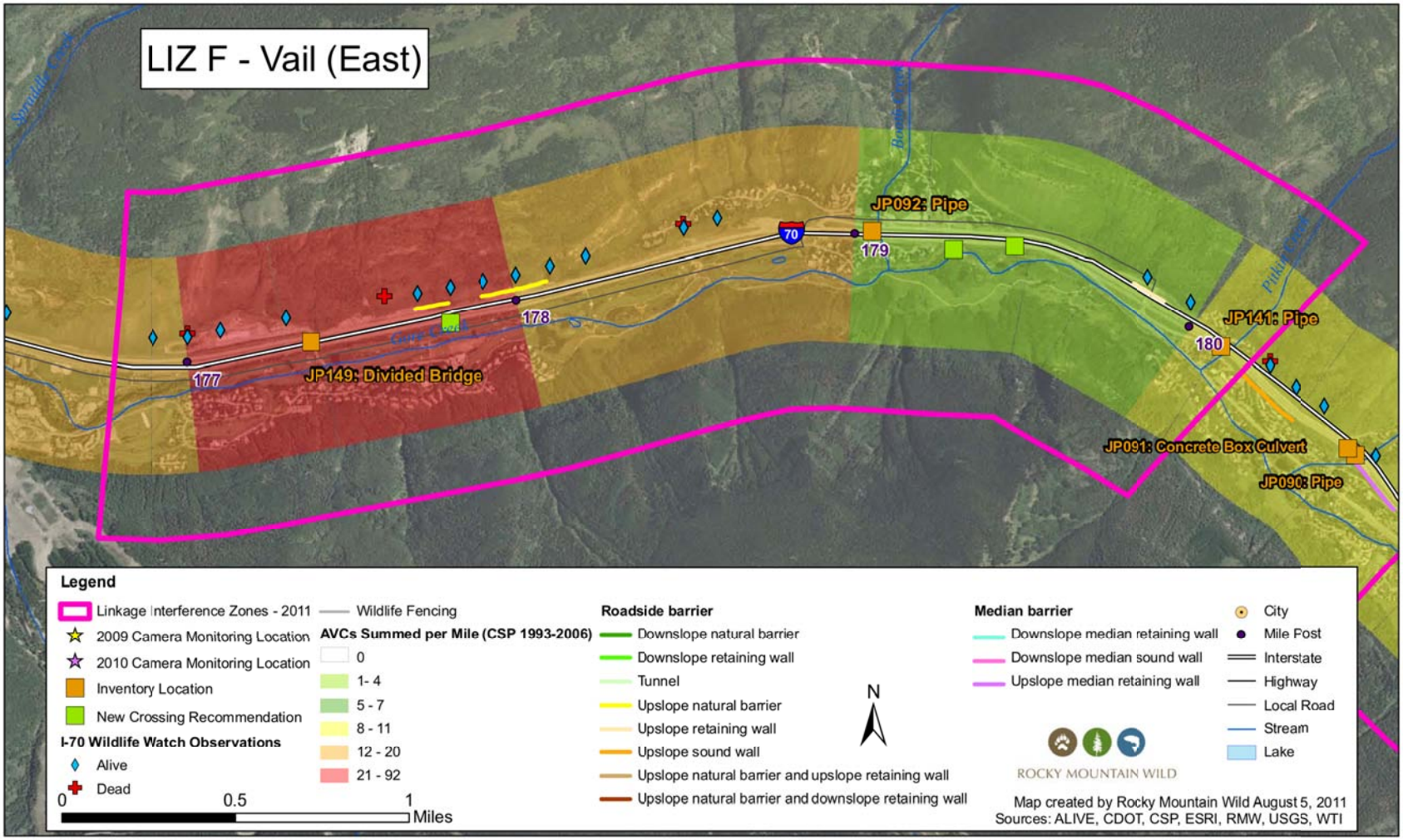
Connectivity Recommendations
Install at least one large bridge underpass and two large arch culvert underpasses to accommodate all primary and secondary target species in this LIZ. Construct limited 8' high wildlife fencing to guide animals to crossings (rather than continuous fencing through LIZ). Consider connecting structures with fencing only if they are less than 1 mile apart. When reconstructing interstate, install additional pipe culverts to accommodate passage for small and medium-sized mammals and amphibians.

Site-Specific Recommendations				
Loc. #	**MP**	**Site Description**	**Recommendations**	**EEO***
JP149	177.4	Bridge with paved road and sidewalk; intersection; frontage road immediately in front of south entrance.	Open up bridge and naturalize side slopes; add dirt or vegetated pathway. Sign at-grade crossing over parallel frontage road (stop signs at intersection keep traffic speeds low at this location)	Yes
n/a	177.8	Natural break in cliffs on north side; feeds into golf course on south side	Construct new large arch culvert or bridge underpass for lynx, deer and elk. Add limited guide fencing to direct animals to structure. Restrict human access through crossing. Requires additional mitigation at south side frontage road. Coordinate with Town of Vail (golf course).	No

JP092	179.0	Booth Creek pipe culvert channels large drainage from north. Culvert crosses under north frontage road and I-70.	Replace with larger structure, such as bridge underpass or arch. New structure should be at least 8' (preferably 10') high and 20' wide (span). Low clearance may necessitate raising roadbed.	No
n/a	179.2	Boreal toad breeding site	Coordinate with CDOW to determine if connectivity for boreal toad is needed in this area. To connect toad habitat north and south of the interstate, install specialized culverts that preserve critical ambient conditions through the culvert.	No
n/a	179.4/ .5	Least developed portion of the LIZ. Road lighting begins at interchange area immediately to east.	Install second carnivore crossing here or at JP092.	No

*Early Enhancement Opportunity

†Indicates wildlife monitoring conducted at site


LIZ F - Vail (East)
JP092: Pipe
179
178
177
JP149: Divided Bridge
JP141: Pipe
180
JP091: Concrete Box Culvert
JP090: Pipe
70
Legend
Linkage Interference Zones - 2011
2009 Camera Monitoring Location
2010 Camera Monitoring Location
Inventory Location
New Crossing Recommendation
I-70 Wildlife Watch Observations
Alive
Dead
Wildlife Fencing
AVCs Summed per Mile (CSP 1993-2006)
0
1- 4
5 - 7
8 - 11
12 - 20
21 - 92
Roadside barrier
Downslope natural barrier
Downslope retaining wall
Tunnel
Upslope natural barrier
Upslope retaining wall
Upslope sound wall
Upslope natural barrier and upslope retaining wall
Upslope natural barrier and downslope retaining wall
Median barrier
Downslope median retaining wall
Downslope median sound wall
Upslope median retaining wall
City
Mile Post
Interstate
Highway
Local Road
Stream
Lake
N
0
0.5
1
Miles
ROCKY MOUNTAIN WILD
Map created by Rocky Mountain Wild August 5, 2011
Sources: ALIVE, CDOT, CSP, ESRI, RMW, USGS, WTI

LIZ G: Gore Creek

Mileposts: 180.9 – 182.1 *Early Enhancement Opportunities in LIZ?* Yes
LIZ Length: 1.3 miles

Target Species	*Species Movement Guilds*
Canada Lynx	Adaptive High Mobility Fauna

Secondary Target Species

Black Bear	Elk
Moose	Mountain Lion
Northern Leopard Frog	River Otter

Animal-Vehicle Collisions: Moderate

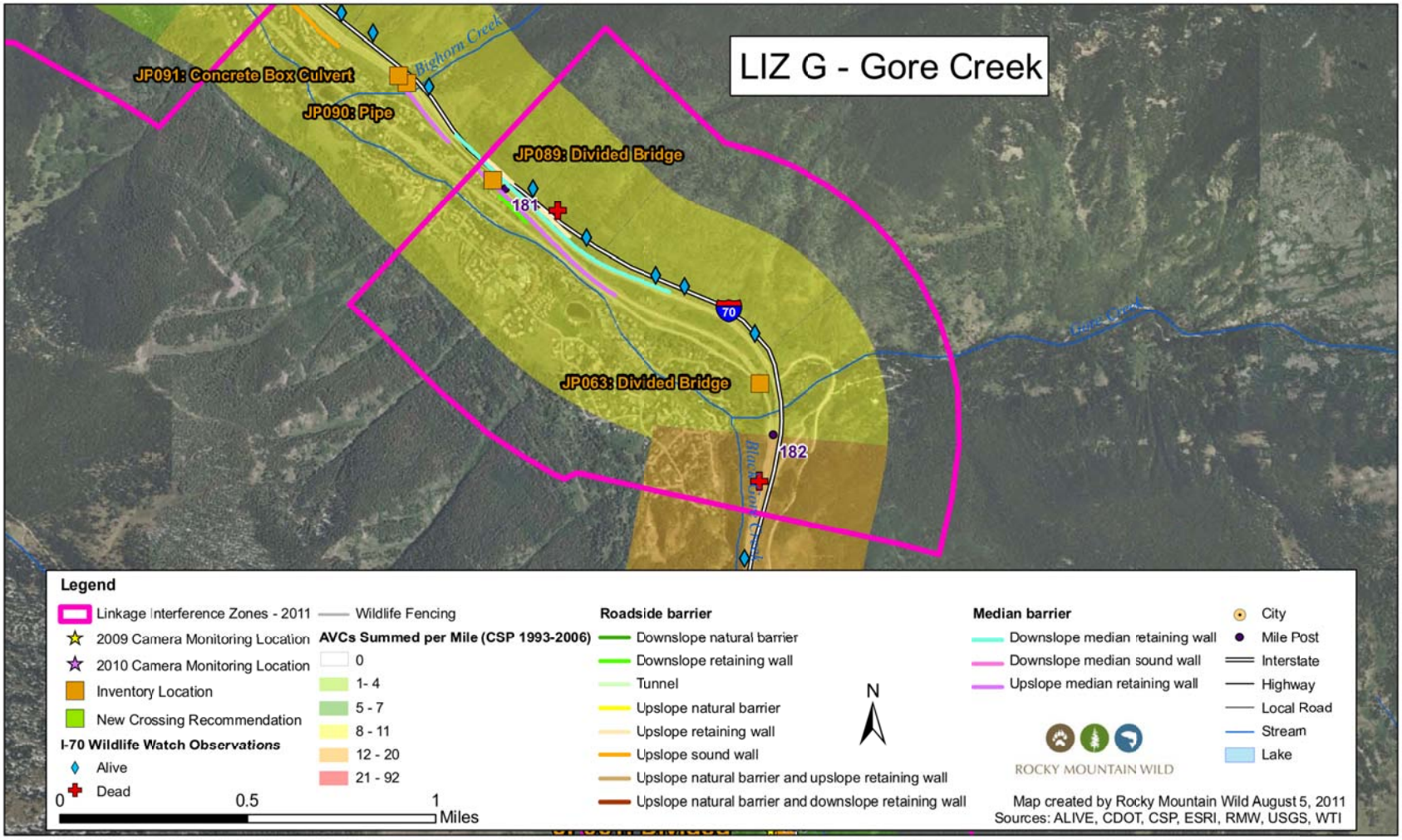
Status of Adjacent Lands: Mostly private

Site Discussion: Sloped terrain. Community of East Vail extends through this LIZ south of I-70.

Connectivity Recommendations

Site-Specific Recommendations				
Loc. #	**MP**	**Site Description**	**Recommendations**	**EEO***
JP089	181.0	Divided span bridge with steep slopes to north and East Vail neighborhood to south. Chain link fence across the south entrance to the bridge likely installed as a measure to keep wildlife out of the neighborhood.	Structure spans natural habitat and offers an excellent passage beneath the interstate for all types of wildlife. However, the fencing surrounding the adjacent neighborhood prevents animals from accessing additional habitat to the south. Explore opportunities with the neighborhood to develop acceptable measures that would allow wildlife to access habitat on the south side of the neighborhood, completing the north-south connection on either side of I-70. If wildlife passage through or around neighbor hood can be accommodated then install guide fencing to direct wildlife towards the structure.	No
JP063	182	Large divided span bridge over Gore Creek and Hwy 6 (dead ends). Bridge connects Forest lands, though much of LIZ is privately owned.	Concentrate human activity immediately around paved access road at west end of structure and implement measures to minimize human activity beneath the rest of the structure. Restore dirt lot/road with native vegetation cover. Requires coordination with local community and user groups to implement effective control measures and to educate the public on the importance of segregated wildlife/human uses at this location.	Yes

*Early Enhancement Opportunity


LIZ G - Gore Creek
JP091: Concrete Box Culvert
JP090: Pipe
JP089: Divided Bridge
JP063: Divided Bridge
181
182
70
Bighorn Creek
Gore Creek
Legend
Linkage Interference Zones - 2011
2009 Camera Monitoring Location
2010 Camera Monitoring Location
Inventory Location
New Crossing Recommendation
I-70 Wildlife Watch Observations
Alive
Dead
Wildlife Fencing
AVCs Summed per Mile (CSP 1993-2006)
0
1- 4
5 - 7
8 - 11
12 - 20
21 - 92
0
0.5
1
Miles
Roadside barrier
Downslope natural barrier
Downslope retaining wall
Tunnel
Upslope natural barrier
Upslope retaining wall
Upslope sound wall
Upslope natural barrier and upslope retaining wall
Upslope natural barrier and downslope retaining wall
N
Median barrier
Downslope median retaining wall
Downslope median sound wall
Upslope median retaining wall
ROCKY MOUNTAIN WILD
City
Mile Post
Interstate
Highway
Local Road
Stream
Lake
Map created by Rocky Mountain Wild August 5, 2011
Sources: ALIVE, CDOT, CSP, ESRI, RMW, USGS, WTI

LIZ H: West Vail Pass

Mileposts: 182.9 – 188.1 *Early Enhancement Opportunities in LIZ?* Yes
LIZ Length: 5.3 miles

Target Species	*Species Movement Guilds*
Canada Lynx	Adaptive High Mobility Fauna

Secondary Target Species

Elk	Moose
Mountain Lion	Mule Deer
Northern Leopard Frog	

Animal-Vehicle Collisions: Ranges from Low to Moderately-Low. Two lynx AVCs recorded in this LIZ at 187.4 and 188.7.

Status of Adjacent Lands: Public (USFS)

Site Discussion: Sloped, mountainous terrain. Black Gore Creek runs parallel to I-70 through LIZ. Zone contains multiple large span bridges that function as effective wildlife crossings for diverse species between mileposts 182.9 – 185.5. No structures are present in the eastern portion of the LIZ, from milepost 186 to 188.1.

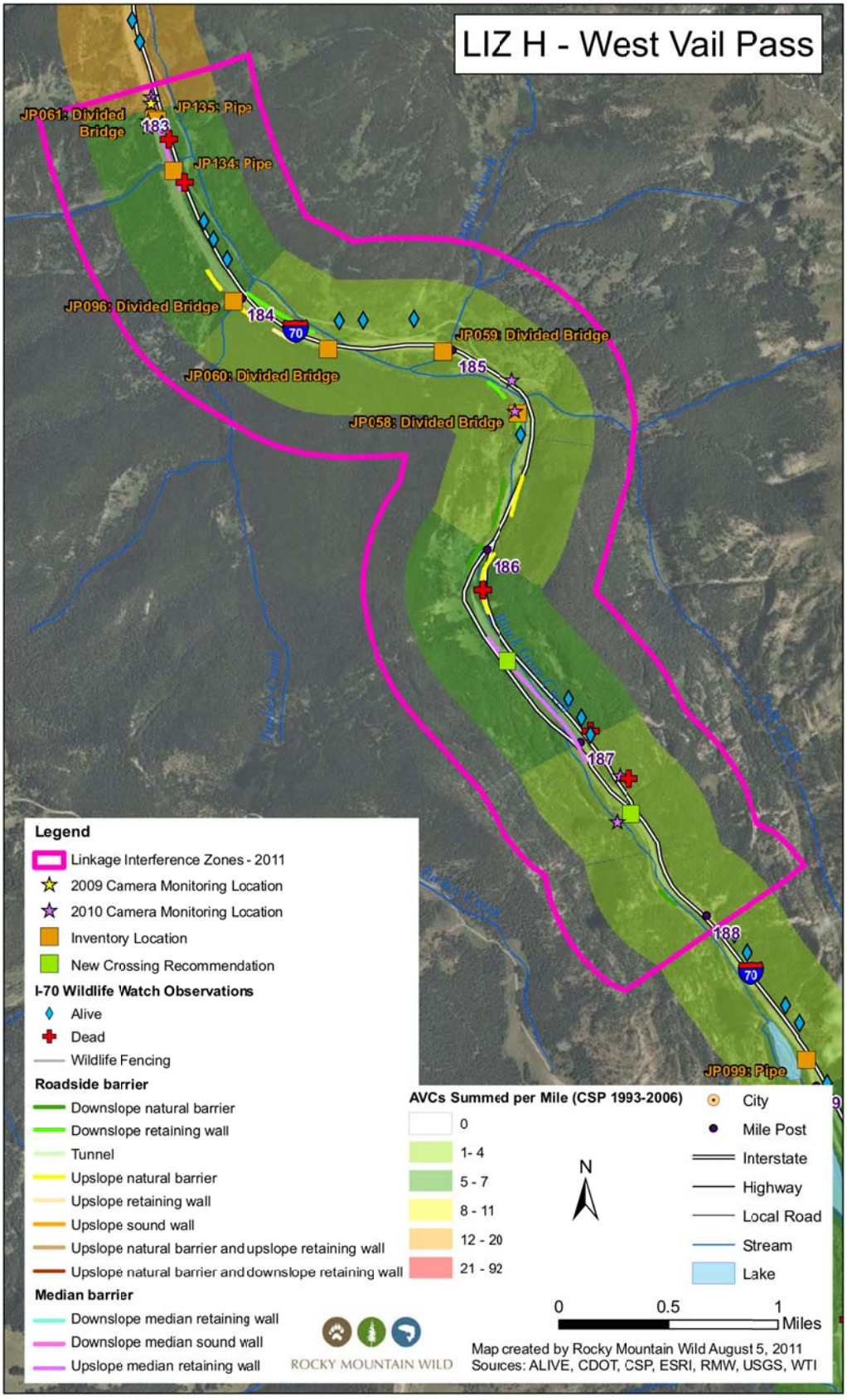
Connectivity Recommendations
Maintain connectivity at existing bridge structures and construct new structures in eastern portion of LIZ. When reconstructing interstate, install additional pipe culverts to accommodate passage for small and medium-sized mammals and amphibians at < 0.5 mile intervals throughout the LIZ. Install wildlife fencing connecting between existing bridge structure from milepost 183 – 185.5. Add guide fencing where new structures are constructed, or, if installing continuous fencing, provide access routes through the fencing for hunters and other backcountry users.

Site-Specific Recommendations				
Loc. #	**MP**	**Site Description**	**Recommendations**	**EEO***
JP061†	183.0	Divided span bridge over small drainage. Creek (JP135) piped under bridge. There is no fencing at this site, but a retaining wall on the southeast side of the roadway and heavy traffic on I-70 act as partial barriers to at-grade crossings.	Remove culvert and restore stream channel through bridge structure. Complement structure with guide fencing to direct animals toward structure and discourage at-grade crossings. If the roadway footprint increases with future highway reconstruction, the span and height of the bridge should also be increased to compensate for the additional length that animals must travel under the bridge.	Yes

JP096	184.0	Large and high divided span bridge. There is no fencing at this site, but heavy traffic on I-70 acts as a partial barrier to at-grade crossings.	Structure is highly functional for target species. Maintain connectivity at site. Complement structure with guide fencing to direct animals toward structure and discourage at-grade crossings.	Yes
JP060	184.5	Large and high divided span bridge. There is no fencing at this site, but heavy traffic on I-70 acts as a partial barrier to at-grade crossings.	Structure is highly functional for target species. Maintain connectivity at site. Complement structure with guide fencing to direct animals toward structure and discourage at-grade crossings.	Yes
JP059	185.0	Large and high divided span bridge. There is no fencing at this site, but heavy traffic on I-70 acts as a partial barrier to at-grade crossings.	Structure is highly functional for target species. Maintain connectivity at site. Complement structure with guide fencing to direct animals toward structure and discourage at-grade crossings.	Yes
JP058†	185.5	Large and high divided span bridge. There is no fencing at this site, but heavy traffic on I-70 acts as a partial barrier to at-grade crossings. Bike path crosses under far east section of the span. Sediment pond located under structure.	Structure is highly functional for target species. Maintain connectivity at site. Complement structure with guide fencing to direct animals toward structure and discourage at-grade crossings.	Yes
n/a	186.5	Gap in cliffs on north side of roadway	Construct wildlife arch at least 12'x24' suitable for elk, deer, lynx and small and mid-sized mammals (2004 LIZ recommendation)	No
n/a†	187.4	Forest cover down to road on north side; open area to south Sediment pond on the north side of the highway.	Construct wildlife overpass	No

*Early Enhancement Opportunity

†Indicates wildlife monitoring conducted at site


LIZ H - West Vail Pass
JP061: Divided Bridge
JP135: Pipe
183
JP134: Pipe
JP096: Divided Bridge
184
70
JP059: Divided Bridge
185
JP060: Divided Bridge
JP058: Divided Bridge
186
187
188
70
JP099: Pipe
Legend
Linkage Interference Zones - 2011
2009 Camera Monitoring Location
2010 Camera Monitoring Location
Inventory Location
New Crossing Recommendation
I-70 Wildlife Watch Observations
Alive
Dead
Wildlife Fencing
Roadside barrier
Downslope natural barrier
Downslope retaining wall
Tunnel
Upslope natural barrier
Upslope retaining wall
Upslope sound wall
Upslope natural barrier and upslope retaining wall
Upslope natural barrier and downslope retaining wall
Median barrier
Downslope median retaining wall
Downslope median sound wall
Upslope median retaining wall
AVCs Summed per Mile (CSP 1993-2006)
0
1- 4
5 - 7
8 - 11
12 - 20
21 - 92
N
City
Mile Post
Interstate
Highway
Local Road
Stream
Lake
0
0.5
1
Miles
ROCKY MOUNTAIN WILD
Map created by Rocky Mountain Wild August 5, 2011
Sources: ALIVE, CDOT, CSP, ESRI, RMW, USGS, WTI

LIZ I: East Vail Pass

Mileposts: 191.8 – 194.2 *Early Enhancement Opportunities in LIZ?* No
LIZ Length: 2.5 miles

Target Species	*Species Movement Guilds*
Canada Lynx	Adaptive High Mobility Fauna
Elk	Very High Openness Fauna
Mule Deer	Adaptive Ungulates

Secondary Target Species

Mountain Lion	Northern Leopard Frog
River Otter	

Animal-Vehicle Collisions: Ranges from Moderate to High

Status of Adjacent Lands: Public (USFS)

Site Discussion: Divided highway with a wide, open median with West Tenmile Creek flowing through the median. Multiple large span bridges offer excellent crossing opportunities under the eastbound traffic lanes, however there are no such crossing opportunities under the westbound lanes in this LIZ.

Connectivity Recommendations
Construct structures under westbound lanes and connect new and existing structures with wildlife fencing, including median fencing. Connect fencing to existing structures outside of LIZ to west on both eastbound and westbound sides of I-70. Control gaps (for example, by installing electomats) in fencing where bike path intersects and provide recreation access through fencing at key points. Do not install continuous fencing in this LIZ before the construction of new structures that provide safe passages across westbound lanes. If continuous fencing installed, provide human access points through fencing.

Site-Specific Recommendations				
Loc. #	**MP**	**Site Description**	**Recommendations**	**EEO***
JP031†	192.0 (EB)	Large divided span bridge over small creek, for eastbound lanes only. Low, cliffy slopes opposite on westbound side.	Structure is highly functional for target species. There is no fencing at this site, but heavy traffic on I-70 acts as a partial barrier to at-grade crossings. Maintain connectivity at site and add wildlife fencing to prevent at-grade crossings from gentle slopes adjacent to bridge. Consider tying into existing structure outside LIZ to west – continuous fencing should be installed only if new crossing structures are constructed under westbound traffic lanes.	No

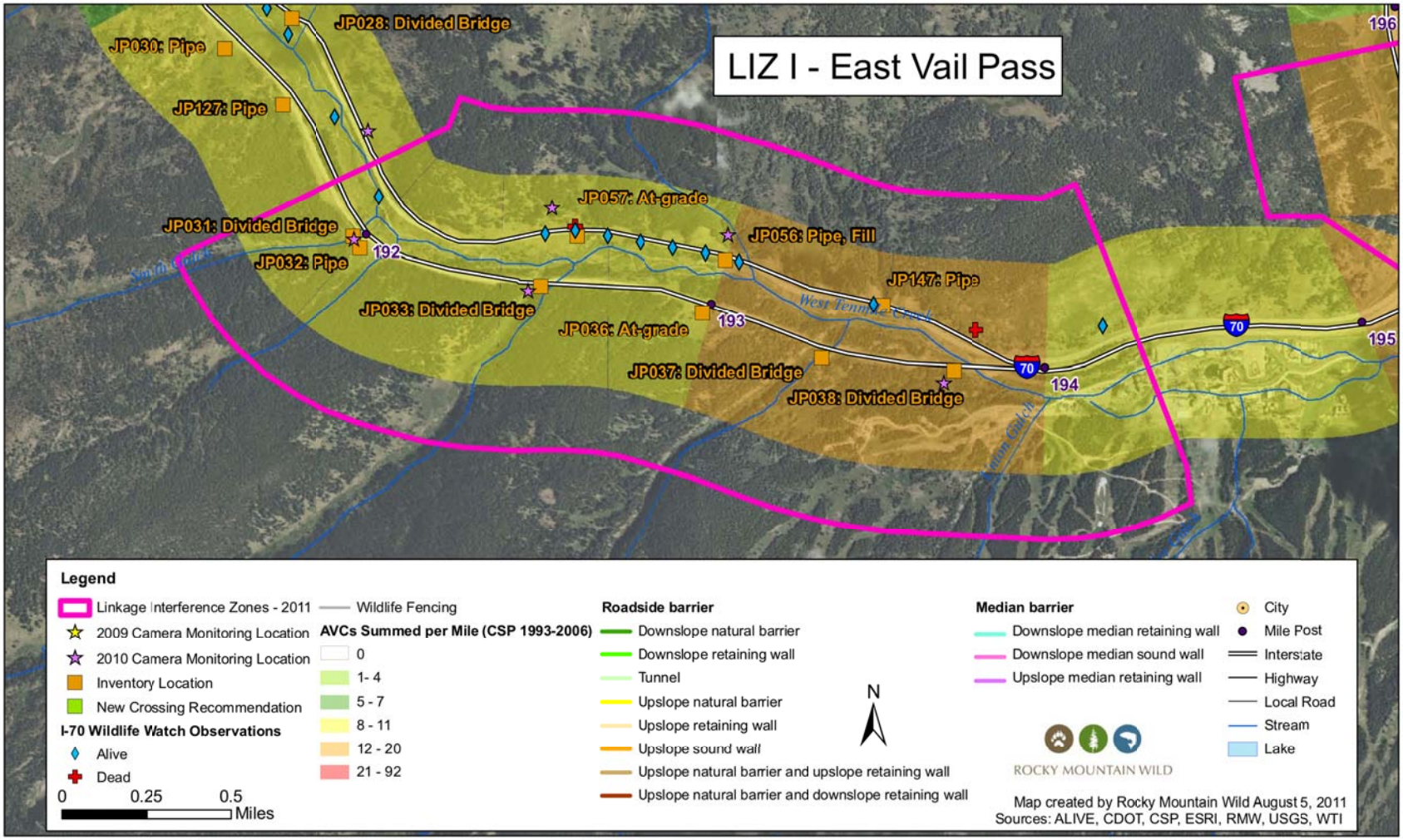
n/a†	192. 0 (WB)	At-grade with gentle, shrubby, wet drainage running perpendicular to road.	None	No
JP057	192.5-192.6 (WB)	At-grade crossing area. Gentle slopes from the north bisected by westbound traffic lanes lead into the West Tenmile Creek drainage in the median. Site is directly across from a span bridge for eastbound lanes (JP033)	Remove fill and construct large bridge arch or bridge underpass to accommodate all primary and secondary target species at this location.	No
JP033†	192.5 (EB)	EB bridge over Stafford Creek.	Existing dry natural pathways on both side of creek. Maintain connectivity. Consider adding guide fencing or connecting to new and existing structures with wildlife fencing. Continuous fencing should be installed only if new crossing structures are constructed under westbound traffic lanes.	No
JP036	193.0 (EB)	At-grade crossing area. Mineral lick adjacent to I-70 eastbound lanes on south side	Construct a wildlife arch overpass over eastbound lanes and connect to existing structures with wildlife fencing; or given the presence of nearby existing structures on the eastbound side, in lieu of constructing a new structure here, consider directing wildlife to existing structures via wildlife fencing.	No
JP056†	193.0 (WB)	Fill slope with pipe draining small drainage bisected by westbound traffic lanes; feeds into West Tenmile Creek from the north.	Remove fill and construct large bridge or arch underpass to accommodate all primary and secondary target species at this location. Restore natural hydrologic flow regime under highway.	No
JP037	193.3 (EB)	Large divided span bridge over small creek	Structure is highly functioning for target species. There is no fencing at this site, but heavy traffic on I-70 acts as a barrier to at-grade crossings. Maintain connectivity at site. Consider connecting structure to new and existing structures with wildlife fencing.	No
JP147	193.5 (WB)	1m pipe culvert (ephemeral flows) under westbound lanes at base of fill slope on north side. Drainage across from bridge at JP037 and up from JP038 under	Provide connection across westbound lanes for wildlife using structures at JP037 & 038 by constructing a new bridge or arch underpass at this location suitable for lynx, elk, deer and moose. Add guide fencing or connect to other new structures to west with wildlife fencing. As there are no other structures to east, wildlife fencing in this direction should not extend greater than 0.5 miles, and tie back into the	No

		eastbound lanes.	forest/topographic features to direct animals away from the road and prevent 'end-arounds'.	

JP038†	193.7 (EB)	Large divided span bridge over West Tenmile Creek. Bike path crosses under far east side of the structure, on the north side of the creek.	Structure is highly functional for target species. Maintain connectivity at site. Add guide fencing or connect to other new structures to west with wildlife fencing. As there are no other structures to east, wildlife fencing in this direction should not extend greater than 0.5 miles, and tie back into the forest/topographic features to direct animals away from the road and prevent 'end-arounds'.	No

*Early Enhancement Opportunity

†Indicates wildlife monitoring conducted at site


LIZ I - East Vail Pass
JP028: Divided Bridge
JP030: Pipe
JP127: Pipe
JP057: At-grade
JP031: Divided Bridge
JP056: Pipe, Fill
JP032: Pipe
192
JP147: Pipe
JP033: Divided Bridge
JP036: At-grade
193
JP037: Divided Bridge
JP038: Divided Bridge
194
195
196
70
Legend
Linkage Interference Zones - 2011
2009 Camera Monitoring Location
2010 Camera Monitoring Location
Inventory Location
New Crossing Recommendation
I-70 Wildlife Watch Observations
Alive
Dead
0 0.25 0.5 Miles
Wildlife Fencing
AVCs Summed per Mile (CSP 1993-2006)
0
1- 4
5 - 7
8 - 11
12 - 20
21 - 92
Roadside barrier
Downslope natural barrier
Downslope retaining wall
Tunnel
Upslope natural barrier
Upslope retaining wall
Upslope sound wall
Upslope natural barrier and upslope retaining wall
Upslope natural barrier and downslope retaining wall
N
Median barrier
Downslope median retaining wall
Downslope median sound wall
Upslope median retaining wall
ROCKY MOUNTAIN WILD
City
Mile Post
Interstate
Highway
Local Road
Stream
Lake
Map created by Rocky Mountain Wild August 5, 2011
Sources: ALIVE, CDOT, CSP, ESRI, RMW, USGS, WTI

LIZ J: Wheeler Junction

Mileposts: 195.2 – 195.8 *Early Enhancement Opportunities in LIZ?* No
LIZ Length: 0.7 miles

Target Species	*Species Movement Guilds*
Canada Lynx	Adaptive High Mobility Fauna

Secondary Target Species

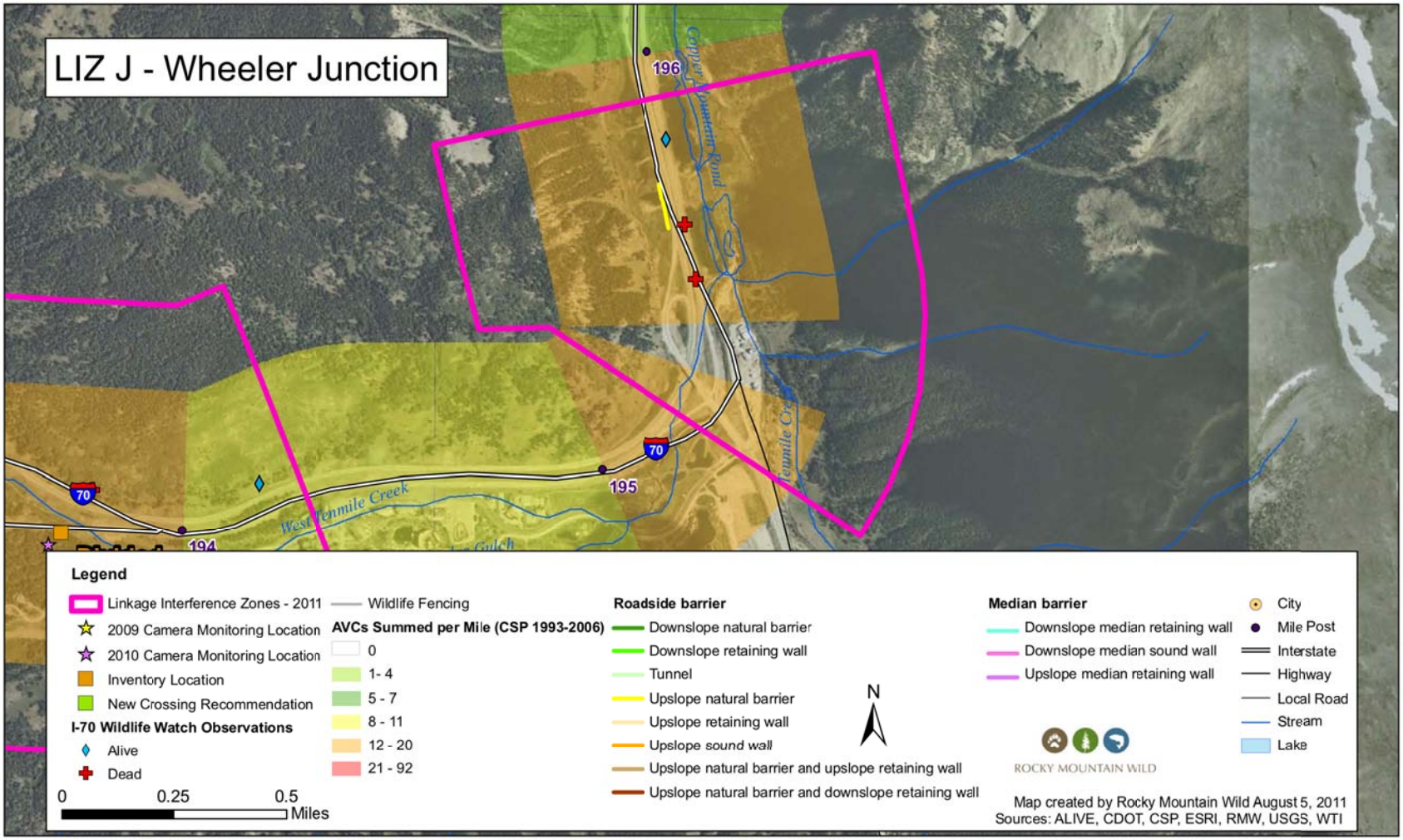
Moose	Northern Leopard Frog
River Otter	

Animal-Vehicle Collisions: High

Status of Adjacent Lands: Mixed public (USFS) and private

Site Discussion: No suitable wildlife crossing structures in LIZ. Much of the LIZ is occupied by the Hwy 91 interchange, where the West Tenmile Creek drainage joins the Tenmile Creek drainage. Interchange has roadway lighting on both eastbound and westbound sides. Wetlands are present on both sides of interstate and several ponds are located adjacent to the south/east side of the interstate.

Connectivity Recommendations
Construct new large bridge, arch or three-sided box culvert to accommodated primary and secondary target species as well as natural hydrologic flows and wetlands. Culvert must include a year-round dry, natural pathway for terrestrial passage. The roadbed is low relative to the surrounding landscape, and may require raising the roadbed to install a sufficiently sized culvert. Install amphibian tunnels and walls to promote amphibian movement between the wetlands.


LIZ J - Wheeler Junction
196
195
194
70
West Tenmile Creek
Tenmile Creek
Legend
Linkage Interference Zones - 2011
2009 Camera Monitoring Location
2010 Camera Monitoring Location
Inventory Location
New Crossing Recommendation
I-70 Wildlife Watch Observations
Alive
Dead
0 0.25 0.5 Miles
Wildlife Fencing
AVCs Summed per Mile (CSP 1993-2006)
0
1- 4
5 - 7
8 - 11
12 - 20
21 - 92
Roadside barrier
Downslope natural barrier
Downslope retaining wall
Tunnel
Upslope natural barrier
Upslope retaining wall
Upslope sound wall
Upslope natural barrier and upslope retaining wall
Upslope natural barrier and downslope retaining wall
N
Median barrier
Downslope median retaining wall
Downslope median sound wall
Upslope median retaining wall
City
Mile Post
Interstate
Highway
Local Road
Stream
Lake
ROCKY MOUNTAIN WILD
Map created by Rocky Mountain Wild August 5, 2011
Sources: ALIVE, CDOT, CSP, ESRI, RMW, USGS, WTI

LIZ K: Laskey Gulch

Mileposts: 207.3 – 209.0 *Early Enhancement Opportunities in LIZ?* No
LIZ Length: 1.8 miles

Target Species	*Species Movement Guilds*
Canada Lynx	Adaptive High Mobility Fauna
Elk	Very High Openness Fauna

*Secondary Target Species**

Black Bear	Moose
Mule Deer	Northern Leopard Frog

* River otter occurs in the Straight Creek drainage, but habitat is not bisected by the interstate and otter movement is not a concern in the LIZ.

Animal-Vehicle Collisions: Moderate

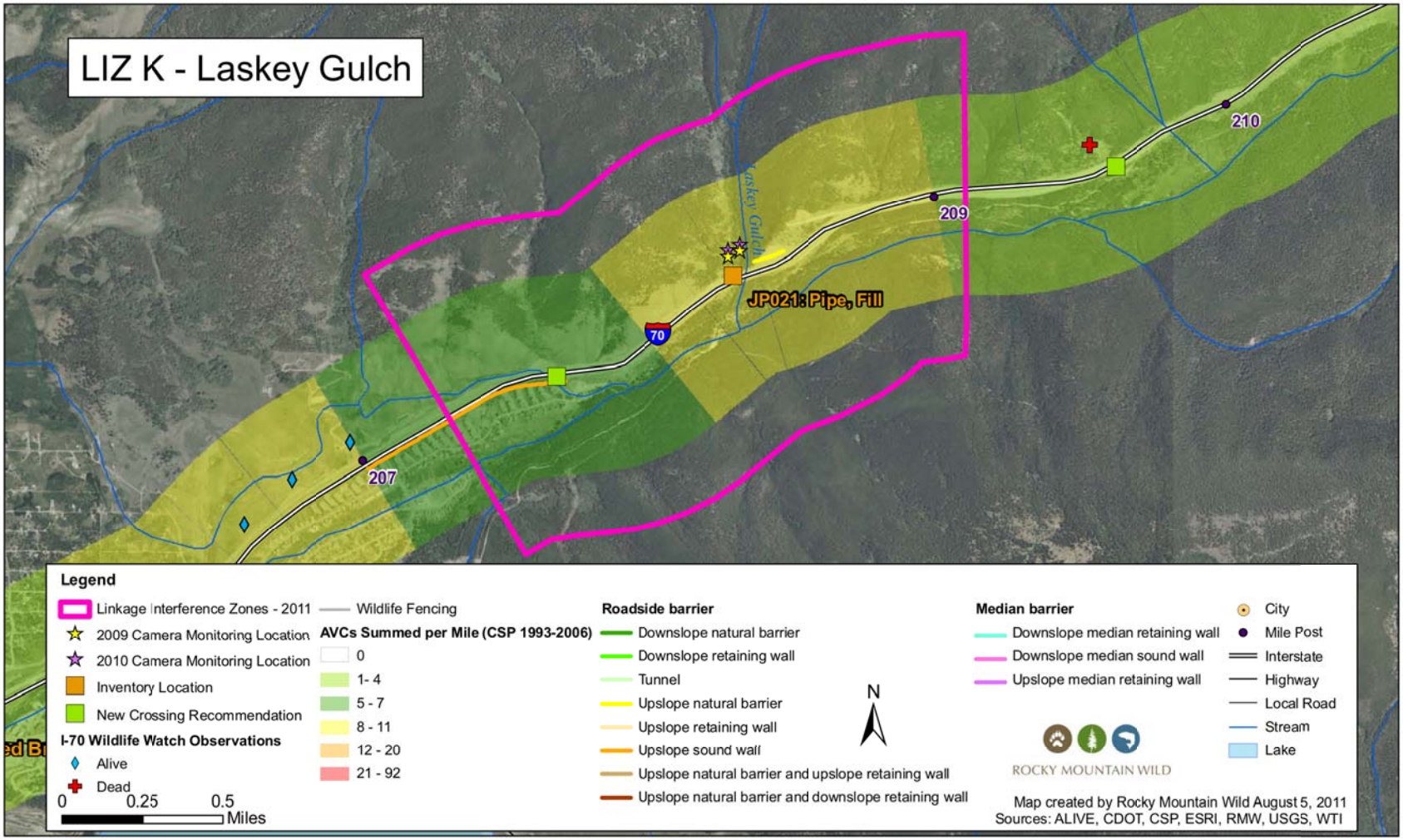
Status of Adjacent Lands: USFS with some private and Denver Water Board at west end of LIZ

Site Discussion: Highway parallels the Straight Creek drainage and bisects smaller drainages feeding into Straight Creek from the north; large, steep continuous fill slope on south side of interstate. Consider implications of beetle kill in adjacent forest for habitat connectivity for primary and secondary target species.

Connectivity Recommendations

Site-Specific Recommendations				
Loc. #	**MP**	**Site Description**	**Recommendations**	**EEO***
n/a	207.7	No existing structure.	Investigate option for a second crossing structure in LIZ - arch culvert or large buried-bottom pipe culvert	No
JP021†	208.4	Large fill slope with pipe bisecting Laskey Gulch. Steep fill slope on south side drops onto flat bench.	Remove fill and construct a large divided bridge underpass to accommodate all primary and secondary target species at this location. Restore natural hydrologic flow regime under highway. Install guide fencing to direct wildlife towards structure and avert attempted at-grade crossings.	No

*Early Enhancement Opportunity
†Indicates wildlife monitoring conducted at site


LIZ K - Laskey Gulch
210
209
207
70
JP021: Pipe, Fill
Laskey Gulch
Legend
Linkage Interference Zones - 2011
2009 Camera Monitoring Location
2010 Camera Monitoring Location
Inventory Location
New Crossing Recommendation
I-70 Wildlife Watch Observations
Alive
Dead
0 0.25 0.5 Miles
Wildlife Fencing
AVCs Summed per Mile (CSP 1993-2006)
0
1- 4
5 - 7
8 - 11
12 - 20
21 - 92
Roadside barrier
Downslope natural barrier
Downslope retaining wall
Tunnel
Upslope natural barrier
Upslope retaining wall
Upslope sound wall
Upslope natural barrier and upslope retaining wall
Upslope natural barrier and downslope retaining wall
N
Median barrier
Downslope median retaining wall
Downslope median sound wall
Upslope median retaining wall
ROCKY MOUNTAIN WILD
City
Mile Post
Interstate
Highway
Local Road
Stream
Lake
Map created by Rocky Mountain Wild August 5, 2011
Sources: ALIVE, CDOT, CSP, ESRI, RMW, USGS, WTI

Boreal Toad Breeding Site (outside of a LIZ)

Milepost: 209.5 *Early Enhancement Opportunities?* No

Target Species	*Species Movement Guilds*
Boreal Toad	Low Mobility Small Fauna

Status of Adjacent Lands: Public (USFS)

Connectivity Recommendations

Coordinate with CDOW to determine if connectivity for boreal toad is needed in this area to connect the breeding site to upland habitat. To connect toad habitat across the interstate, install specialized culverts that preserve critical ambient conditions through the culvert. Avoid impacts to habitat during construction, operations and maintenance.

LIZ L: Hamilton Gulch

Mileposts: 211.6 – 212.4 *Early Enhancement Opportunities in LIZ?* No
LIZ Length: 0.9 miles

Target Species	*Species Movement Guilds*
Canada Lynx	Adaptive High Mobility Fauna

Secondary Target Species

Black Bear	Moose
Northern Leopard Frog	

Animal-Vehicle Collisions: Moderately-Low

Status of Adjacent Lands: Public (USFS)

Site Discussion: Highway parallels the Straight Creek drainage and bisects smaller drainages feeding into Straight Creek from the north; large, steep continuous fill slope on south side of interstate. Consider implications of beetle kill in adjacent forest for habitat connectivity for primary and secondary target species.

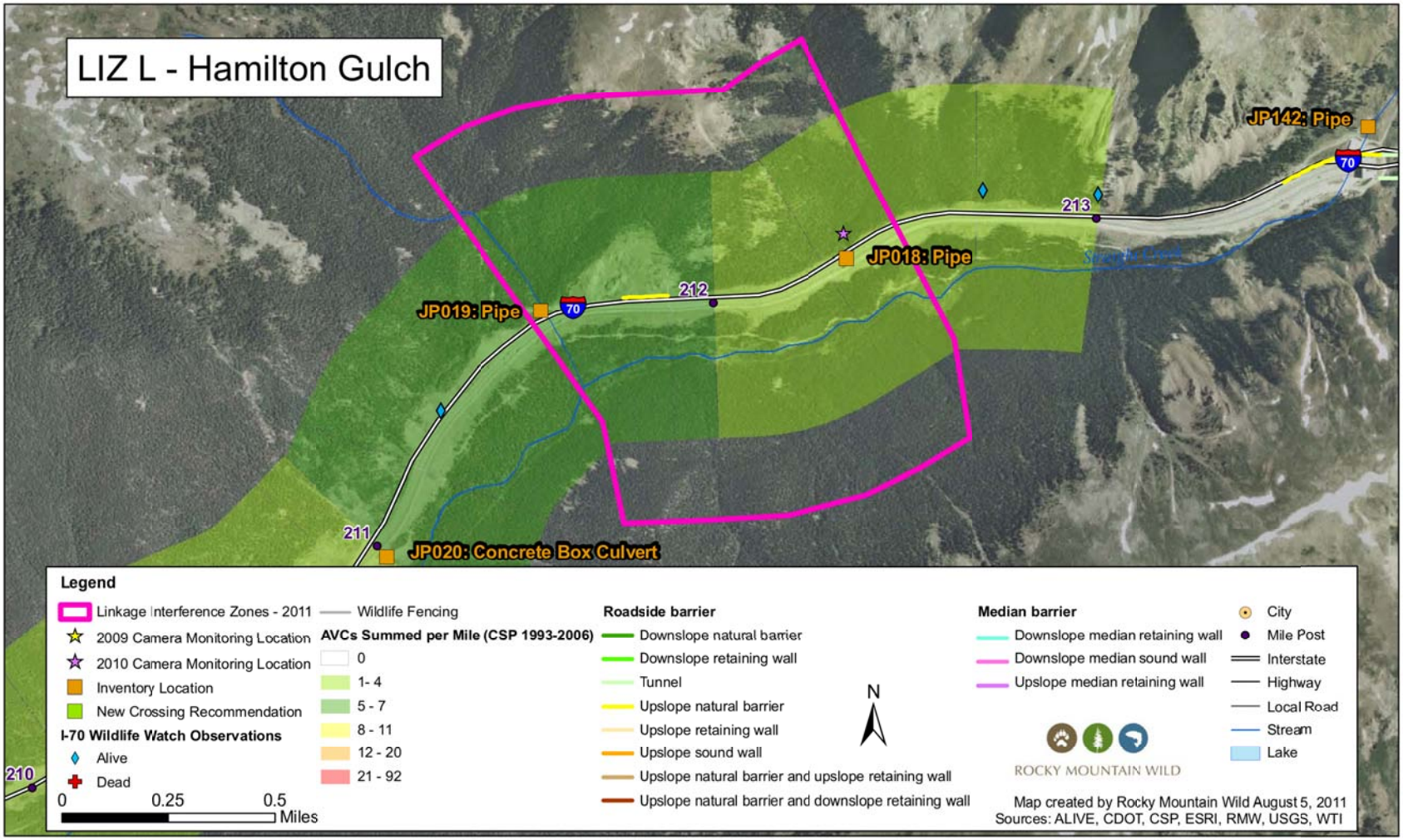
Connectivity Recommendations
Implement at least one of the below recommended mitigation measures.

Site-Specific Recommendations				
Loc. #	**MP**	**Site Description**	**Recommendations**	**EEO***
JP019	211.7	Steep, narrow drainage with perennial flow bisected by I-70 and runaway truck ramp, creating very wide road footprint. Stream flow shoots out steeply down fill slope at outlet. Small, dirt forest road at base of fill slope on south side at base of fill slope (outlet)	No recommended action unless highway being completely realigned through this segment. If opportunity arises, move runaway truck ramp outside of LIZ (or at minimum, to uphill/east side of drainage) to reduce highway footprint immediately over the drainage. Construct large bridge to accommodate all primary and secondary target species. Restore natural hydrologic flow and stream banks through structure. Install limited wildlife fencing to guide animals to the structure, particularly on the south side of the road (drainage acts as a natural funnel on the north side). Relocate forest road at outlet so that it traverses far from the culvert entrance. Implement measures to prevent human activity at culvert.	No

JP018†	212.4	Small drainage bisected by I-70.	Primary Mitigation Site in LIZ. Construct bridge to accommodate all primary and secondary target species. Restore natural hydrologic flow and stream banks through structure. Install limited wildlife fencing to guide animals to the structure, particularly on the south side of the road (drainage acts as a natural funnel on the north side). Implement measures to prevent human activity at culvert.	No

*Early Enhancement Opportunity

†Indicates wildlife monitoring conducted at site


LIZ L - Hamilton Gulch
JP142: Pipe
70
213
JP018: Pipe
Straight Creek
212
JP019: Pipe
70
211
JP020: Concrete Box Culvert
210
Legend
Linkage Interference Zones - 2011
2009 Camera Monitoring Location
2010 Camera Monitoring Location
Inventory Location
New Crossing Recommendation
I-70 Wildlife Watch Observations
Alive
Dead
0
0.25
0.5
Miles
Wildlife Fencing
AVCs Summed per Mile (CSP 1993-2006)
0
1- 4
5 - 7
8 - 11
12 - 20
21 - 92
Roadside barrier
Downslope natural barrier
Downslope retaining wall
Tunnel
Upslope natural barrier
Upslope retaining wall
Upslope sound wall
Upslope natural barrier and upslope retaining wall
Upslope natural barrier and downslope retaining wall
N
Median barrier
Downslope median retaining wall
Downslope median sound wall
Upslope median retaining wall
ROCKY MOUNTAIN WILD
City
Mile Post
Interstate
Highway
Local Road
Stream
Lake
Map created by Rocky Mountain Wild August 5, 2011
Sources: ALIVE, CDOT, CSP, ESRI, RMW, USGS, WTI

LIZ M: Bakerville

Mileposts: 216.4 – 227.1 *Early Enhancement Opportunities in LIZ?* Yes
LIZ Length: 10.6 miles

Target Species	*Species Movement Guilds*
Canada Lynx	Adaptive High Mobility Fauna

Secondary Target Species

Bighorn Sheep*	Black Bear
Boreal Toad**	Elk
Mountain Lion	Northern Leopard Frog

* Coordinate with CDOW to determine whether there is a need for connectivity between Georgetown and South Clear Creek populations of bighorn sheep. May prefer to maintain barrier to sheep to contain the spread of disease. If population-level movements across I-70 are determined to be important for bighorn sheep, then a wildlife overpass is the recommended crossing type.
** Boreal toad breed sites around mileposts 217.9, 218.7 and 220.8.

Animal-Vehicle Collisions: Moderate on average. Spike at milepost 223.5. Two lynx AVCs recorded in this LIZ at mileposts 217.3 and 220.9.

Status of Adjacent Lands: Public lands (USFS) west of milepost 221; Mixed private & public (USFS & state) between mileposts 221-224; Private east of milepost 224.

Site Discussion: I-70 follows the Clear Creek drainage throughout this LIZ from the Eisenhower Tunnels to Georgetown.

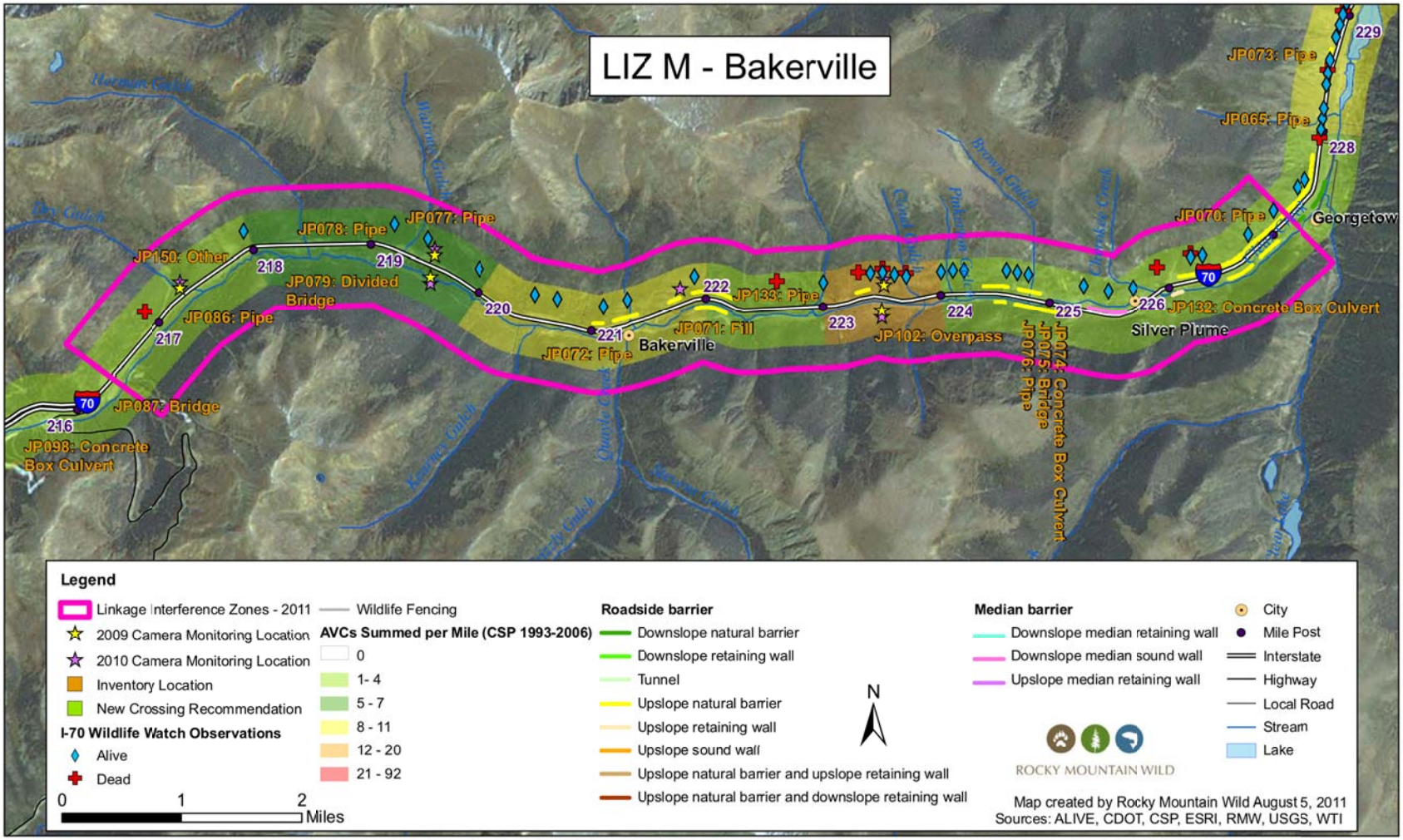
Connectivity Recommendations
This is a long LIZ requiring multiple crossing opportunities for the primary and secondary target species. Construct a wildlife bridge between milepost 219.1 and 220.5 (between chain-up stations) and replace the pipe at Dry Gulch with a large arch or bridge structure. There are also opportunities to construct a large arch culvert suitable for elk & lynx in this segment (e.g., at the fill slope at milepost 221.8). Upgrade existing bridge underpass and overpasses in this segment to better accommodate wildlife. Install additional small animal pipes approximately every 1/4-mile and/or add shelves to existing drainage culverts to provide a dry pathway through these structures. Coordinate with CDOW to determine if connectivity across I-70 for boreal toad is needed in this area to connect the breeding site to upland habitat.

Site-Specific Recommendations				
Loc. #	**MP**	**Site Description**	**Recommendations**	**EEO***
JP086	217.4	51” corrugated pipe at Dry Gulch	Install arch or bridge underpass at least 12'x24'. Coordinate with ARNF to amend forest plan to designate Dry Gulch as a lynx linkage (2004 LIZ recommendation).	No

JP150	217.9	Seepage feeding into wetland on north side of highway; Boreal toad breeding site	No need for aquatic connectivity at this site. This location needs to be protected as a boreal toad breeding site. If connectivity for toads to the south side of the interstate is determined to be important, then install specialized culverts that preserve critical ambient conditions through the culvert.	No
JP079	218.5	Bridge over Herman Gulch exit.	Improve wildlife passage at existing bridge structure by opening up a natural substrate pathway adjacent to the roadway to encourage nighttime use of the structure. Add signage to inform drivers of potential wildlife activity (interchange traffic is slow moving and required to stop around this structure).	Yes
n/a	218.7	Boreal toad breeding site	Coordinate with CDOW to determine if connectivity for boreal toad is needed in this area. To connect toad habitat north and south of the interstate, install specialized culverts that preserve critical ambient conditions through the culvert.	No
n/a	219.1-220.5	Forested area between chain-up stations	Construct wildlife bridge between MP 219.1 and 220.5 (between chain-up stations). Install guide fencing to direct animals towards the structure. Coordinate with the ARNF.	No
n/a	220.8	Boreal toad breeding site	Coordinate with CDOW to determine if connectivity for boreal toad is needed in this area. To connect toad habitat north and south of the interstate, install specialized culverts that preserve critical ambient conditions through the culvert.	No
JP071†	221.8	Low fill slope and gap between cliff sections on north side. Clear Creek runs parallel to south.	Dig out fill slope and/or raise the roadbed so that an arch culvert can be installed at this location. Install guide fencing to direct animals towards the structure.	No
JP102†	223.5	Bridge overpass over I-70 with 2-lane paved road. Hwy 6 frontage road immediately to south. USFS access to north.	Convert one lane of the bridge to vegetative grass/shrub cover. Investigate adding an at-grade wildlife crosswalk over Highway 6 at this location or other mechanisms to slow traffic and make drivers aware of potential wildlife crossing. Install guide fencing to direct animals away from the highway and towards the structure.	Yes
JP075	225.0	Bridge over Hwy 6 with concrete side walls and small dirt paths on either side of road.	At minimum, open up and naturalize side slopes and road shoulders to encourage nighttime wildlife use. Ultimately, replace with a bridge structure spanning the entire drainage (including creek at JP074).	Yes

*Early Enhancement Opportunity

†Indicates wildlife monitoring conducted at site


LIZ M - Bakerville
JP073: Pipe
JP065: Pipe
JP070: Pipe
Georgetow
JP078: Pipe
JP077: Pipe
JP150: Other
JP079: Divided Bridge
JP086: Pipe
JP087: Bridge
JP098: Concrete Box Culvert
JP071: Fill
JP072: Pipe
Bakerville
JP133: Pipe
JP102: Overpass
JP076: Pipe
JP075: Bridge
JP074: Concrete Box Culvert
JP132: Concrete Box Culvert
Silver Plume
216
217
218
219
220
221
222
223
224
225
226
228
229
70
Legend
Linkage Interference Zones - 2011
2009 Camera Monitoring Location
2010 Camera Monitoring Location
Inventory Location
New Crossing Recommendation
I-70 Wildlife Watch Observations
Alive
Dead
Wildlife Fencing
AVCs Summed per Mile (CSP 1993-2006)
0
1- 4
5 - 7
8 - 11
12 - 20
21 - 92
Roadside barrier
Downslope natural barrier
Downslope retaining wall
Tunnel
Upslope natural barrier
Upslope retaining wall
Upslope sound wall
Upslope natural barrier and upslope retaining wall
Upslope natural barrier and downslope retaining wall
Median barrier
Downslope median retaining wall
Downslope median sound wall
Upslope median retaining wall
City
Mile Post
Interstate
Highway
Local Road
Stream
Lake
N
0
1
2
Miles
ROCKY MOUNTAIN WILD
Map created by Rocky Mountain Wild August 5, 2011
Sources: ALIVE, CDOT, CSP, ESRI, RMW, USGS, WTI

LIZ N: Empire Junction

LIZ N: Empire Junction

Mileposts: 231.6 – 232.9 *Early Enhancement Opportunities in LIZ?* No
LIZ Length: 1.4 miles

Target Species	*Species Movement Guilds*
Canada Lynx	Adaptive High Mobility Fauna

Secondary Target Species

Bighorn Sheep*	Black Bear
Elk	Mule Deer
Northern Leopard Frog	

*East-west movement across Highway 40 is more important for Bighorn sheep than connectivity across I-70.

Animal-Vehicle Collisions: High

Status of Adjacent Lands: Mostly private, some county

Site Discussion: Confluence of two large drainages (Clear Creek and the West Fork) and junction with Highway 40. Likely these two drainages provided historical movement pathways for many species. Interchange and other infrastructure create a large barrier at this confluence. Clear Creek has forced meanders around highway infrastructure, reinforced by riprap banks throughout this segment

Connectivity Recommendations

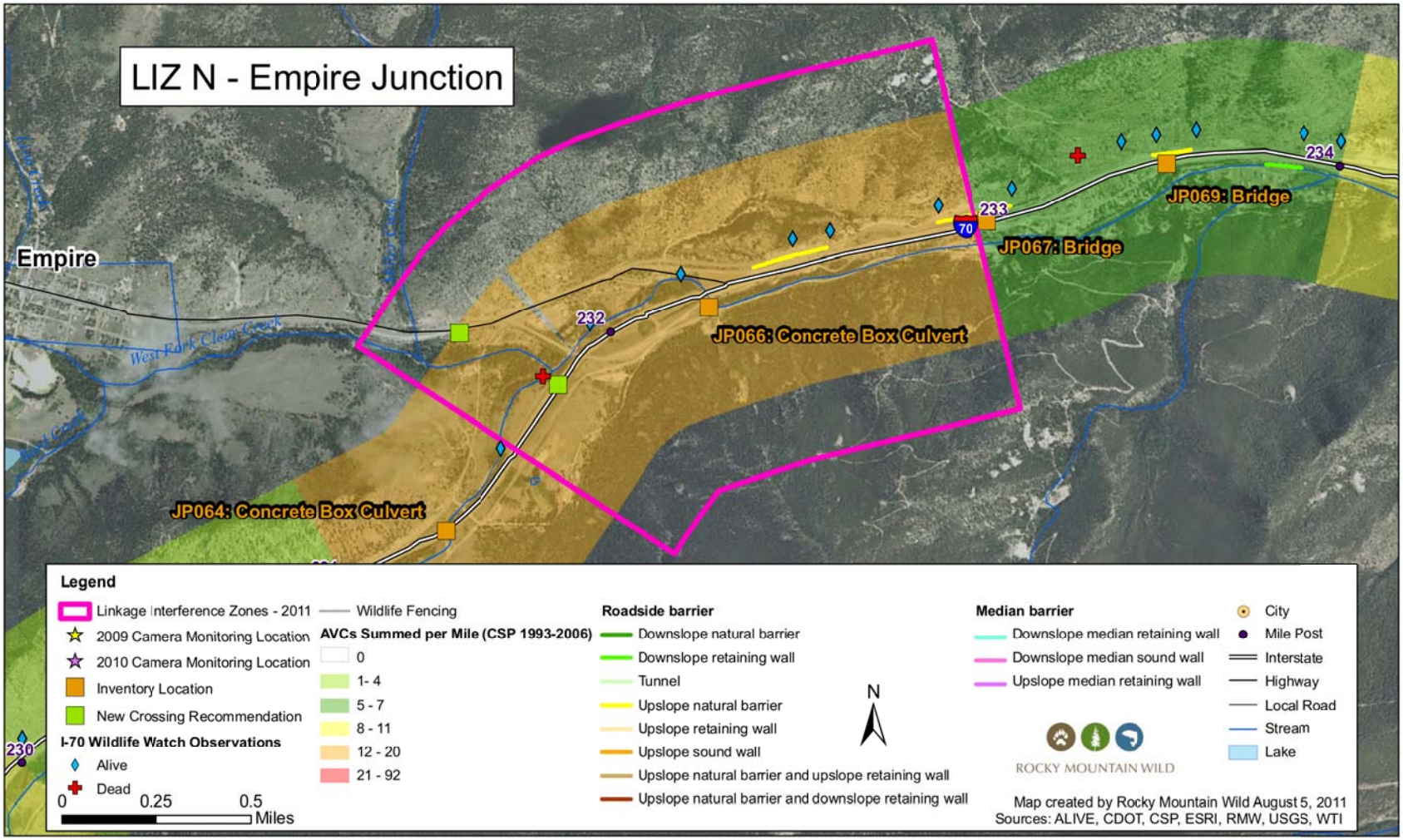
Coordinate visioning and planning for this segment with visioning and planning for Highway 40. Preferred alternative is to construct an extensive span bridge and raised interchange through this section to accommodate terrestrial and aquatic passage between the two drainages and restore the flow of Clear Creek and its riparian banks to a more natural condition. Alternatively, construct new crossing structures at mileposts 231.2 (JP064 - just beyond west end of LIZ) and 231.6-231.9. Investigate using jersey barriers or other barrier structures to keep sheep away from I-70 road edge on north side (2004 LIZ recommendation).

Site-Specific Recommendations				
Loc. #	**MP**	**Site Description**	**Recommendations**	**EEO***
JP064	231.2	Clear Creek concrete box culvert. Outside of LIZ, but possible location for a larger crossing structure.	Replace with a bridge structure and restore riparian banks. Bridge should have a wide enough span to include dry pathways for terrestrial species on both sides of the creek. Install limited guide fencing to direct animals towards structure and investigate use of scent lures to attract lynx towards structure.	No

JP066	232.3	Clear Creek concrete box culvert. Structure goes under traffic lanes and eastbound on-ramp.	None. See preferred alternative.	No
n/a	231.6-231.9	No existing structure	Identify a location to install a new large arch culvert in this segment suitable for lynx, elk, deer and bear. Install limited guide fencing to direct animals towards structure and investigate use of scent lures to attract lynx towards structure.	No
n/a	Hwy 40	No existing structure	Identify a location and construct an overpass for bighorn sheep over Hwy 40 (2004 LIZ recommendation)	No

*Early Enhancement Opportunity

†Indicates wildlife monitoring conducted at site


LIZ N - Empire Junction
Empire
West Fork Clear Creek
JP064: Concrete Box Culvert
JP066: Concrete Box Culvert
JP067: Bridge
JP069: Bridge
230
232
233
234
70
Legend
Linkage Interference Zones - 2011
2009 Camera Monitoring Location
2010 Camera Monitoring Location
Inventory Location
New Crossing Recommendation
I-70 Wildlife Watch Observations
Alive
Dead
0
0.25
0.5
Miles
Wildlife Fencing
AVCs Summed per Mile (CSP 1993-2006)
0
1- 4
5 - 7
8 - 11
12 - 20
21 - 92
Roadside barrier
Downslope natural barrier
Downslope retaining wall
Tunnel
Upslope natural barrier
Upslope retaining wall
Upslope sound wall
Upslope natural barrier and upslope retaining wall
Upslope natural barrier and downslope retaining wall
N
Median barrier
Downslope median retaining wall
Downslope median sound wall
Upslope median retaining wall
ROCKY MOUNTAIN WILD
City
Mile Post
Interstate
Highway
Local Road
Stream
Lake
Map created by Rocky Mountain Wild August 5, 2011
Sources: ALIVE, CDOT, CSP, ESRI, RMW, USGS, WTI

LIZ O: Clear Creek Junction

Mileposts: 243.0 – 244.9 *Early Enhancement Opportunities in LIZ?* No
LIZ Length: 2 miles

Target Species	*Species Movement Guilds*
Elk	Very High Openness Fauna
Mule Deer	Adaptive Ungulates

Secondary Target Species

Bighorn Sheep	Canada Lynx
Mountain Lion	Preble's Jumping Mouse

Animal-Vehicle Collisions: Low to Moderately-Low

Status of Adjacent Lands: Private

Site Discussion: Highway 6/Clear Creek Canyon Interchange. Western Portion of LIZ parallels Clear Creek; eastern portion ascends Floyd Hill.

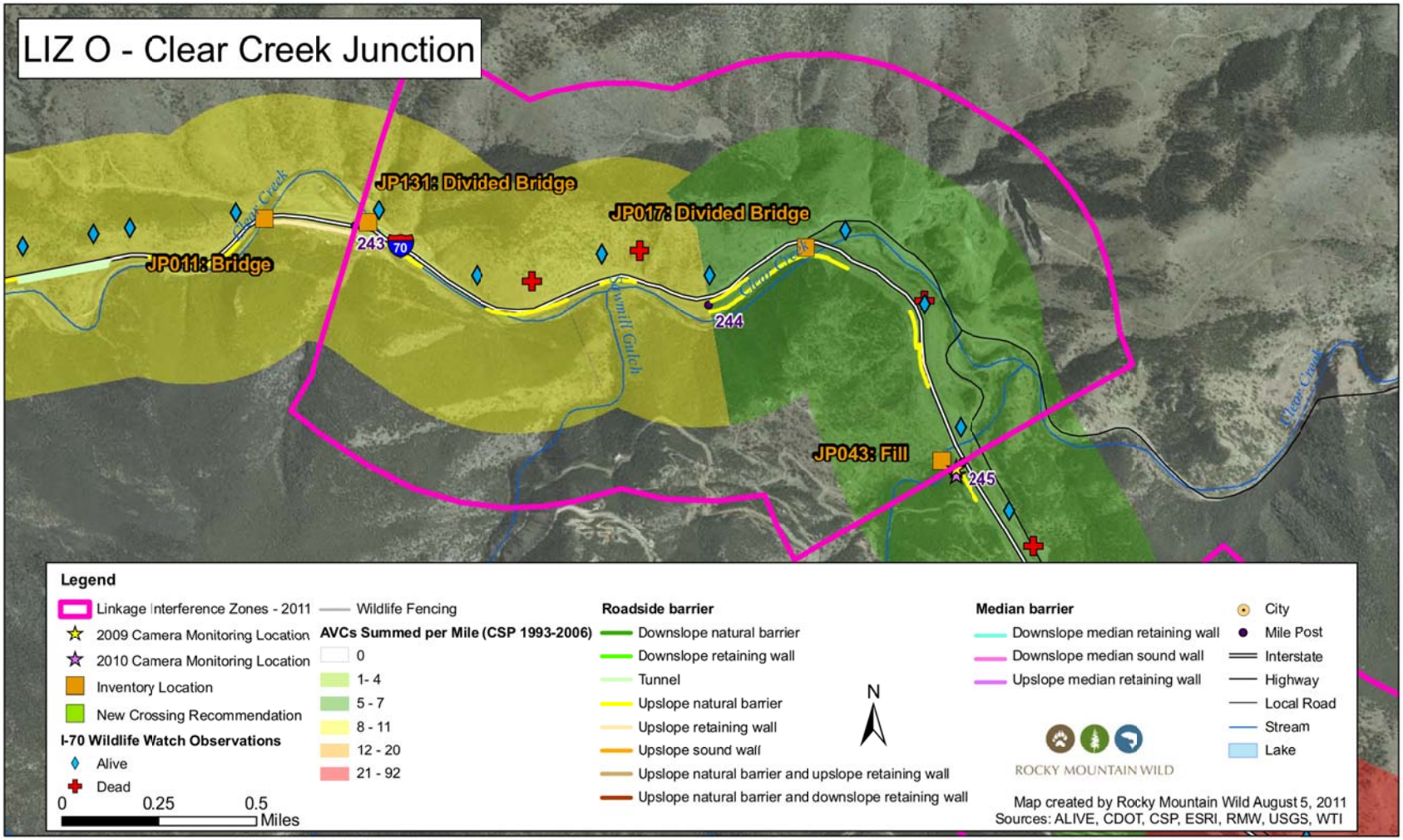
Connectivity Recommendations
Land bridge over Twin Tunnels just beyond LIZ to the west. Existing bridges over Clear Creek provide little opportunity for terrestrial passage. There is a proposal in the Final PEIS to tunnel eastbound lanes from milepost 243.5 to 245.0 to remove the sharp curve at the bottom of Floyd Hill; Westbound lanes would continue on the current alignment. This tunneling option may offer the opportunity to minimize the roadway footprint through this segment.

Site-Specific Recommendations				
Loc. #	**MP**	**Site Description**	**Recommendations**	**EEO***
JP131	243.0	Divided bridge at Central City exit with additional bridges to north (exit ramp and local road). Extensive riprap under all bridges. Dirt path with 2m clearance under hwy bridges.	Open up terrestrial pathway under highway bridges (particularly on west side of creek) and restore natural stream banks. Re-design exit ramp to provide greater clearance under bridge. Facilitate at-grade crossing over local road until that bridge can also be replaced with a larger structure encompassing riparian banks and providing dry terrestrial pathways.	No
JP017	244.2	Divided bridge with concrete support walls at Hwy 6 junction. Spans Clear Creek and bike path.	Open up north side of eastbound structure by replacing walls with pillar supports. Open up and restore riparian banks on both sides of the creek (including low cover for Preble's jumping mouse). Cliffs act as natural funnel towards structure.	No

JP043†	244.9	Fill slope; Hwy 40 frontage road parallel and below interstate to north/east	Construct bridge wildlife crossing - possibly also under Hwy 40. Relocate dirt pull-out to reduce roadway footprint at this location and to discourage human activity. Install limited guide fencing.	No

*Early Enhancement Opportunity

†Indicates wildlife monitoring conducted at site


LIZ O - Clear Creek Junction
JP131: Divided Bridge
JP017: Divided Bridge
JP011: Bridge
JP043: Fill
243
70
244
245
Clear Creek
Lawrence Gulch
Legend
Linkage Interference Zones - 2011
2009 Camera Monitoring Location
2010 Camera Monitoring Location
Inventory Location
New Crossing Recommendation
I-70 Wildlife Watch Observations
Alive
Dead
0
0.25
0.5
Miles
Wildlife Fencing
AVCs Summed per Mile (CSP 1993-2006)
0
1- 4
5 - 7
8 - 11
12 - 20
21 - 92
Roadside barrier
Downslope natural barrier
Downslope retaining wall
Tunnel
Upslope natural barrier
Upslope retaining wall
Upslope sound wall
Upslope natural barrier and upslope retaining wall
Upslope natural barrier and downslope retaining wall
N
Median barrier
Downslope median retaining wall
Downslope median sound wall
Upslope median retaining wall
ROCKY MOUNTAIN WILD
City
Mile Post
Interstate
Highway
Local Road
Stream
Lake
Map created by Rocky Mountain Wild August 5, 2011
Sources: ALIVE, CDOT, CSP, ESRI, RMW, USGS, WTI

LIZ P: Beaver Brook

Mileposts: 245.5 – 250.2 *Early Enhancement Opportunities in LIZ?* Yes
LIZ Length: 4.8 miles

Target Species	*Species Movement Guilds*
Elk	Very High Openness Fauna
Mule Deer	Adaptive Ungulates

Secondary Target Species

Black Bear	Canada Lynx
Mountain Lion	Northern Leopard Frog
Preble's Jumping Mouse	

Animal-Vehicle Collisions: Very High

Status of Adjacent Lands: Private

Site Discussion: I-70 is traversing through the foothills in this LIZ. Numerous fill slopes occur where the highway crosses drainages. Tall concrete median barrier (3.3' high) is present on the west side of Floyd Hill, from milepost 245.5 to the exit at milepost 246.6.

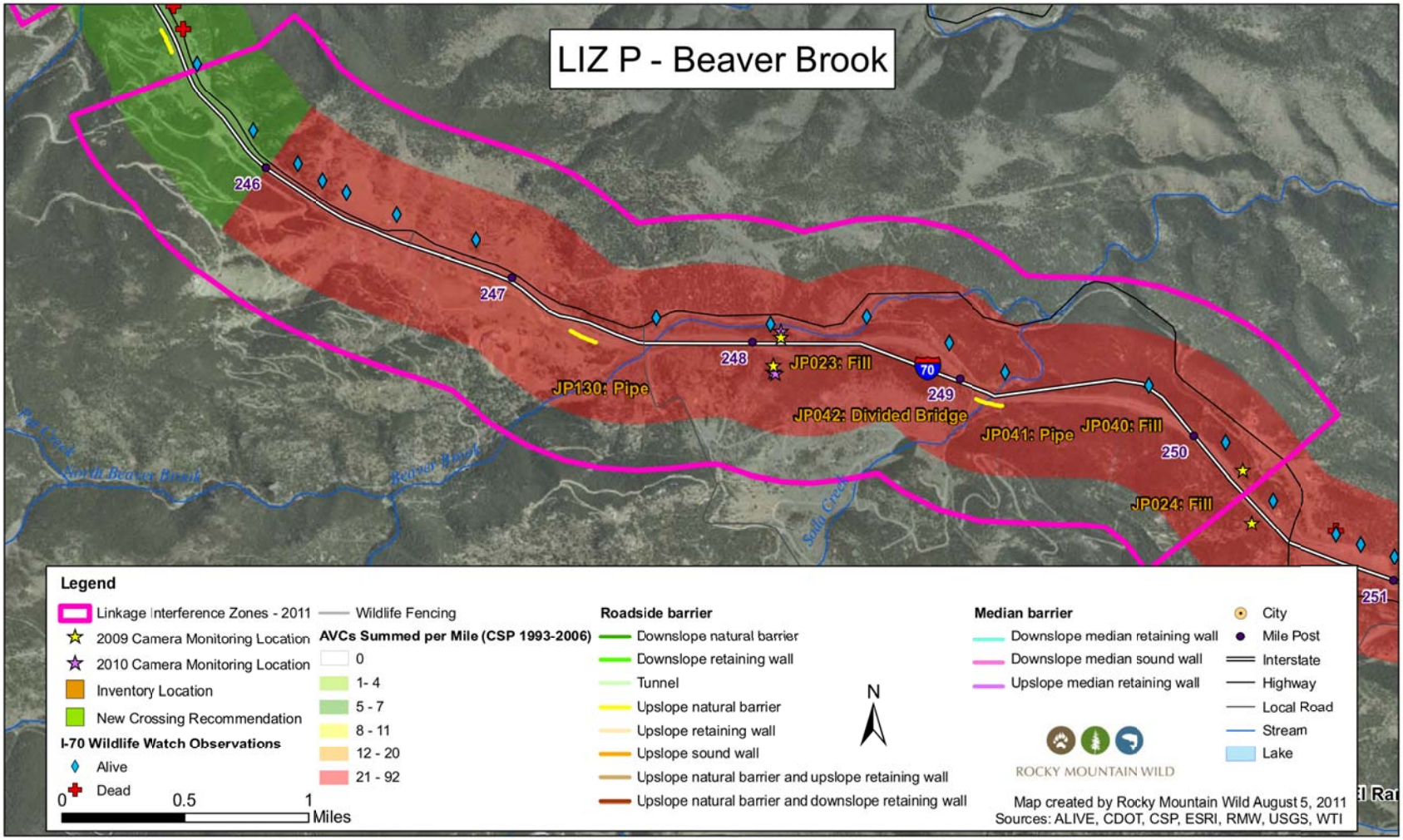
Connectivity Recommendations
Construct new crossing structures where drainages are bisected by I-70. Investigate opportunities to install a crossing structure on the west side of Floyd Hill between mileposts 245.5 and 247.5. Coordinate with local landowners and the county on zoning in this LIZ to manage zoning and development and to obtain conservation easements on key properties adjacent to new crossing structures.

Site-Specific Recommendations				
Loc. #	**MP**	**Site Description**	**Recommendations**	**EEO***
n/a	245.5	Small drainage. Open area to south, fill slope to north. Scattered homes to south	Investigate opportunity to install crossing suitable for deer and elk at this location. Consider Hwy 40 parallel to north.	No
n/a	246.5	Cut slopes just west of highway exit	Investigate opportunity to build wildlife overpass over interstate and Hwy 40.	No

JP130	247.5	North Branch Beaver Brook. Preble's occupied habitat and elk crossing area.	Primary recommended crossing location in LIZ. Replace pipe with bridge or large arch culvert and restore riparian habitat. Integrate terrestrial and aquatic crossings - structure should be large and wide enough for elk passage.	No
JP023†	248.2	Fill slope with small drainage pipe. Commercial/private lot at base of fill on N side.	Coordinate with private landowners to install bridge or large arch culvert to facilitate deer and elk passage. Add wildlife fencing to guide animals toward structure. Include woody debris cover along one side of the structure to facilitate small mammal and amphibian passage.	No
JP041	249.0	Small pipe funneling Soda Creek	Replace with more expansive bridge spanning Soda Creek, road (JP042), and riparian area. Restore and maintain riparian cover. Add wildlife fencing (and amphibian walls) to guide animals to structure.	No
JP042	249.0	Divided bridge over Soda Creek Rd	At minimum, open up riprap side slopes and restore vegetative cover along edges of road. Ultimately, replace structure with a more expansive bridge also spanning Soda Creek and restore riparian zone through structure (JP041). Add wildlife fencing (and amphibian walls) to guide animals to structure.	Yes
JP040	250.0	Large fill slope on north side; smaller fill on south side. No residences immediately adjacent.	Primary recommended crossing location in LIZ. Construct new structure either here (preferred) or MP 250.2 (JP024). Obtain easement to protect site from development. Install bridge or large arch culvert to facilitate deer and elk passage. Add wildlife fencing to guide animals toward structure. Include woody debris cover along one side of the structure to facilitate small mammal and amphibian passage.	No
JP024†	250.2	Large fill slope. Chain station above south side; residential development at base of fill to north.	Construct new structure either at MP 250 (JP040 - preferred) or here. Coordinate with private landowners to install bridge or large arch culvert to facilitate deer and elk passage. Add wildlife fencing to guide animals toward structure. Include woody debris cover along one side of the structure to facilitate small mammal and amphibian passage.	No

*Early Enhancement Opportunity

†Indicates wildlife monitoring conducted at site


LIZ P - Beaver Brook
246
247
248
249
250
251
JP130: Pipe
JP023: Fill
JP042: Divided Bridge
JP041: Pipe
JP040: Fill
JP024: Fill
70
Legend
Linkage Interference Zones - 2011
2009 Camera Monitoring Location
2010 Camera Monitoring Location
Inventory Location
New Crossing Recommendation
I-70 Wildlife Watch Observations
Alive
Dead
Wildlife Fencing
AVCs Summed per Mile (CSP 1993-2006)
0
1- 4
5 - 7
8 - 11
12 - 20
21 - 92
0
0.5
1
Miles
Roadside barrier
Downslope natural barrier
Downslope retaining wall
Tunnel
Upslope natural barrier
Upslope retaining wall
Upslope sound wall
Upslope natural barrier and upslope retaining wall
Upslope natural barrier and downslope retaining wall
N
Median barrier
Downslope median retaining wall
Downslope median sound wall
Upslope median retaining wall
ROCKY MOUNTAIN WILD
City
Mile Post
Interstate
Highway
Local Road
Stream
Lake
Map created by Rocky Mountain Wild August 5, 2011
Sources: ALIVE, CDOT, CSP, ESRI, RMW, USGS, WTI

LIZ Q: Mt Vernon Creek

Mileposts: 252.8 – 257.6 *Early Enhancement Opportunities in LIZ?* Yes
LIZ Length:

Target Species	*Species Movement Guilds*
Elk*	Very High Openness Fauna
Mule Deer	Adaptive Ungulates

*Resident herd

Secondary Target Species

Black Bear	Canada Lynx
Mountain Lion	Preble's Jumping Mouse**

**Preble's range, but no known occupied habitat

Animal-Vehicle Collisions: Very High

Status of Adjacent Lands: Private with some Denver Parks at west end

Site Discussion: I-70 is traversing through the foothills in this LIZ. Numerous fill slopes occur where the highway crosses drainages.

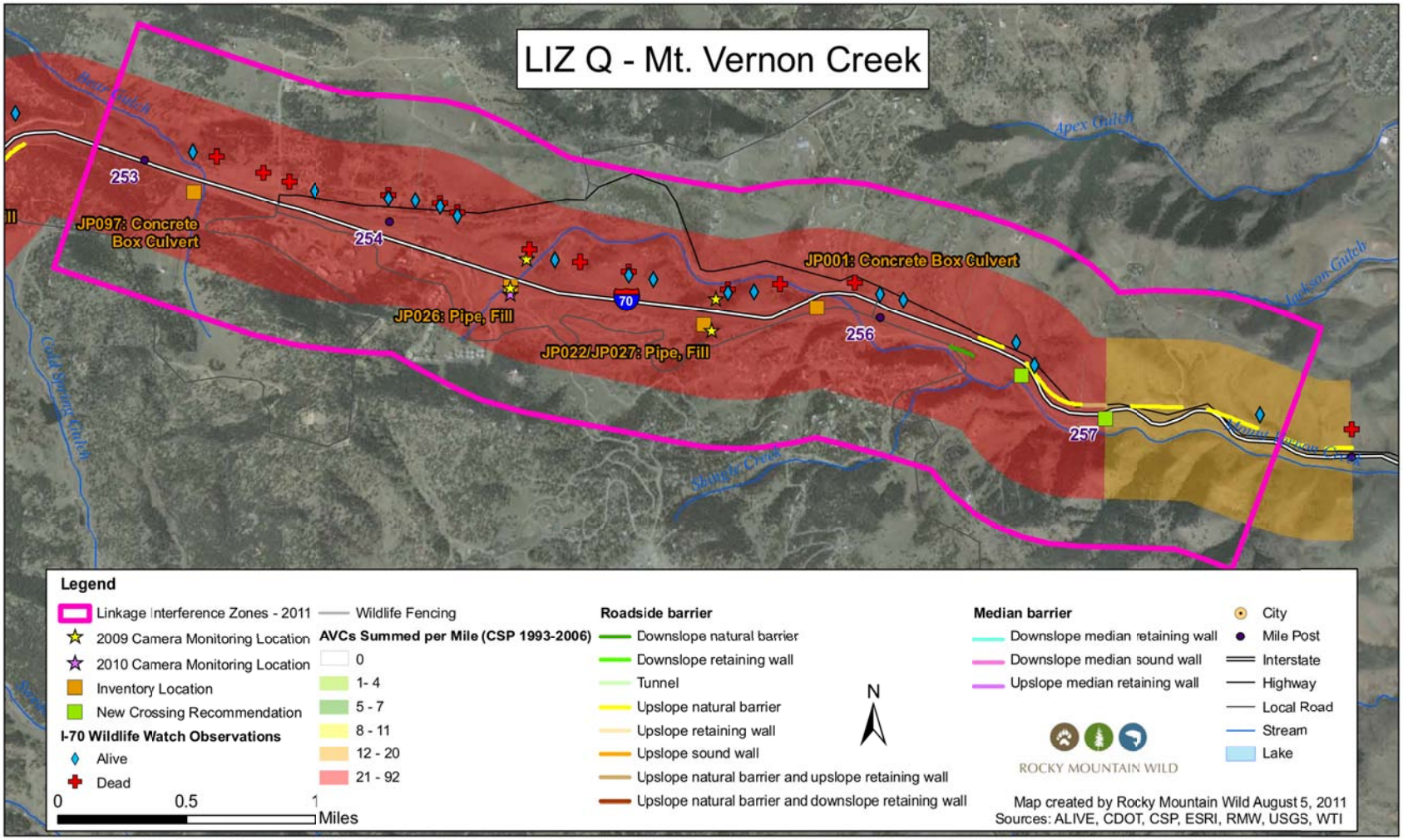
Connectivity Recommendations
Add limited guide fencing associated with each structure as they are constructed. If entire zone is to be fenced, then connect new structures only once they are constructed. Wildlife fencing must include controls at highway interchanges or other gaps (e.g., electromats or double cattle-guards). Primary locations for new wildlife crossing structures at mileposts 254.5, 255.3 and 257.0.

Site-Specific Recommendations				
Loc. #	**MP**	**Site Description**	**Recommendations**	**EEO***
JP097	253.4	Box culvert at Bear Gulch. Fencing enclosure for managed bison herd.	Set back park fencing and add gates leading to underpass so that they can be closed when moving the bison herd from one side of the highway to the other and left open for wildlife passage the rest of the time. Discourage cars parking above culvert on south side of interstate for bison viewing - direct all tourist traffic to north side viewing area, away from culvert. Note: adjusting the bison enclosure will allow wildlife access to the culvert, however this culvert is not large considered large enough for elk passage. It is possible, though uncertain, that the resident herd could become adapted to it, particularly given the high traffic levels on I-70. Coordinate with Denver Parks on fence design and maintain viewing area on NE side (off exit)	Yes

JP097	253.4	Same as above.	Ultimately replace the box culvert with a bridge underpass or large arch culvert suitable for elk. Tie into wildlife fencing.	No
JP026†	254.5	Steep, long fill; scattered residences to north and south	Primary recommended crossing location in LIZ. Coordinate with private landowners to install bridge or large arch culvert to facilitate deer and elk passage. Add wildlife fencing to guide animals toward structure. Include woody debris cover along one side of the structure to facilitate small mammal passage.	No
JP027; JP022†	255.3	Steep fill slope (JP027) with small pipe at base of fill (JP022). Hwy 40 fill slope located to north.	Primary recommended crossing location in LIZ. Coordinate with private landowners to install bridge or large arch culvert to facilitate deer and elk passage. Add wildlife fencing to guide animals toward structure. Include woody debris cover along one side of the structure to facilitate small mammal passage.	No
JP001	256.0	Large fill slope with small box culvert funneling Mt Vernon Creek. Paradise Rd. immediately to North. Area has extensive exurban development.	Secondary site. Coordinate with private landowners to install bridge or large arch culvert to facilitate deer and elk passage. Add wildlife fencing to guide animals toward structure. Include woody debris cover along one side of the structure to facilitate small mammal passage.	No
n/a	256.6	Large fill slope at Hwy 6 on north side; drops into Mt Vernon Creek on south side.	Install bridge structure under Hwy 6 and I-70 to accommodate deer and elk. Include woody debris cover along one side of the structure to facilitate small mammal passage. Investigate opportunities to obtain conservation easements around crossing.	No
n/a	257.0	Low fill, rolling hills on north side; steep slope to creek on south side. Hwy 6 parallels to north. No development in vicinity.	Primary recommended crossing location in LIZ. Install bridge structure under Hwy 6 and I-70 to accommodate deer and elk. Include woody debris cover along one side of the structure to facilitate small mammal passage. Investigate opportunities to obtain conservation easements around crossing.	No

*Early Enhancement Opportunity

†Indicates wildlife monitoring conducted at site


LIZ Q - Mt. Vernon Creek
253
254
256
257
70
JP097: Concrete Box Culvert
JP026: Pipe, Fill
JP022/JP027: Pipe, Fill
JP001: Concrete Box Culvert
Apex Gulch
Jackson Gulch
Legend
Linkage Interference Zones - 2011
2009 Camera Monitoring Location
2010 Camera Monitoring Location
Inventory Location
New Crossing Recommendation
I-70 Wildlife Watch Observations
Alive
Dead
Wildlife Fencing
AVCs Summed per Mile (CSP 1993-2006)
0
1- 4
5 - 7
8 - 11
12 - 20
21 - 92
0
0.5
1
Miles
Roadside barrier
Downslope natural barrier
Downslope retaining wall
Tunnel
Upslope natural barrier
Upslope retaining wall
Upslope sound wall
Upslope natural barrier and upslope retaining wall
Upslope natural barrier and downslope retaining wall
N
Median barrier
Downslope median retaining wall
Downslope median sound wall
Upslope median retaining wall
ROCKY MOUNTAIN WILD
City
Mile Post
Interstate
Highway
Local Road
Stream
Lake
Map created by Rocky Mountain Wild August 5, 2011
Sources: ALIVE, CDOT, CSP, ESRI, RMW, USGS, WTI

AQUATIC CONNECTIVITY RECOMMENDATIONS (Fish Passage)

*Target species not listed. Contact CDOW for species-specific information.
**Indicates Early Enhancement Opportunity. Before implementing enhancements, confirm target species presence in sites currently listed as 'unknown'.
†Whirling disease is present in many streams indicated.

STREAM NAME	LOC #	MP	TARGET SPECIES*	INTEN-TIONAL BARRIER	SITE DISCUSSION	CONNECTIVITY RECOMMENDATIONS	EEO**
Colorado River†	JP051	133.5	Unknown	No	Divided Bridge. Dirt parking lots on both east and west sides. Parallel bridge to north for county road has low clearance over riparian banks.	Maintain aquatic connectivity at site including natural stream channel and stream banks. While site is not in a LIZ-2011, it offers an excellent opportunity for terrestrial connectivity as well. Minimize riprap along banks and concentrate human activity at a designated put in/take out site.	No
Eby Creek†	JP136	146.4	Unknown	No	5' diameter corrugated pipe. Inlet inaccessible. Feeds directly into Eagle River at outlet; presumed outlet drop at lower water levels.	Replace with larger box, arch, open-bottomed pipe or embedded pipe culvert and lower the culvert height to allow fish upstream access to wetland habitat on north side of interstate.	No
Eagle River†	JP116	154.0	Unknown	No	Divided Bridge over Eagle River, Hwy 6 & RR. Continuous substrate and shallow banks through structure.	Maintain aquatic connectivity at site and integrate terrestrial connectivity measures.	No
Eagle River†	JP114	158.7	Unknown	No	Divided Bridge. Continuous substrate and shallow banks through structure.	Maintain aquatic connectivity at site and integrate terrestrial connectivity measures. Monitor bank erosion and implement upstream and downstream stability measures as needed.	No

STREAM NAME	LOC #	MP	TARGET SPECIES*	INTEN-TIONAL BARRIER	SITE DISCUSSION	CONNECTIVITY RECOMMENDATIONS	EEO**
Red Canyon Creek†	JP113	159.4	Unknown	No	Corrugated pipe with perennial flow. Channel was rerouted (90 degree angle) for roadway. Pooling at inlet due to debris accumulation and culvert skew. 1.6' drop at outlet and fencing across outlet and second pipe downstream under railroad.	Confirm presence of target species and establish connectivity need. Preferred solution: Replace the existing pipe and box culvert at JP112 with a bridge over the road and stream and restore the entire riparian channel. Alternate option: Install a new, larger culvert (e.g., oversized open bottomed pipe) more consistent with the natural stream channel slope and alignment. Restore stream channel and maintain natural substrate through the new culvert; Construct a series of navigable pools & steps through both the Hwy culvert and the RR culvert (which likewise should be replaced with a larger culvert). Include a low-flow channel to maintain sufficient water depth through the culvert year-round.	No

STREAM NAME	LOC #	MP	TARGET SPECIES*	INTEN-TIONAL BARRIER	SITE DISCUSSION	CONNECTIVITY RECOMMENDATIONS	EEO**
Beard Creek†	JP110	161.9	Unknown	No	5.6' diameter corrugated metal pipe at base of fill slope. Outlet perched with 13' drop to channel, which flattens out beyond the outlet through a wide, agricultural floodplain.	Coordinate with CDOW to determine whether the natural stream grade is a natural barrier to connectivity between the Eagle River and Beard Creek upstream from the Eagle River floodplain. Culvert slope, even if replaced, likely too steep for fish passage. If connectivity is desirable at this location, replace with large 3-sided box, arch, open-bottomed pipe or embedded pipe culvert. Implement upstream and downstream grade-control measures and identify an appropriate culvert slope to remove drop and mimic channel conditions through the culvert to improve passage.	No
Berry Creek†	JP137	162.7	Yes	Yes	Creek realigned 90 degrees and funneled into large culvert and then drops - distance unknown. Large trash rack over inlet (some debris accumulation at time of inventory). Upstream culvert under local road. Outlet not found (among buildings or directly channeled into Eagle River).	Coordinate with CDOW to determine if connectivity desirable at the road-stream crossing. Replace existing culvert with shorter culverts and restore stream channel to confluence with Gore Creek. Criteria include: minimizing culvert length, removing drop(s) and restoring a more natural grade, mimicking the natural range of velocities inside the culvert, and providing rest areas for fish moving upstream through the culvert. Daylight a long culvert as needed.	No

STREAM NAME	LOC #	MP	TARGET SPECIES*	INTEN-TIONAL BARRIER	SITE DISCUSSION	CONNECTIVITY RECOMMENDATIONS	EEO**
Buck Creek †	JP138	166.3	Unknown	No	6' diameter pipe. Meanders into wing wall. Culvert grade largely consistent with channel grade - sediment in culvert at outlet. Channel continues between buildings/lots, and retains stream banks and meanders.	Build up grade coming into inlet so that water flow doesn't have to 'jump' into culvert. Add substrate inside culvert and secure by constructing baffles or weir plates inside the culvert.	Yes
Nottingham Gulch†	JP101	168.0	Unknown	No	Pipe culvert. Inlet is a drainage slot, with large stormwater control structure. Culvert channeled under I-70, frontage road, Home Depot parking lot, RR and secondary road. Flow restriction structure at outlet to limit stormwater inputs into Gore Creek	Replace hard stormwater control infrastructure with a wetland on the north side of I-70 (inlet) and build constructed wetland on the south side of I-70 before the outlet to control runoff inflows. Use soft bioengineering techniques in lieu of flow restriction devices to control inflows into Gore Creek from Nottingham Creek and surrounding impervious surfaces. Replace pervious pavements with impervious pavements to control runoff. Replace structure with a series of shorter structures.	No
Eagle River†	JP049	168.7	No	No	Large, divided span bridge over Eagle River, railroad and Hwy 6. Some bank armoring (support wall) and riprap.	Maintain connectivity at site including natural stream channel and stream banks. Minimize riprap and maintain shallow banks.	No

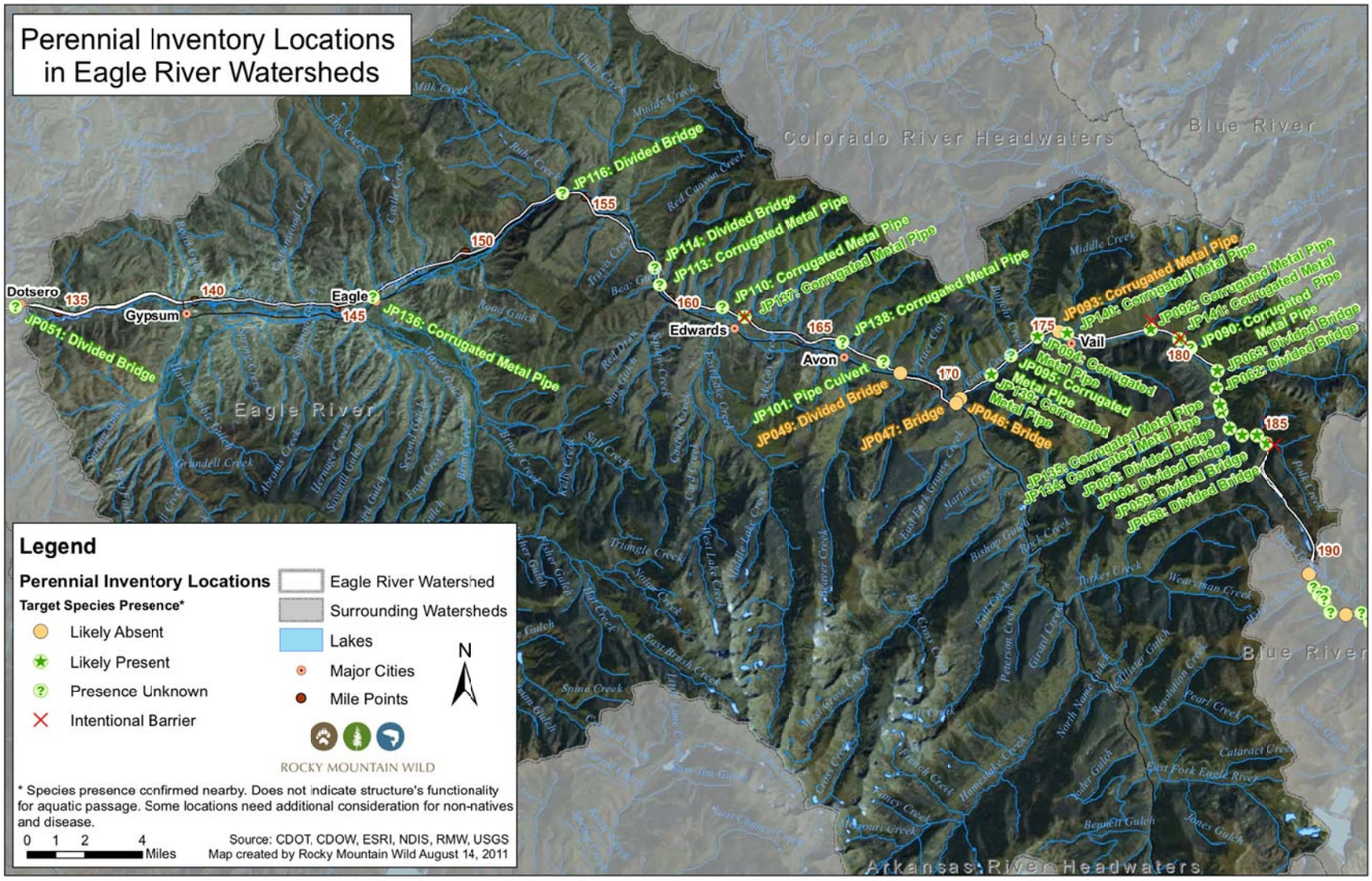
STREAM NAME	LOC #	MP	TARGET SPECIES*	INTEN-TIONAL BARRIER	SITE DISCUSSION	CONNECTIVITY RECOMMENDATIONS	EEO**
Eagle River†	JP047	171.1	No	No	Divided span bridge at Minturn Exit. Road on west side of channel; railroad on east side. Substantial riprap along banks through structure and upstream/downstream. Second bridge immediately downstream.	Maintain connectivity at site including natural stream channel and stream banks. Minimize riprap and maintain shallow banks.	No
Gore Creek†	JP046	171.3	No	No	Bridge over Gore Creek and bike path. Deep channel with extensive riprap.	Maintain connectivity at site including natural stream channel and stream banks. Minimize riprap and maintain shallow banks.	No
Unknown Tributary to Gore Creek†	JP139	172.9	Yes	No	42" pipe. Wildlife fence runs 10' in front of inlet w/ debris built up along base of fence. Sediment in culvert at inlet. Drops into riprap cascade on banks of Gore Creek at outlet.	Replace culvert with an oversized box, arch or pipe so that the outlet invert is at the elevation of Gore Creek at low flow. Reroute wildlife fencing so that it does not block culvert inlet.	Yes
Buffehr Creek†	JP095	174.0	Unknown	No	75" diameter corrugated metal pipe. Culvert skew and concrete apron at inlet; apron at outlet, cascades into rocky, stabilized channel. Inadequate.	Improve transition into culvert by creating a step-pool system through culvert, including a low-flow channel. Consider downstream improvements such as rock weirs.	Yes
Red Sandstone Creek†	JP094	175.0	Yes	No	83" diameter corrugated metal pipe. Inlet and outlet skewed relative to stream channel. Drops on to concrete apron at inlet. Cascade at outlet into deep pool.	Add rocky step-pool system through culvert and at inlet to control high water velocities and provide resting areas inside the culvert. Include a low-flow channel in the retrofit design. Ultimately, install a new, larger culvert (e.g., oversized open bottomed pipe) more consistent with the natural stream channel slope and alignment. Restore natural stream channel and maintain natural substrate through the new culvert.	Yes

STREAM NAME	LOC #	MP	TARGET SPECIES*	INTEN-TIONAL BARRIER	SITE DISCUSSION	CONNECTIVITY RECOMMENDATIONS	EEO**
Middle Creek†	JP093	175.8	No	No	~118" diameter corrugated metal pipe. Pipe skewed relative to road and stream channel (inlet and outlet). Flow cascades into inlet through trash rack. Small drop into pool at outlet. Outlet is slightly crushed in; sediment filled, reducing effective culvert height to 1/2 of inlet height. Indeterminate.	None – no target species present.	No
Spraddle Creek†	JP140	176.0	Yes	No	Concrete water slide into grated pipe culvert, then drops into abyss. Thick willow riparian channel upstream. Culvert runs under Spraddle Creek Road, exit ramp, interstate and Town of Vail on south side. Outlet unknown.	To restore connectivity at this location, culvert must be replaced with large 3-sided box, arch, open-bottomed pipe or embedded pipe culvert. Minimize culvert length (several shorter culverts as opposed to one long one); implement upstream and downstream grade-control measures and identify an appropriate culvert slope to remove drop and mimic channel conditions through the culvert to improve passage.	No

STREAM NAME	LOC #	MP	TARGET SPECIES*	INTEN-TIONAL BARRIER	SITE DISCUSSION	CONNECTIVITY RECOMMENDATIONS	EEO**
Booth Creek†	JP092	179.0	Yes	Yes, upstream barrier	Oblong (122x79") corrugated pipe at inlet; About 10' into culvert, pipe slopes steeply down. Pipe size much smaller at outlet. Small drop into pool at outlet. Culvert skewed relative to stream channel and road. Long culvert under I-70 & frontage road.	Coordinate with CDOW to determine if connectivity desirable between the Eagle River and the lower portions of Booth Creek (to upstream barrier). Install a new, larger culvert (e.g., oversized open bottomed pipe) more consistent with the natural stream channel slope and alignment. Design culvert to be as short as possible and, ideally, install two separate culverts under the interstate and the frontage road. Build natural substrate through the new culver and construct a series of navigable pools & steps through the culvert; include a low-flow channel to maintain sufficient water depth through the culvert year-round. Daylight a long culvert as needed.	No
Pitkin Creek†	JP141	180.0	Yes	Yes	Pipe culvert. Sloped inlet with wing wall and headwall. Inlet-to-channel width ratio 1:2. 3.3' drop at outlet into 5x4m pool.	CDOW maintains intentional barriers to protect upstream conservation population. Coordinate with CDOW to determine if connectivity for other aquatic organisms is desirable at this road crossing location.	No

STREAM NAME	LOC #	MP	TARGET SPECIES*	INTEN-TIONAL BARRIER	SITE DISCUSSION	CONNECTIVITY RECOMMENDATIONS	EEO**
Bighorn Creek†	JP090	180.6	Unknown	No	63" diameter corrugated metal pipe. Skewed at inlet and relative to roadway. Flow drops ~3' onto concrete apron at inlet. Cascade onto riprap and into pool at outlet. Second culvert under local road downstream. Inadequate.	Remove barrier at inlet and allow substrate to fill the bottom of the culvert and restore natural grade into inlet. Ultimately, replace culvert with large 3-sided box, arch, open-bottomed pipe or embedded pipe culvert. Maintain a grade through the culvert that is consistent with upstream and downstream conditions. Construct features to mimic channel conditions through the culvert and improve fish passage. Coordinate with local municipality to ensure continued connectivity through downstream culvert.	Yes
Gore Creek†	JP063	182.0	Yes	No	Large divided span bridge.	Maintain connectivity at site including natural stream channel and stream banks.	No
Black Gore Creek†	JP062	182.5	Yes	No	Divided bridge over steep, narrow drainage.	Maintain connectivity at site including natural stream channel and stream banks.	No
Unknown Tributary to Black Gore Creek†	JP135	183.0	Yes	No	3.3' diameter culvert piped under bridge structure (JP061). Culvert is heavily skewed relative to road. Outlet drops onto metal apron and 2.5m pool. Metal wing wall at outlet broken and leaning across outlet. Inlet inaccessible, surrounded by willows.	Remove culvert and restore stream channel under bridge structure at JP061.	Yes

STREAM NAME	LOC #	MP	TARGET SPECIES*	INTEN-TIONAL BARRIER	SITE DISCUSSION	CONNECTIVITY RECOMMENDATIONS	EEO**
Unknown Tributary to Black Gore Creek†	JP134	183.3	Yes	No	4.5' pipe; step-pool system. Channel somewhat wider than culvert.	Install shallow weir plates through culvert to reduce water velocities and add roughness. Ultimately, install a new, larger culvert (e.g., oversized open bottomed pipe) to encompass the channel's bankfull width. Construct features that mimic channel conditions through the culvert and improve fish passage.	Yes
Timber Creek†	JP096	184.0	Yes	No	Large divided span bridge over natural riparian channel.	Maintain connectivity at site including natural stream channel and stream banks.	No
Black Gore Creek†	JP060	184.5	Yes	No	Large divided span bridge over natural riparian channel.	Maintain connectivity at site including natural stream channel and stream banks.	No
Miller Creek†	JP059	185.0	Yes	Yes, upstream (natural)	Large divided span bridge over natural riparian channel. Natural upstream barrier maintained to protect conservation population.	Maintain connectivity at site including natural stream channel and stream banks.	No
Polk Creek†	JP058	185.5	Yes	Yes, upstream	Large divided span bridge over natural riparian channel.	CDOW maintains intentional barriers upstream to protect upstream fish population. Coordinate with CDOW to determine if connectivity for other aquatic organisms is desirable at this road crossing location.	No


Perennial Inventory Locations in Eagle River Watersheds
Colorado River Headwaters
Blue River
Eagle River
Arkansas River Headwaters
Dotsero
Gypsum
Eagle
Edwards
Avon
Vail
135
140
145
150
155
160
165
170
175
180
185
190
JP051: Divided Bridge
JP136: Corrugated Metal Pipe
JP116: Divided Bridge
JP114: Divided Bridge
JP113: Corrugated Metal Pipe
JP147: Corrugated Metal Pipe
JP110: Corrugated Metal Pipe
JP138: Corrugated Metal Pipe
JP101: Pipe Culvert
JP049: Divided Bridge
JP047: Bridge
JP046: Bridge
JP093: Corrugated Metal Pipe
JP141: Corrugated Metal Pipe
JP092: Corrugated Metal Pipe
JP141: Corrugated Metal Pipe
JP090: Corrugated Metal Pipe
JP063: Divided Bridge
JP062: Divided Bridge
JP094: Corrugated Metal Pipe
JP095: Corrugated Metal Pipe
JP139: Corrugated Metal Pipe
JP135: Corrugated Metal Pipe
JP134: Corrugated Metal Pipe
JP096: Divided Bridge
JP060: Divided Bridge
JP059: Divided Bridge
JP058: Divided Bridge
Legend
Perennial Inventory Locations
Target Species Presence*
Likely Absent
Likely Present
Presence Unknown
Intentional Barrier
Eagle River Watershed
Surrounding Watersheds
Lakes
Major Cities
Mile Points
N
ROCKY MOUNTAIN WILD
* Species presence confirmed nearby. Does not indicate structure's functionality for aquatic passage. Some locations need additional consideration for non-natives and disease.
0 1 2 4 Miles
Source: CDOT, CDOW, ESRI, NDIS, RMW, USGS
Map created by Rocky Mountain Wild August 14, 2011

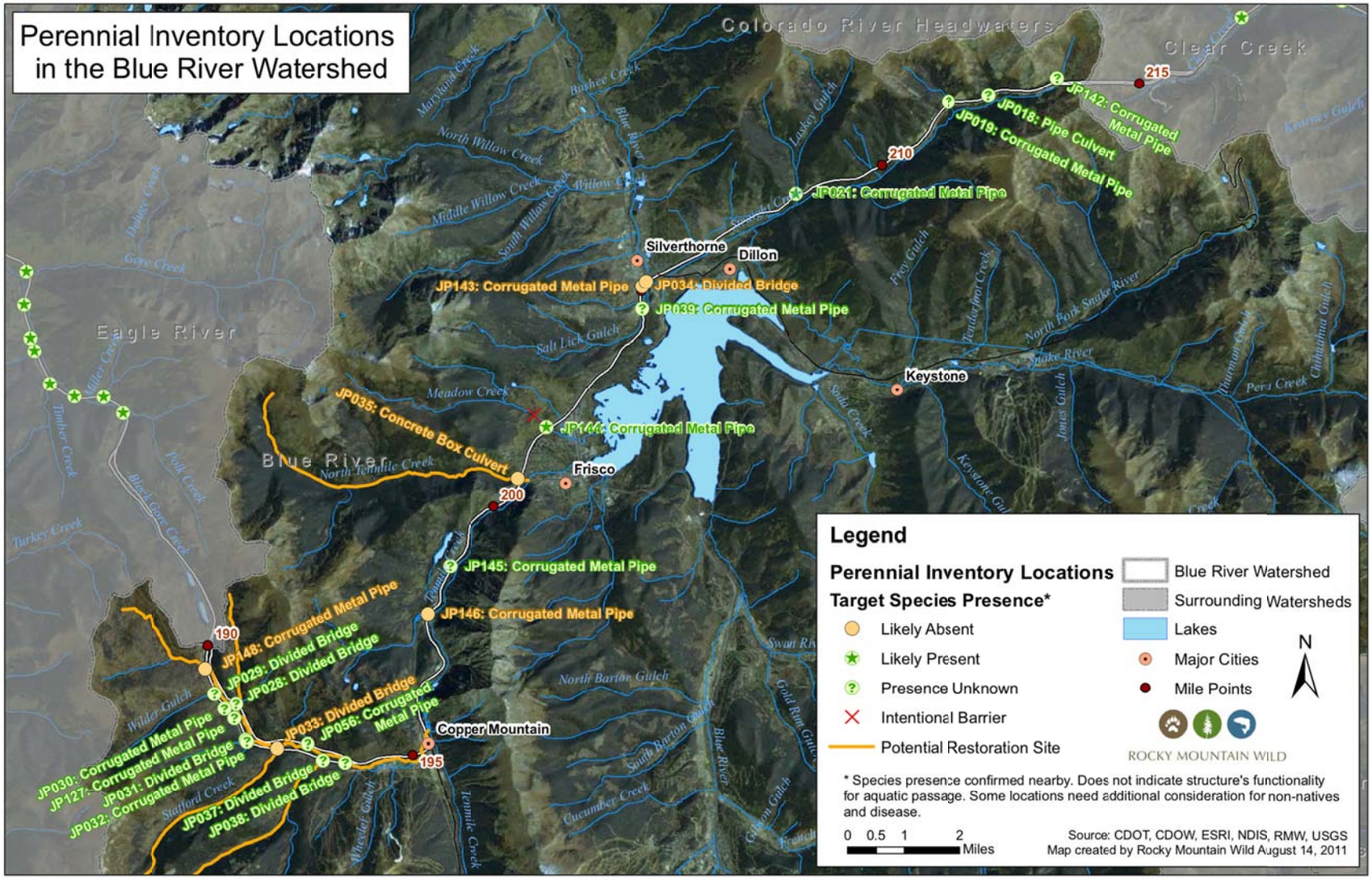
STREAM NAME	LOC #	MP	TARGET SPECIES*	INTEN-TIONAL BARRIER	SITE DISCUSSION	CONNECTIVITY RECOMMENDATIONS	EEO**
West Tenmile Creek	JP148	190.3 (EB)	No	No	94" embedded pipe. Stream alignment forced through culvert causing pooling and erosion above inlet and pushing wing wall in. Structure crosses under hwy and bike path.	Implement upstream bank stabilization measures to reduce bank erosion and alleviate wing wall failure. When structure is replaced, widen structure or install a curved culvert to minimize forced changes in flow direction that undermine structure integrity.	No
Wilder Gulch	JP029	190.8 (EB)	Unknown	No	Large divided span bridge over natural riparian channel.	Maintain connectivity at site including natural stream channel and stream banks.	No
Unknown Tributary West Tenmile Creek	JP030	191.2 (EB)	Unknown	No	40" diameter corrugated metal pipe. Inlet and outlet metal aprons and wing walls. Inlet wing wall is crushed in.	Repair crushed flared end section at inlet. Install weir plates and add gravel substrate inside culvert; construct step/pool features at outlet.	Yes
Corral Creek	JP028	191.3 (WB)	Unknown	No, but potential location for a barrier	Large divided span bridge over natural riparian channel.	Maintain connectivity at site including natural stream channel and stream banks.	No
Unknown Tributary West Tenmile Creek	JP127	191.5 (EB)	Unknown	No	49" diameter corrugated metal pipe under eastbound lanes only (feeds into W. Tenmile Creek in median)	Construct drop/pool structures.	Yes
Smith Gulch	JP031	192.0 (EB)	Unknown	No	Large divided span bridge over natural riparian channel.	Maintain connectivity at site including natural stream channel and stream banks.	No

STREAM NAME	LOC #	MP	TARGET SPECIES*	INTEN-TIONAL BARRIER	SITE DISCUSSION	CONNECTIVITY RECOMMENDATIONS	EEO**
Unknown Tributary to West Tenmile Creek	JP032	192.0 (EB)	Unknown	No	36" diameter corrugated pipe. Inlet & outlet aprons & wing walls. Some pooling at inlet. Creek flows into West Tenmile Creek in median. Indeterminate.	Install weir plates at inlet and through structure to control flow velocities and retain gravel substrate.	Yes
Stafford Creek	JP033	192.5 (EB)	No (historical trout pop.)	No, but potential location for a barrier	Large divided span bridge over natural riparian channel. Stafford Creek is on record as having cutthroat trout, but there are no recent data.	Maintain connectivity at site including natural stream channel and stream banks. This tributary should be highlighted as a potential place to introduce a barrier if identified as a need after surveys are conducted.	No
Unknown Tributary to West Tenmile Creek	JP056	193.0 (WB)	Unknown	No	40" diameter corrugated metal flat-bottomed pipe. Steep long culvert, slope flattens at outlet. Culvert heavily skewed relative to stream channel at inlet. Shallow flow disperses over apron at inlet during low-flow periods. Sediment buildup at outlet.	Narrow channel at inlet to create deeper pool and increase flow depth over inlet apron. Coordinate terrestrial and aquatic connectivity needs and, ultimately, remove fill and construct a large bridge or arch underpass. Restore natural hydrologic flow regime under highway.	Yes
Guller Creek	JP037	193.3 (EB)	Unknown (historic trout pop.)	No, but potential location for a barrier	Large divided span bridge. Guller Creek is on record as having cutthroat trout, but there are no recent data.	Maintain connectivity at site including natural stream channel and stream banks. This tributary should be highlighted as a potential place to introduce a barrier if identified as a need after surveys are conducted.	No
West Tenmile Creek	JP038	193.7 (EB)	Unknown	No, but potential location for a barrier	Large divided span bridge over natural riparian channel.	Maintain connectivity at site including natural stream channel and stream banks.	No

STREAM NAME	LOC #	MP	TARGET SPECIES*	INTEN-TIONAL BARRIER	SITE DISCUSSION	CONNECTIVITY RECOMMENDATIONS	EEO**
Officer's Gulch	JP146	198.0	No	No	60" pipe. Drop into inlet. Debris collection at trash rack across inlet causing water to pool. Upstream pedestrian bridge at lake outlet also has debris collection. Outlet has extensive wing walls and pooling (water flow eddies back into wing wall).	Lower invert of channel so that it is at the same elevation as the inlet of the pipe, thus creating a deeper pool. Redesign trash rack such that debris accumulates on the surface of the pool and water can flow through the rack from the pool and into the inlet without dropping. Maintain regularly to remove debris accumulation at trash rack.	No
Unknown Tributary to Tenmile Creek	JP145	199.0	Unknown	No	Two 32" culverts situated in a long concrete headwall. Culverts heavily skewed relative to stream channel and there is extensive pooling at inlet and outlet.	Replace undersized culverts with a single large culvert wide enough to encompass the stream and floodplain and natural stream alignment to remove forced changes in flow direction.	No
North Tenmile Creek	JP035	200.9	No	No, but potential location for a barrier	11x10' concrete box culvert. Drop over concrete apron into culvert with fish ladder (unknown effectiveness).	Coordinate with CDOW - if trout are reintroduced upstream an intentional barrier may be installed and connectivity may not be needed at this location. Redesign the fish ladder with longer pools spread out over a greater distance to improve resting areas.	No
Meadow Creek	JP144	201.9	Yes, upstream	Yes, upstream waterfall	40" culverts (separate culverts under EB and WB lanes with open, vegetated median); concrete headwall and wing walls. Culverts undersized for heavy flows.	Coordinate with CDOW on upstream trout conservation.	No

STREAM NAME	LOC #	MP	TARGET SPECIES*	INTEN-TIONAL BARRIER	SITE DISCUSSION	CONNECTIVITY RECOMMENDATIONS	EEO**
Salt Lick Gulch	JP039	204.5	Unknown	No	45" corrugated metal pipe. Smooth plastic at inlet, corrugated metal at outlet. 15" drop onto riprap at outlet and into pool. Stream crosses under I-70 again downstream at JP143.	Coordinate with CDOW to determine priority, given lack of connectivity downstream to Blue River at culvert under access road (note target species present in Blue River). Construct a series of drop/pools at the outlet to remove drop.	Yes
Salt Lick Gulch	JP143	205.0	No	No	60" pipe, 0.5 mile downstream from road-stream crossing at JP039. Extensive, deep pooling at inlet; metal culvert pulling away from concrete headwall at inlet. Culvert drops under highway, flattens out at outlet. Extensive pooling at outlet. Channel has been realigned between highway and Wildernest Rd at outlet, creating major skew. Creek then crosses secondary road (with concrete slide drop at inlet) before feeding into Blue River.	None – target species not present and lack of connectivity downstream to Blue River at culvert under access road.	No
Blue River	JP034	205.3	No	No	Divided bridge over river, frontage road, bike path and dirt access road. Continuous substrate and shallow banks through structure. Adjacent parallel bridge for local road has low clearance and no shallow banks under bridge.	Coordinate with local municipality on infrastructure planning. Maintain connectivity at site.	No

STREAM NAME	LOC #	MP	TARGET SPECIES*	INTEN-TIONAL BARRIER	SITE DISCUSSION	CONNECTIVITY RECOMMENDATIONS	EEO**
Laskey Gulch	JP021	208.4	Yes	No	60" corrugated metal pipe at base of large fill slope, 20" drop into large pool at outlet. Outlet pool then drops 40" at headgate into stream channel	Determine if in-stream barrier needed. Replace culvert with large span bridge. Integrate terrestrial and aquatic connectivity needs. Restore natural hydrologic flow regime under highway.	No
Hamilton Gulch	JP019	211.7	Unknown	No	43" corrugated metal pipe - runs under runaway truck ramp and interstate. Extremely steep grade. Some debris present at inlet (trees); slope flattens out to a more natural grade >50m from outlet. 60m from outlet are twin smaller culverts underneath a forest road.	Replace culvert with bridge structure (integrate with terrestrial recommendation) and restore step/pool system.	No
Unknown Trib Straight Creek	JP018	212.4	Unknown	No	43" corrugated plastic pipe. Steep culvert slope. Heavy, fast flows at time of inventory.	Integrate terrestrial and aquatic connectivity needs. Restore natural hydrologic flow regime under highway.	No
Straight Creek	JP142	213.5	Unknown	No	4' diameter pipe culvert. Headwall, pooling at inlet. Inlet-channel width ratio 1:3. Stream drops steeply into inlet and crosses under CDOT buildings, I-70 and large paved area at west entrance to Tunnels.	None.	No
Dry Gulch	JP086	217.4	Yes, upstream	Yes	51" corrugated plastic pipe with steep concrete apron and wing walls at inlet. Projects into pool at outlet. Dry Gulch has a very high gradient stretch just north of I-70 continuing north up to a valley bench where the valley flattens out and where the greenbacks are located. This high gradient section needs to be maintained to protect the pure trout.	Maintain grade barrier to protect upstream trout conservation population.	No


Perennial Inventory Locations in the Blue River Watershed
Colorado River Headwaters
Clear Creek
Eagle River
Blue River
215
210
200
195
190
JP142: Corrugated Metal Pipe
JP018: Pipe Culvert
JP019: Corrugated Metal Pipe
JP021: Corrugated Metal Pipe
Silverthorne
Dillon
JP143: Corrugated Metal Pipe
JP034: Divided Bridge
JP039: Corrugated Metal Pipe
Keystone
JP035: Concrete Box Culvert
JP144: Corrugated Metal Pipe
Frisco
JP145: Corrugated Metal Pipe
JP146: Corrugated Metal Pipe
JP148: Corrugated Metal Pipe
JP029: Divided Bridge
JP028: Divided Bridge
JP033: Divided Bridge
JP056: Corrugated Metal Pipe
Copper Mountain
JP030: Corrugated Metal Pipe
JP127: Corrugated Metal Pipe
JP031: Divided Bridge
JP032: Corrugated Metal Pipe
JP037: Divided Bridge
JP038: Divided Bridge
Legend
Perennial Inventory Locations
Target Species Presence*
Likely Absent
Likely Present
Presence Unknown
Intentional Barrier
Potential Restoration Site
Blue River Watershed
Surrounding Watersheds
Lakes
Major Cities
Mile Points
N
ROCKY MOUNTAIN WILD
* Species presence confirmed nearby. Does not indicate structure's functionality for aquatic passage. Some locations need additional consideration for non-natives and disease.
0 0.5 1 2
Miles
Source: CDOT, CDOW, ESRI, NDIS, RMW, USGS
Map created by Rocky Mountain Wild August 14, 2011

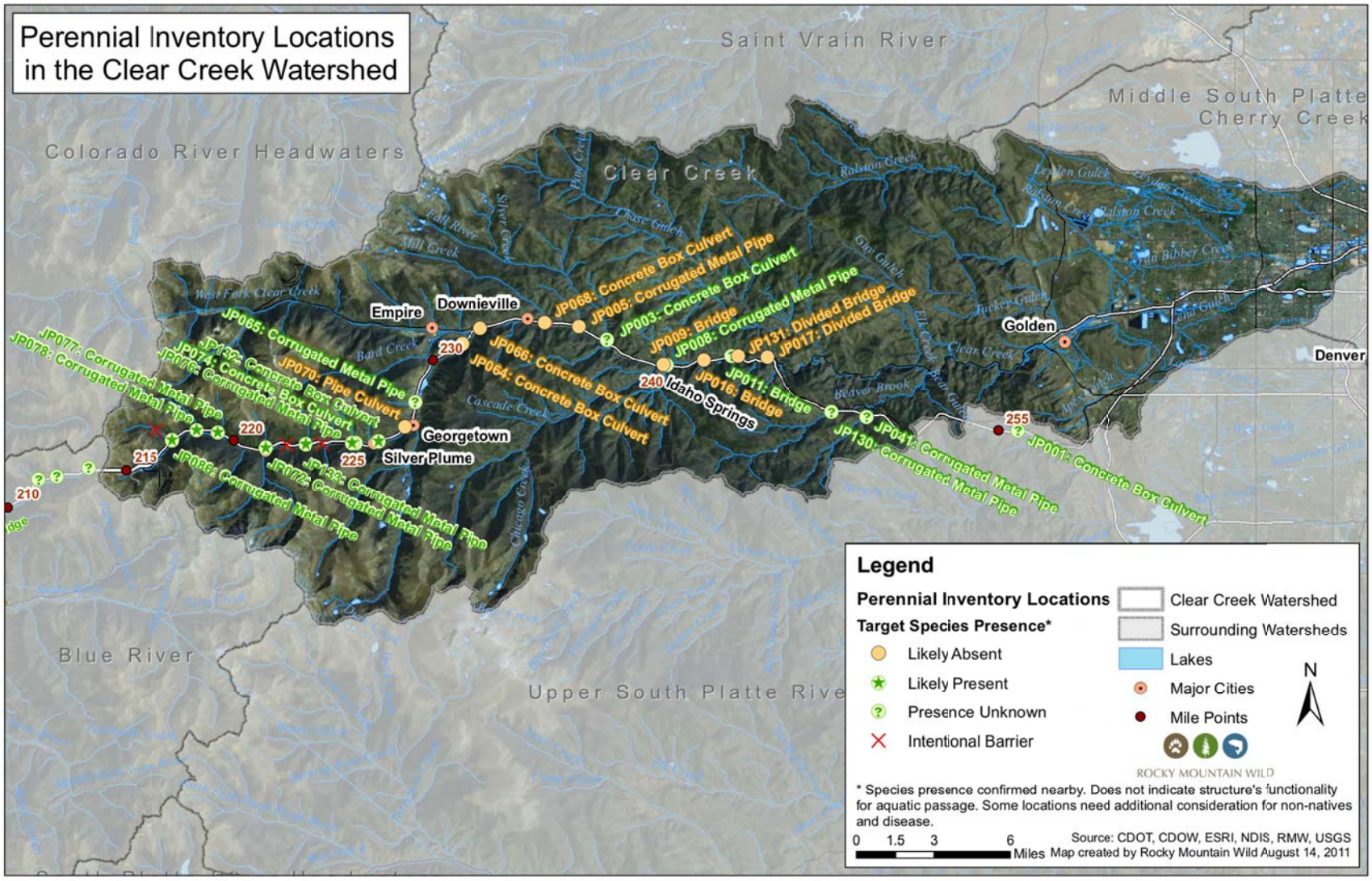
STREAM NAME	LOC #	MP	TARGET SPECIES*	INTEN-TIONAL BARRIER	SITE DISCUSSION	CONNECTIVITY RECOMMENDATIONS	EEO**
Herman Gulch	JP078	218.5	Yes	No	70" corrugated metal pipe under exit ramp and traffic lanes. Trailhead access bridge immediately upstream. Flows over steep concrete apron into inlet.	At minimum, add weir plates on inlet apron to create drop-pool structure. May add weir plates through structure as well. Maintain step pools at outlet. Ultimately, replace with an oversized bottomless culvert and restore natural channel and banks.	Yes
Watrous Gulch	JP077	219.4	Yes	No	Metal pipe under I-70 and eastbound and westbound chain stations. Steep, incised channel upstream, pools as grade flattens in front of culvert at inlet (embedded). 3' drop into small pool at outlet.	Replace with an oversized bottomless culvert that mimics the natural channel grade to eliminate drops and pooling.	No
Unk Trib Clear Creek	JP072	221.4	Yes	Yes, upstream waterfall	40" corrugated metal pipe. Second culvert upstream at top of waterfall under frontage road. Feeds immediately into Clear Creek at outlet.	None. Very high gradient tributary does not provide trout habitat. Downstream barriers on Clear Creek.	No
Thompson Gulch	JP133	222.8	Yes	No	40" corrugated metal pipe. Steep, rocky drop into concrete-reinforced inlet. Wing wall, pooling at inlet. Outlet inaccessible.	None. Very high gradient tributary does not provide trout habitat. Upstream and downstream intentional barriers on Clear Creek.	No
Brown Gulch	JP076	224.9	Yes	No	60" metal pipe - inlet is slot drain. Steep drainage upstream. Cascade onto riprap at outlet feeds directly into Clear Creek.	None. Very high gradient tributary does not provide trout habitat. Upstream and downstream intentional barriers on Clear Creek.	No

STREAM NAME	LOC #	MP	TARGET SPECIES*	INTEN-TIONAL BARRIER	SITE DISCUSSION	CONNECTIVITY RECOMMENDATIONS	EEO**
Clear Creek	JP074	225.0	Unknown	No	16x8.5' angled concrete box culvert. Riprap banks upstream and downstream. Small box culvert under frontage road about 300' from inlet.	Maintain connectivity at site. Ultimately, replace with wider culvert and restore natural channel alignment. Preferred alternative is to integrate terrestrial and aquatic connectivity needs by replacing culvert and bridge at JP075 with a longer bridge spanning the entire drainage and roadway.	No
Clear Creek	JP132	225.9	Yes	No	13x6.5' concrete box culvert. Heavily skewed from channel, 1:2 inlet-channel width ratio. Water velocities through structure may present a barrier to fish passage at high water levels.	Reduce water velocity through structure. Restore a more natural channel alignment and replace with a new, larger structure that can accommodate the bankful channel width.	No
Unk Trib Clear Creek	JP070	227.0	No	Yes, upstream waterfall	35" smooth metal pipe at inlet, corrugated metal at outlet. Steep culvert grade. Feeds onto concrete channel at outlet.	None. Very high gradient tributary does not provide trout habitat.	No
Silver Gulch	JP065	228.2	Unknown	No	45" corrugated metal pipe. Inlet heavily skewed relative to channel. Cascade over riparp into inlet. Sediment buildup at outlet. Substrate may provide spawning gravel for brown trout inhabiting adjacent areas of Clear Creek.	Remove drop at frontage road by cutting back the culvert and creating a step/pool system. Ultimately, replace and lower the culvert.	Yes

STREAM NAME	LOC #	MP	TARGET SPECIES*	INTEN-TIONAL BARRIER	SITE DISCUSSION	CONNECTIVITY RECOMMENDATIONS	EEO**
Clear Creek	JP064	231.2	No	No	30x9.5' double box culvert. Culvert is skewed relative to channel and road. Forced changes in flow direction cause backwatering and pooling. Riprap banks at inlet and outlet. Flow drops into culvert at inlet	None - target species are not known to be present.	No
Clear Creek	JP066	232.3	No	No	26x8.5' double box culvert under traffic lanes and on-ramp. Entire segment of Clear Creek has been realigned to accommodate the interstate. Slopes reinforced with riprap throughout segment.	Integrate terrestrial and aquatic connectivity needs. Preferred alternative is to construct an extensive span bridge and raised interchange through this section to accommodate terrestrial and aquatic passage between the two drainages and restore the flow of Clear Creek and its riparian banks to a more natural condition.	No
Mill Creek	JP068	234.8	No	No	10x8.5' concrete box culvert. Long, steep apron into inlet. Bridge over frontage road immediately upstream. Concrete walls line the banks of this section of the creek. Natural substrate into inlet. Substrate continuity through 3/4 of structure; last 1/4 is concrete. The culvert does not appear to currently present a major barrier to fish passage.	Connectivity is not a priority at this location because no target species are known to be present in this tributary. Ultimately, replace concrete pan at frontage road bridge with low-flow cobble channel to dissipate energy and allow fish and other aquatic organisms to navigate upstream. Add boulders to outlet of box culvert to dissipate energy and add habitat. Replace long apron at inlet with a series of low-flow step pools and build up culvert outlet to remove drop.	No
Spring Gulch	JP005	236.2	No	No	67" partially embedded corrugated metal pipe. Sediment buildup and dumping at inlet. Slope drops steeply at outlet into Clear Creek.	None.	No

STREAM NAME	LOC #	MP	TARGET SPECIES*	INTEN-TIONAL BARRIER	SITE DISCUSSION	CONNECTIVITY RECOMMENDATIONS	EEO**
Fall River	JP003	237.7	Unknown	No	10x10' box culvert. Small drop at culvert inlet, some backwatering at inlet and outlet.	Maintain connectivity at site.	No
Clear Creek	JP009	239.9	No	No	Bridge, riprap bank armoring. Resembles natural channel.	Maintain grade control in Clear Creek. Maintain connectivity at site.	No
Soda Creek	JP008	240.1	Unknown	No	102x118" corrugated metal pipe. Rocks placed inside culvert. Creek goes under lumber yard at outlet (smaller culvert, but nicely entrenched), channelized until it reaches Clear Creek.	None. Coordinate with local municipality, lumberyard and other downstream property owners for future reconstruction.	No
Clear Creek	JP016	241.8	No	No	Bridge - resembles natural channel	Maintain grade control in Clear Creek. Maintain connectivity at site.	No
Clear Creek	JP011	242.9	Unknown	No	Bridge - resembles natural channel. Downstream bridges.	Maintain grade control in Clear Creek. Maintain connectivity at site. When bridge replaced, restore shallow banks under bridge.	No
Clear Creek	JP131	243.0	No	No	Divided bridge; additional bridges to north for exit ramp and local road. Very little natural bank areas.	Maintain grade control in Clear Creek. Maintain connectivity at site. Coordinate with local road department to ensure ongoing connectivity through all structures. When bridge replaced, integrate terrestrial and aquatic connectivity needs, including the restoration of riparian banks through the structure.	No
Clear Creek	JP017	244.2	No	No	Divided span bridge with concrete support walls.	Maintain grade control in Clear Creek. When bridge replaced, integrate terrestrial and aquatic connectivity needs, including the restoration of riparian banks through the structure.	No

STREAM NAME	LOC #	MP	TARGET SPECIES*	INTEN-TIONAL BARRIER	SITE DISCUSSION	CONNECTIVITY RECOMMENDATIONS	EEO**
Beaver Brook	JP130	247.5	Unknown	No	55" pipe culvert. More water flow at outlet than at inlet. Culvert must have bend under highway and have other sources flowing into it. Extensive woody debris in front of inlet. Inhabited by small-bodied fish. Outlet apron creates a barrier to fish passage.	Integrate terrestrial and aquatic connectivity needs. Replace with bridge or arch and restore banks and riparian habitat. Restore a more natural stream alignment (no sharp bends).	No
Soda Creek	JP041	249.0	Unknown	No	45" corrugated metal pipe. Some sediment deposition in culvert and fill eroding above culvert at inlet. 28" drop at outlet into pool. Culvert is a major barrier for the small-bodied fish that inhabit this stream.	At minimum, replace with a bottomless culvert and construct step/pool structures to eliminate drops. Preferred alternative is to integrate terrestrial and aquatic connectivity needs. Replace with a bridge structure and restore natural stream channel and riparian banks.	Yes
Mt Vernon Creek	JP001	256.0	Unknown	No	7.9x6.2' box culvert at base of large fill slope. Steep drop into culvert at inlet. Flow through culvert is wider and shallower than upstream channel. Outlet partially buried with sediment and debris. Large pool at outlet with weir and water diversion structure.	Reduce the width to depth ratio and install habitat enhancement measures, such as adding weirs at inlet and through culvert to provide velocity control and a low-flow channel through the culvert. Identify water rights holder and determine if water diversion in use; if possible, remove water diversion at outlet.	Yes


Perennial Inventory Locations in the Clear Creek Watershed
Saint Vrain River
Middle South Platte Cherry Creek
Colorado River Headwaters
Clear Creek
Blue River
Upper South Platte River
Empire
Downieville
Georgetown
Silver Plume
Idaho Springs
Golden
Denver
JP068: Concrete Box Culvert
JP005: Corrugated Metal Pipe
JP003: Concrete Box Culvert
JP009: Bridge
JP008: Corrugated Metal Pipe
JP131: Divided Bridge
JP017: Divided Bridge
JP065: Corrugated Metal Pipe
JP066: Concrete Box Culvert
JP064: Concrete Box Culvert
JP070: Pipe Culvert
JP132: Concrete Box Culvert
JP074: Concrete Box Culvert
JP076: Corrugated Metal Pipe
JP077: Corrugated Metal Pipe
JP078: Corrugated Metal Pipe
JP086: Corrugated Metal Pipe
JP072: Corrugated Metal Pipe
JP133: Corrugated Metal Pipe
JP011: Bridge
JP016: Bridge
JP041: Corrugated Metal Pipe
JP130: Corrugated Metal Pipe
JP001: Concrete Box Culvert
210
215
220
225
230
240
255
Legend
Perennial Inventory Locations
Target Species Presence*
Likely Absent
Likely Present
Presence Unknown
Intentional Barrier
Clear Creek Watershed
Surrounding Watersheds
Lakes
Major Cities
Mile Points
N
ROCKY MOUNTAIN WILD
* Species presence confirmed nearby. Does not indicate structure's functionality for aquatic passage. Some locations need additional consideration for non-natives and disease.
0 1.5 3 6 Miles
Source: CDOT, CDOW, ESRI, NDIS, RMW, USGS
Map created by Rocky Mountain Wild August 14, 2011